1.0 Project Background

The California Department of Forestry and Fire Protection (CDF) completed a Draft California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration (IS/MND) for the Artesa Fairfax Ranch Vineyard Conversion Project (Project) in 2004. Comment letters received on the environmental document by the CDF questioned the issuance of a Negative Declaration on several grounds, including the potential for irreversible and irretrievable loss of cold water habitat in downstream areas where the Northern California Evolutionarily Significant Unit (ESU) of steelhead trout *(Oncorhynchus mykiss irideus)* occur. Steelhead trout was listed as "threatened" under the federal Endangered Species Act (ESA) on August 7, 2000 by the National Marine Fisheries Service (NMFS).

According to the Regional Water Quality Control Board (RWQCB) steelhead trout are found in the lower reaches of Patchett Creek commencing about 4,800 feet downstream of the project area. Steelhead trout are not able to migrate above this point as there is an impassable area to further upstream reaches (as cited in Erickson Engineering Inc., 2004).

Both the federal and state listed coho salmon (*O. kisutch)* and tidewater goby *(Eucyclogius newberryi)* may be found in the Gualala watershed. The California Department of Fish and Game (CDFG) coho salmon assessment states that coho are unlikely to be present within the project vicinity (CDFG, 2002). Habitat conditions for the presence of tidewater goby, including coastal lagoons, are not present.

Inland Ecosystems, Inc. (IE) was retained by Raney Planning & Management, Inc. (RPM) to review project hydrological, erosion control, and environmental documentation with specific reference to identifying potential impacts to listed salmonids downstream of the project site. This assessment addresses steelhead trout in lower Patchett Creek as the primary cold water fish species of concern occurring downstream from the project site.

2.0 Site Location

The project site is located on a broad ridge crest, approximately 0.75 miles southeast of Annapolis in northern Sonoma County within the Gualala River watershed. The Gualala River watershed is approximately 32 miles long in a north/south direction, with an average width of 14 miles located along the coast of southern Mendocino and northern Sonoma counties. Elevations vary from sea level to 2,602 feet at Gube Mountain and terrain is most mountainous in the northern and eastern parts of the watershed (North Coast Watershed Assessment Project (NCWAP, 2002). The river enters the Pacific Ocean near the town of Gualala, 114 miles north of San Francisco.

The area around the project site is a mix of forestland, existing vineyards and rural residential development (EEI) 2004). The proposed vineyard is on a property that has been logged, pastured, and farmed in the past. The ground is generally undulating at 5 - 20% with alternating minor ridges and swales at 5% - 30% slope (EEI, 2004).

The total watershed area of Patchett Creek is 1,125 acres, or 1.76 mi^2, and approximately 0.4% of the entire Gualala basin. The watershed averages about 6,000 feet wide over a length of 10,800 feet (EEI, 2004). Patchett Creek flows through the project site and joins the Wheatfield Fork Gualala River approximately 1.5 miles downstream. The upper section of Patchett Creek, above the natural barrier, is a Class III watercourse (RWQCB Pre Harvest Inspection report as cited in EEI, 2004).

3.0 Fish Species Composition in the Gualala River Basin

Fish species present in the Gualala River basin include steelhead trout, coho salmon, pacific lamprey *(Entosphenus tridentatus)*, threespine stickleback *(Gasterosteus aculeatus)*, Gualala roach (*Lavinia symmetricus parvipinnis)*, coastrange sculpin *(Cottus aleuticus)*, prickly sculpin *(Cottus asper)*, and riffle sculpin (NCWAP, 2002). Further downstream towards the coastal habitats of the river the federally endangered tidewater goby may be found.

The RWQCB (2002) Technical Support Document (TSD) for the Gualala River Watershed Water Quality Attainment Action Plan for Sediment concluded that "available information indicates that the steelhead trout populations show a pattern of decline". The coho salmon population has all but vanished throughout the watershed.

In 1991 Entrix, Inc. conducted a fisheries survey and habitat assessment from the vicinity of the Wheatfield Fork and South Fork Gualala River confluence downstream to the confluence of the South Fork and North Fork Gualala River (Entrix Inc., 1991). The reach of river between the confluence of the Wheatfield Fork and South Fork Gualala River downstream to the Sea Ranch Wells was delineated as Segment 1 and covered approximately 0.7 river miles.

Seven species of fish were collected during surveys including steelhead trout, coastrange sculpin, prickly sculpin, Pacific lamprey, threespine stickleback, green sunfish (*Lepomis cyanellus*), and Gualala roach. The three most abundant species collected were Gualala roach, threespine stickleback, and juvenile steelhead trout (Table 1). No coho salmon were collected during the study.

Table 1. Total number of the three most abundant fish species collected between the confluence of the Wheatfield Fork and South Fork Gualala River downstream to the Sea Ranch Wells in July and October 1991 by Entrix, Inc.

Species	**Total number collected**
Gualala roach	4,569
Threespine stickleback	2,039
Steelhead trout	1,072

4.0 Select Habitat Requirements for Steelhead Trout

Steelhead trout spawn in freshwater rivers and creeks. Juvenile steelhead trout can remain in rivers and creeks from 1 to 3 years before migrating to the ocean to mature into adults. Steelhead trout return to the rivers and creeks where they hatched to spawn. This cycle from spawning area to the ocean and back defines steelhead trout as "anadromous".

Important habitat requirements necessary for steelhead trout include cool water temperatures, high dissolved oxygen content, adequate forage base, gravel and cobble substrate to provide suitable spawning and hatching substrate, undercut banks, tree roots, riffles and pools (Moyle, 2002).

5.0 Factors Leading to the Decrease in the Distribution and Abundance of Steelhead

The historic (pre-1900) and current distribution of steelhead trout in California is presented in Figure 1. The Northern California ESU includes steelhead trout in coastal river basins from Redwood Creek south to the Gualala River. The 1996 population estimate for this ESU was approximately 25,000 individuals.

Within the Gualala watershed past land use activities including streamside road construction, stream clearance projects (e.g., removal of large woody debris), timber operations and ranchland conversions have contributed to reduced instream shelter and baseflow, and increase in fine sediments (NCWAP, 2002). Heavy rainfall and high river flows during mid-20th-century storm events activated many road debris slides and washed out large sections of streamside roads introducing considerable quantities of sediment into the basin waterways (NCWAP, 2002). These factors have contributed to the steelhead trout decline in California.

The RWQCB beneficial uses impaired by excessive sediment in the Gualala River are primarily those associated with the Gualala River's salmonid fishery, specifically: Commercial or Sport Fishing (COMM), Cold Freshwater Habitat (COLD), Estuarine Habitat (EST), Migration of Aquatic Organisms (MIGR), and Spawning, Reproduction, and/or Early Development (SPWN).

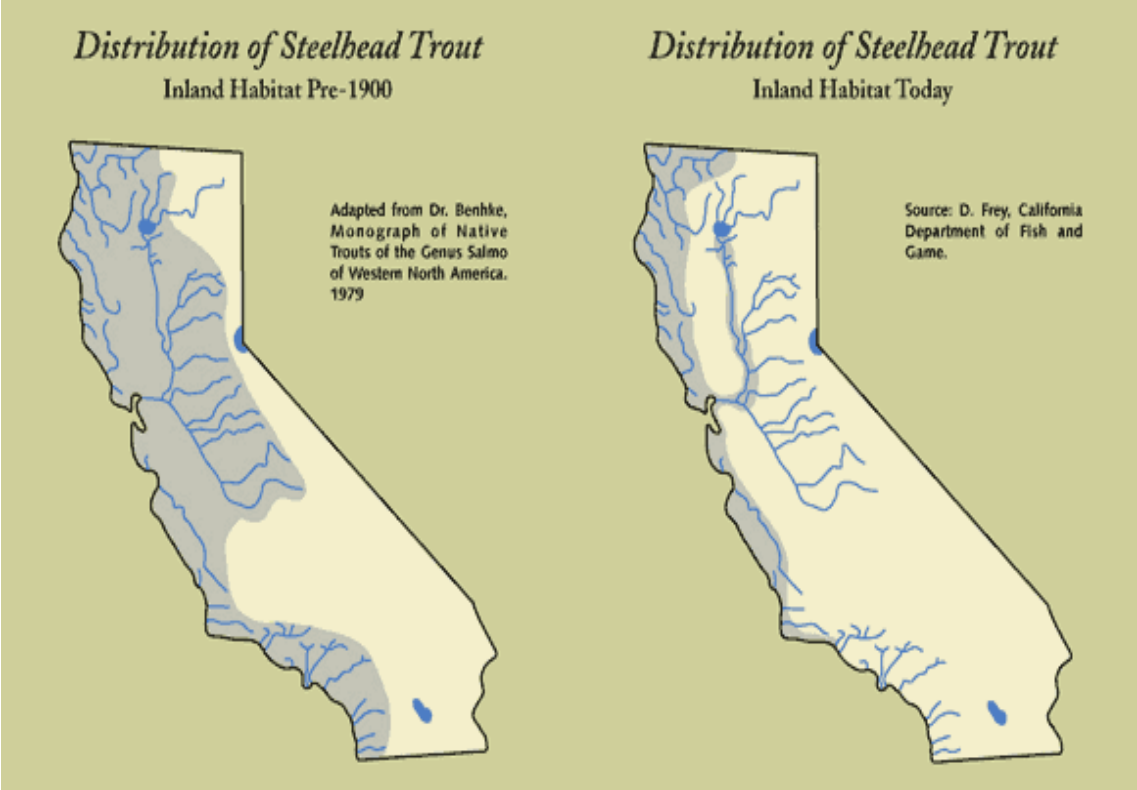

Figure 1. California Steelhead Trout Population Distribution pre-1900 and pre-2000. Map taken from the NCWAP web page.

6.0 Thresholds of Significance

The significance criteria described below were developed for use in assessing potential impacts to cold water steelhead trout resulting from the proposed project. Application of these significance criteria to findings determined from this review was used to make impact significance determinations. Effects of the proposed project on steelhead trout were considered significant if the project would:

- Cause changes to lower Patchett Creek and/or Wheatfield Fork Gualala River water quality and quantity of sufficient magnitude and frequency that could cause a reduction in species abundance or long-term population levels in these water bodies.

- Cause sufficient degradation in aquatic habitat in lower Patchett Creek and/or Wheatfield Fork Gualala River that would substantially cause interference with the success of upstream adult immigration or downstream juvenile emigration, thereby resulting in adverse population-level effects.

7.0 Potential for project-specific impacts to steelhead trout inhabiting Patchett Creek and the Gualala River Basin

7.1 Potential Impact: *Potential changes to Patchett Creek hydrology and summer base flows.*

Steelhead trout spawning and rearing success are dependent upon adequate flow during these important life stages. Any substantial change in flow in Patchett Creek would be a significant impact.

The California Department of Fish and Game (DFG) and the National Marine Fisheries Service (NMFS) jointly developed draft guidelines for diverting water from central coastal watersheds in California. The guidelines, issued in 2002, call for diversions during the winter period (December 15-March 31) when stream flows are generally high and when water withdrawals would be least likely to adversely affect fisheries resources.

The guidelines recommend that diversions should not be permitted or otherwise sanctioned if:

1) The cumulative maximum rate of instantaneous withdrawal at the point of diversion exceeds a flow rate equivalent to 15% of the estimated "winter 20% exceedence flow". The "winter 20% exceedence flow" is the 20% exceedence value of the stream's daily average flow duration curve for the period December 15 to March 31 or;

2) The total cumulative volume of water to be diverted from the stream at historical points of anadromy exceeds 10% of the unimpaired runoff between October 1 and March 31 during normal water years. Spawning habitat for anadromous salmonids can be adversely affected by diverting more than 10% of winter runoff.

In addition the guidelines state that the maximum cumulative rate of withdrawal from proposed and existing diversions will not appreciably diminish the natural hydrograph (<5%) in the frequency and magnitude of unimpaired high flows necessary for channel maintenance and will not appreciably reduce the frequency and magnitude of unimpaired moderate and high flows *(e.g.,* flows higher than median February) used by migrating and spawning fishes.

According to the guidelines, hydrologic analysis indicates that adequate spawning flows, and near natural hydrographs, are generally maintained when the natural volume of winter runoff is impaired *(i.e.,* reduced) by less than 10%.

7.1.1 Impact Determination

OEI (2007) used the watershed experimental data conducted at Caspar Creek to assess potential hydrologic effects for vineyard conversion projects. Conversion of timberland to vineyard may affect hydrologic processes by the removal of forest vegetation and alteration of soil conditions. A reduction in forest vegetation would reduce interception of

rainfall by forest canopy which represents a net gain to water delivered to the soil surface for infiltration and percolation.

At Caspar Creek, minimum mean daily summer flows increased an average of 148% following clearcut harvesting of about 50% of the watershed of North Fork Caspar Creek and resulted in increased aquatic habitat that would benefit aquatic resources. Annual runoff increased an average of 15% following harvest at Caspar Creek (Keppeler, 1998, p. 43 as cited in the OEI, 2007 report).

The OEI (2007) report states that the proximity and general similarity of the Caspar Creek watershed to the Patchett Creek watershed indicates that the experimental results at Caspar Creek would be generally applicable at the project site. Observations from Caspar Creek suggest that the Artesa Fairfax project will result in higher soil moisture levels, higher annual streamflow, and higher summer baseflow. Groundwater quantity would tend to increase as a result of the project. Reduced evapotranspiration and canopy interception is the likely cause of increases in both total annual runoff and summer stream flow.

For the Artesa Fairfax conversion the diversion of runoff to the irrigation reservoir will reduce stream flow during some periods of storm runoff. However, this will occur only during peak flow periods during the winter when the reduced flow will be negligible downstream. This is in accordance with CDFG/NMFS (2002) guidelines for cumulative diversions less than 5% during winter peak flow conditions when stream flows are generally high and when water withdrawals would be least likely to adversely affect fisheries resources. The diversion of this runoff will tend to offset predicted increases in runoff from the project area.

No substantial impacts are expected to occur to either the downstream morphology or hydrology of Patchett Creek. Therefore, with the mitigation measures outlined for hydrology (e.g., winter diversions), impacts to listed species would be less than significant.

7.2 Potential Impact: *Potential changes to Patchett Creek peak flows.*

The West Yost Associates (WYA, 2007) report indicates that minor post-project flow increases of the order of 3 to 5% are projected for certain discharge points from the project. Potential increases in peak flows as a result of vineyard conversion and increased runoff could result in downstream scouring and displacement of steelhead to less suitable habitat types which would be a significant impact.

7.2.1 Impact Determination

The USDA-NRCS TR55 procedure for evaluating runoff ascribes Type IA storm systems to coastal areas such as Annapolis with weather patterns strongly influenced by the Pacific Ocean (EEI, 2004). The synthetic hydrograph typically associated with such storms has a short, sharp peak flow.

WYA (2007) estimated peak runoff flows for Patchett Creek using the SCS Curve Number Method and a HEC-1 model at two locations. Node 1 is located just below the second major confluence on Patchett Creek, where the creek is described by the RWQCB as having a very steep section that blocks the migration of salmonids. Node 2 is located at the confluence of Patchett Creek and the Wheatfield Fork of the Gualala River. Peak runoff calculations were made for the 24-hour 2-year, 10-year and 100-year storm events.

The results indicate that estimated peak flows would increase by 2 to 5% at Node 1 (Table 2) and 2 to 4% at Node 2 depending on the storm event (Table 3).

Table 2. Estimated peak flows for Node 1 on Patchett Creek (data from WYA, 2007).

Storm Event Return Period	Flow Under Existing Conditions (cfs)	Post-Project Conditions Flow (cfs)	Percent Increase
2-year	585	614	5
10-year	1,230	1,270	3
100-year	2,126	2,172	2

Table 3. Estimated peak flows for Node 2 on Patchett Creek (data from WYA, 2007).

Storm Event Return Period	Flow Under Existing Conditions (cfs)	Post-Project Conditions Flow (cfs)	Percent Increase
2-year	675	703	4
10-year	1,500	1,541	3
100-year	2,604	2,652	2

The WYA (2007) analysis conservatively assumed that the reservoir would be full and that all flows would be directed towards Patchett Creek. However, as stated in the report, the reservoir would not be full and a portion of the runoff would be collected and pumped to the reservoir for storage. Under such operating conditions, the peak runoff under a 2-year storm is estimated to decrease by 4 percent at Node 1 and by 3 percent at Node 2. Therefore, net gain in peak flow for a 2-year storm event may, on average, be 1%.

OEI (2007) used the rational runoff method to assess the magnitude of peak flow change and its potential effect on channel erosion processes by increases in winter runoff. The report concluded that the percentage flow increases are generally small incremental volumes which diminish rapidly downstream of the project area. In upper tributary reaches the areas immediately below individual outfalls may have slightly increased short duration peak flows. Channels further downstream would not be sensitive to potential peak flow changes because of the small magnitude of peak flow increase at a larger watershed scale and the degree of erosion resistance (e.g., armoring) in the steep channels draining the project area (OEI, 2007).

Research at Caspar Creek showed that despite local increases in runoff in tributaries and erosion, mainstem habitat water quality did not decline. Peak flow increase and associated fluvial erosion that could potentially result from the Artesa Fairfax timberland conversion is not expected to represent a substantial detriment to downstream steelhead trout. No substantial impacts are expected to occur to either the downstream morphology or hydrology of Patchett Creek. Therefore, with the mitigation measures outlined for reservoir capture and project drainage, impacts related to peak flows would be less than significant.

7.3 Potential Impact: *Lower Patchett Creek and Wheatfield Fork Gualala River Groundwater Inputs.*

Groundwater recharge is due to soil infiltration rate among other factors. A reduction in ground water recharge as a result of the project would affect summer base flow conditions for steelhead and would be a significant impact.

7.3.1 Impact Determination

The OEI (2007) report states that there are seven wells located northwest and one well located southwest of the project site. It is unlikely that the project would affect any wells in the area because groundwater flows under the site are toward Patchett Creek and away (east-southeast) from existing wells. A small on-site well will be developed to provide water for washing and other incidental needs of vineyard workers (WYA, 2007).

The OEI (2007) analysis of the vineyard conversion predicts an increase in groundwater and summer base flows by improving soil infiltration rates and groundwater recharge. Any increase in dry-season base flows will help maintain cooler water and enhance habitat which is critical to steelhead trout survival.

No substantial or adverse impacts are expected to occur to groundwater quantity and/or quality from implementation of the project. Therefore, impacts to listed fish species would be less than significant.

7.4 Potential Impact: *Potential changes to Patchett Creek sediment loading.*

The discharge of soil, silt, bark, sawdust, or other organic and earthen material into any stream or watercourse in the Gualala basin in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited by the RWQCB. The primary water quality concern in the Gualala River watershed is sediment that can be deposited in stream reaches supporting fish habitat.

Sediment is a limiting factor to successful steelhead trout spawning and rearing. Eggs and fry depend upon waters flowing through the substrate to wash away metabolic wastes and provide oxygen.

Sediment can affect habitat quality by filling in pools and riffles, creating high turbidity levels, and increasing water temperature. Excess sediment degrades the invertebrate community which serves as the prey base for fish. Sediment loading from project specific activities would be a significant impact, particularly in downstream areas of Patchett Creek that are accessible to steelhead trout.

7.4.1 Impact Determination

The OEI (2007) report entitled "Erosion Analysis, Artesa Fairfax THP and Conversion" provides the basis for interpretation of the likely significance of potential increases in erosion and downstream sediment loading resulting from vineyard operations. The report used the RUSLE2 model to develop quantitative estimates of erosion rates by surface processes on the project site and adjacent areas. These erosion rates were used in the sediment source analysis for the Patchett Creek watershed to evaluate potential changes in water quality resulting from the project.

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). As part of the projects mitigation to offset this increase, the project reservoir collection system will largely eliminate runoff to a 1,200 ft reach of Class III channel south of the proposed reservoir site. The channel erosion and bank creep processes in this section of channel are expected to be reduced by 1.7 t/yr (Table 1).

The reservoir collection system will also largely eliminate storm runoff delivered to two large gullies. OEI's (2007) estimated reduction in erosion rates in these gullies would reduce mean annual sediment yield by 8.3 to 15.8 t/yr for the low range and high range estimates respectively.

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.

The estimated sediment yield for Patchett Creek from the proposed project site with erosion and sedimentation mitigations decreases by 10 to 20 t/yr (Table 1). The OEI (2007) report also states that current erosion rates in Patchett Creek are relatively low compared to other portions of the Gualala River watershed, and the magnitude of potential erosion from the proposed project is not significant in relation to both existing and natural background rates.

Table 1. Total increased sediment yield from project and reductions in sediment yield from mitigation measures above on existing conditions (Data from OEI, 2007).

	Project Yield	Mitigation
Increased yield	+11 t/yr	
Decrease channel erosion		-1.7 t/yr
Decrease gully erosion		-8.3 to 15.8 t/yr
Decrease road erosion		-10.6 to 13.3 t/yr
Total	+11 t/yr	-10 to 20 t/yr

The Erosion Control and Mitigation Plan (ECP) prepared by EEI (2004) for the vineyard system will use erosion and sediment control features, consistent with recommendations, practices, and standards of:

1. Hillside Vineyards Unit, Redwood Empire Target Area. Napa and Sonoma Counties CA. USDA Soil Conservation Service, 1985.

2. Sonoma County Hillside Vineyard Ordinance, Stormwater, Erosion, and Sediment Control Plan..

3. Erosion and Sediment Control Field Manual, San Francisco Bay Regional Water Quality Control Board, 1996.

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.

7.5 Potential Impact: *Potential changes to Patchett Creek water temperature.*

Water temperature is an important habitat characteristic when considering habitat quality for steelhead trout downstream of the project site. Steelhead trout optimal egg and fry incubation temperatures range from 48°F to 52°F (Moyle, 2002). Optimal temperatures for fry and juvenile rearing range from 45°F to the mid-60s. Thermal stress in juvenile steelhead trout occur at temperatures exceeding this range which can promote disease and reduce growth.

Water temperature data analyzed for the NCWAP (2002) indicate that the Gualala River has major water temperature problems for cold water fish species such as steelhead trout. Few tributaries have cooler temperatures where steelhead trout can survive during the summer months. Water temperature data for Patchett Creek was not available for this review although Higgins (2003) states "it is likely that Patchett Creek flow provide potential islands of cool water near their mouths for juvenile steelhead trout in their lower reaches".

Temperature can be adversely influenced by soil erosion and alteration of flow. Potential increases in water temperature as a result of the project would be a significant impact.

7.5.1 Impact Determination

Winter runoff water temperature is a function of ambient weather conditions, and will be unaffected by vineyard presence. Water temperature during summer months or under drought conditions is a function of groundwater providing recharge, recharge flow rates, riparian canopy cover density, and ambient temperatures (EEI, 2004). The development of the vineyard will be conducted in such a manner to prevent future erosion and siltation to any watercourse below the site. No correlation is expected between increased water temperature and the proposed project. Therefore, with project mitigation measures presented in the OEI (2007) report for erosion control and sedimentation, impacts related to increase water temperature for listed fish species would be less than significant.

7.6 Potential Impact: *Potential changes to Patchett Creek nutrient and/or heavy metal loading.*

Nutrients are applied to vineyards on an as needed basis. There are numerous scientific studies in the literature demonstrating deleterious effects to waterbodies from nutrient and/or heavy metal loading that could be a potential impact to Patchett Creek and the Wheatfield Fork Gualala River.

7.6.1 Impact Determination

Agricultural chemicals are typically applied during the dry season when runoff is not expected. Use of any fertilizer, herbicide, insecticide, or other agricultural chemicals in this vineyard will be at low, safe, and least-cost agronomic rates according to label direction by qualified, properly certified vineyard management individuals. Deep percolation of fertilizer to groundwater is highly unlikely (EEI, 2004).

No mining sites, or other practices associated with heavy metals or possible high pesticide or chemical usage are known or believed to be present on the project site (EEI, 2004).

8.0 Cumulative Assessment

The degree of historic timber harvest, road building, and other land use changes (e.g., agriculture) in the Gualala River basin and the correlation with cumulative adverse watershed effects is well documented in the NCWAP and TSD. Land use disturbances significantly exacerbated erosion problems within the Gualala River basin and continue to impact the basin today.

The demise of California's native fish populations due to a multitude of factors including flow reduction, high sediment loading, and increased water temperatures cannot be underestimated. Of 67 native inland fish species, more than half are extinct or in serious decline.

Ninety-five percent of the Gualala watershed is privately owned and additional land use change over time may have direct and/or indirect effects on the steelhead trout population. The potential impacts of future land use changes on aquatic resources will be required to undergo environmental review.

It is apparent that the steelhead trout population in the Gualala River watershed has declined. However, the direct factors that continue to limit the distribution and abundance of steelhead trout in the Gualala watershed including reduced summer base flow, increased sediment inputs and water temperature are not associated with the project. The project may enhance downstream conditions by increasing summer base flow and reducing erosion.

However, it is possible that unexpected indirect activities associated with the project could contribute to cumulative effects being experienced in the basin. As indicated in the OEI (2007) report, should erosion conceivably have some sedimentation impacts in reaches of Patchett Creek accessible to coldwater fish, a monitoring program would be implemented and any potential problems corrected prior to potentially significant effects becoming manifest. Therefore, with the mitigation measures outlined for the project, direct cumulative project impacts to downstream steelhead trout populations would be less than significant.

9.0 Conclusions

This section summarizes the findings of this review and presents conclusions related to potential effects that project-related operations of the Artesa Fairfax vineyard conversion could have on steelhead trout. The major conclusions of this review are:

- The drainage area of Patchett Creek is 0.4% of the entire Gualala watershed.

- 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

vegetation which may improve habitat conditions for salmonids. Project-related effects from potential hydrological changes on the steelhead trout resources in lower Patchett Creek and/or Wheatfield Fork Gualala River are not likely to have adverse impacts.

- Collection of runoff from a portion of the proposed vineyard area for storage and irrigation is not expected to have a significant adverse effect on annual yield. Runoff capture is not expected to affect steelhead trout spawning activity.

- Peak flow increases are expected to increase by 3 to 5% above existing conditions in some ephemeral and intermittent channels draining the project area. This analysis assumes the reservoir would not be full. If filling (likely scenario), the peak runoff under a 2-year storm is estimated to decrease by 4 percent at Node 1 and by 3 percent at Node 2. Therefore, net gain in peak flow for a 2-year storm event may, on average, be 1%.

- Increased peak flows from vineyard outlets are generally relatively low volume and short-duration flows, with effects that dissipate rapidly with distance due to tributary dilution efforts.

- No significant increases in erosion are expected to occur. Effects on steelhead trout in lower Patchett Creek and/or Wheatfield Fork Gualala River resulting from potential sediment input from project activities are not likely to have adverse impacts. The increase in project-specific baseline sediment transport would be offset by decreases in other existing erosion problem areas. Mitigation measures to repair and prevent existing erosion on the project site is expected to reduce annual erosion rates by 10 to 20 t/yr for low and high range estimates, respectively (Table 1). The project is designed to improve existing soil erosion and sediment transport conditions that can affect steelhead trout. Agency-approved methods and industry standard Best Management Practices will be incorporated throughout the construction and development of the vineyard.

- Potential increases in water temperature downstream of the project site are unlikely and impacts to steelhead trout in lower Patchett Creek and/or Wheatfield Fork Gualala River are not expected.

- Off-site groundwater supplies are unlikely to be affected because of the prevailing groundwater flow gradient toward Patchett Creek and away from existing wells.

- A monitoring plan will be developed to detect channel erosion, should it occur, and ensure that appropriate erosion control and/or mitigation measures are implemented to address such occurrences. Peak flow impacts are not considered to represent a substantial adverse effect to downstream steelhead trout.

- The Artesa Fairfax Ranch timber harvest and conversion, with the proposed mitigation outlined in the OEI (2007) report is not likely to adversely lead to

direct cumulative effects by altering the hydrology, sediment supply, or water temperature in Patchett Creek and/or Wheatfield Fork Gualala River. There is, however, a potential for indirect cumulative impacts during and after project implementation. A water quality monitoring program could be implemented to demonstrate that indirect impacts to sediment loading, hydrology, and water temperature are not adversely affected by the project.

10.0 References

California Department of Fish and Game and the National Marine Fisheries Service. June 17, 2002. Guidelines for Maintaining Instream Flows to Protect Fisheries Resources Downstream of Water Diversions in Mid-California Coastal Streams (An update of the May 22, 2000 Guidelines)