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Mr. Daniel Meyers, Water Rights Committee Chair
Mendocino Group of the Sierra Club
P.O. Box 499
Philo, CA 95466-0178

Re: Adequacy of Mendocino General Plan Update and Draft Environmental Impact Report (DEIR)
with Regard to Pacific Salmon Recovery and Meeting CEQA Requirements

Dear Mr. Meyers,

At your request as Redwood Chapter Sierra Club Water Rights Committee Chair, I have reviewed the Mendocino County General Plan and the Hydrology and Water Quality and Biological Resources chapters of the related *Draft Environmental Impact Report* (DEIR) (MCPD 2008). In addition I have also read numerous Mendocino County Total Maximum Daily Load (TMDL) reports (U.S. EPA 1998, 1999, 2000, 2000a) and associated technical documents (GMA 1999, 2000) and reviewed consulting hydrologist Dennis Jackson (2008) report regarding changes in Navarro River flow over the last several decades.

I find that the Mendocino County General Plan has insufficient relevant implementation measures or action items to be effective in preventing further declines in aquatic resources. Their DEIR mentions coho salmon four times in voluminous tables of sensitive plant and animal species, but there is absolutely no discussion of fisheries resources, water flow and the impacts of implementing the updated General Plan on Pacific salmon. This is incredible negligence since coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss*) are all recognized as being in danger of extinction in Mendocino County (Good et al. 2005). Furthermore, the existing problems with over-allocation of water, illegal diversions and lack of stream flow (Higgins 2008) are wholly ignored. Consequently, the DEIR is fatally flawed when it comes to meeting the requirements of the California Environmental Quality Act (CEQA), which requires use of best available scientific literature and analysis of cumulative effects. The DEIR invokes the power of various agencies to prevent damage to resources in lieu of ordinances or action, but in fact these agencies are not capable of doing this without more cooperation from Mendocino County.

My Qualifications

I have been a consulting fisheries biologist with an office in Arcata, California since 1989 and my specialty is salmon and steelhead restoration. In that capacity I have authored fisheries elements for several large northern California watershed restoration plans (Kier Associates, 1991; Pacific Watershed Associates, 1994; Mendocino Resource Conservation District, 1992) and co-authored the northwestern California status review of Pacific salmon species on behalf of the American Fisheries Society (Higgins et al., 1992). I prepared the *Gualala River Watershed Literature Search and Assimilation* (Higgins 1997) to capture the historical changes of the river and its fish runs but also to outline steps for potential restoration. I have provided comments on timber harvest plans or vineyard

conversions for more than a dozen private clients in Mendocino County watersheds and I am attaching several for your reference and potential use of County staff (Higgins, 2003, 2004, 2007). I am also providing my comments (Higgins 2006) on the *Jackson Demonstration State Forest Management Plan and EIR* (CDF 2006) to provide further evidence of cumulative watershed effects in Mendocino County that need to be considered in the revised DEIR.

I have played a key role in design and implementation of a regional fisheries, water quality and watershed information database system, known as the Klamath Resource Information System or KRIS (www.krisweb.com). This custom program was originally devised to track restoration success in the Klamath and Trinity River basins, but has been applied to another dozen watersheds in northwestern California including the Gualala, Garcia, Navarro, Big, Noyo, Ten Mile, Mattole and Russian Rivers. The data incorporated in these projects allow comprehensive analysis of watershed and aquatic health and should be acknowledged and fully utilized by Mendocino County.

Since January 2004, I have been working under contract with the Klamath Basin Tribal Water Quality Work Group, a consortium of environmental departments of Lower Klamath River Basin Indian Tribes, to improve enforcement of the Clean Water Act and to expedite Klamath Dam removal (www.klamathwaterquality.com). Through work on review of Total Maximum Daily Load (TMDL) reports, I have become further acquainted with factors limiting Pacific salmon, including those related to flow depletion. I also have extensive experience as a field biologist in Mendocino County (Higgins 1995) starting as a seasonal aid with the California Department of Fish and Game on the Navarro and Mattole Rivers in 1972. From 1994-96 I collected data for a water pollution assessment of the Eel River basin (Friedrichsen 1997), including portions in Mendocino County. Some of my comments below are direct observation in the field of current river conditions in Mendocino County that contrast with historic accounts and data (Kimsey 1953) from the same locale.

DEIR Fails to Properly Characterize Current Mendocino County Watershed and Aquatic Habitat Conditions

There is no recognition of the degraded condition of Mendocino County watersheds relative to those extant when the General Plan was last adopted in 1981. While the DEIR cites Clean Water Act pollution abatement efforts through the Total Maximum Daily Load (TMDL) program, they do not delve into the extent of impairment, the relationship to land use or the implications for Mendocino County General Plan implementation. All major river systems in Mendocino County are recognized by the California State Water Resources Control Board (SWRCB, 2006) as impaired under section 303d of the Clean Water Act (Table 1). The DEIS has a partial list of impaired water bodies but fails to acknowledge that the Garcia, Albion and Noyo Rivers are temperature impaired.

The most pervasive water quality problem in Mendocino County is water temperature, which is driven by cumulative effects of riparian vegetation removal, increased sedimentation leading to expanded width to depth ratios, reduced flows and wetland destruction leading to loss of connection between surface water and groundwater. Cold water beneficial uses (COLD) include coho salmon, Chinook salmon and steelhead populations within Mendocino County Pacific salmon species that are significantly and negatively impacted (Higgins et al. 1992, IFR 2003).

Listings for sediment are driven by erosion related to roads, timber harvest, agricultural activities and urban and rural residential development (SWRCB 2006). These current conditions need to be recognized and the interaction with continuing development evaluated to meet CEQA requirements. Since 1981, many Mendocino County watersheds such as the Noyo River have been logged in 70% of their watershed area (GMA 1998) (Figure 1). In basins like the Gualala and Navarro the effects of conversion to vineyards combine with previous and on-going timber harvest and development to cause

Table 1. California SWRCB 303d listed waterbodies in Mendocino County

Stream/Watershed	Reason for Listing
Albion River	Temperature
Big River	Temperature
Garcia River	Sediment
Gualala River	Sediment
Mattole River	Temperature
MF Eel River	Temperature
Middle-Main Eel River	Temperature
Navarro River	Temperature
NF Eel River	Temperature
Noyo River	Sediment
Pudding Creek	Temperature
SF Eel River	Temperature
Ten Mile River	Temperature
Upper Eel River	Temperature, Sediment, Mercury
Upper Russian River	Sediment, Temperature, Mercury

major productive river systems to lose surface flow (Figure 2) where they were formerly deep and perennially cold. This eclipses all beneficial uses seasonally, seriously compromises fisheries productivity and may constrain downstream agricultural water supply as well.

Environmental data, such as CDFG (2004) habitat typing can be used to understand conditions as can data from Friedrichsen (1996). Figure 3 shows water temperatures for the upper South Fork Eel within Mendocino County, indicating that even as of 1996 lethal conditions for salmonids (Sullivan et al. 2000) prevailed in the mainstem above Rattlesnake Creek and in lower Ten Mile Creek. After collecting temperature data in Ten Mile Creek in 1995-96, I returned to study a nearby stream and found that Ten Mile Creek now loses surface flow where it formerly was perennial (Figure 4).

The DEIR also does a particularly poor job of dealing with the aquatic impacts of urbanization (Booth and Jackson 1997). Rural residential and urban development increase risk of non-point source pollution from herbicides and pesticides that are known to negatively impact salmonids (Ewing 1999,



Figure 1. Twenty square miles of redwood clearcuts near Ft. Bragg in the Pudding Creek and Little North Fork Noyo watersheds. The line of trees extending to the right below center in the photo is the Little NF riparian zone. Photo by Nicholas Wilson, 1990 from KRIS Noyo.



Figure 2. Gualala River Wheatfield Fork running dry during summer 2001 due to more than 20 feet of sediment deposition. Rural residential and vineyard use of water contribute to the problem. Photo by the California Geologic Service (CGS) from KRIS

Gualala.

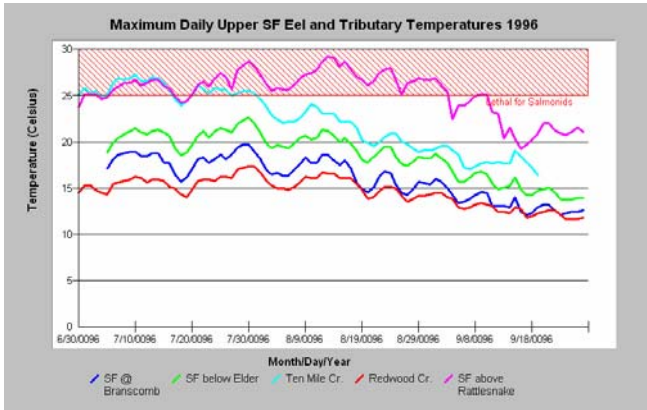


Figure 3. Water temperatures during summer of 1996 in the upper South Fork Eel and show some streams are recovering but that the mainstem and Ten Mile Creek have major problems supporting salmonids. Data from Friedrichsen 1997).

Figure 4. Ten Mile Creek north of Laytonville in Mendocino County running dry in October 2002 where less than ten years before it had been perennial (Friedrichsen 1997). Photo by Diane Higgins.

NCAP 1999). Friedrichsen (1997) found that urban creeks in Willits had the poorest biodiversity (Barbour et al. 1998) of any other Eel River tributaries as indicated by the number of pollution intolerant taxa present in the mayfly (Ephemeroptera), stonefly (Plecoptera) and caddisfly (Trichoptera) orders (Figure 4). To be credible, the Mendocino County General Plan and the revised DEIR must clearly define challenges of urbanization and water quality impacts and formulate specific action items for storm water retention and pollution control.

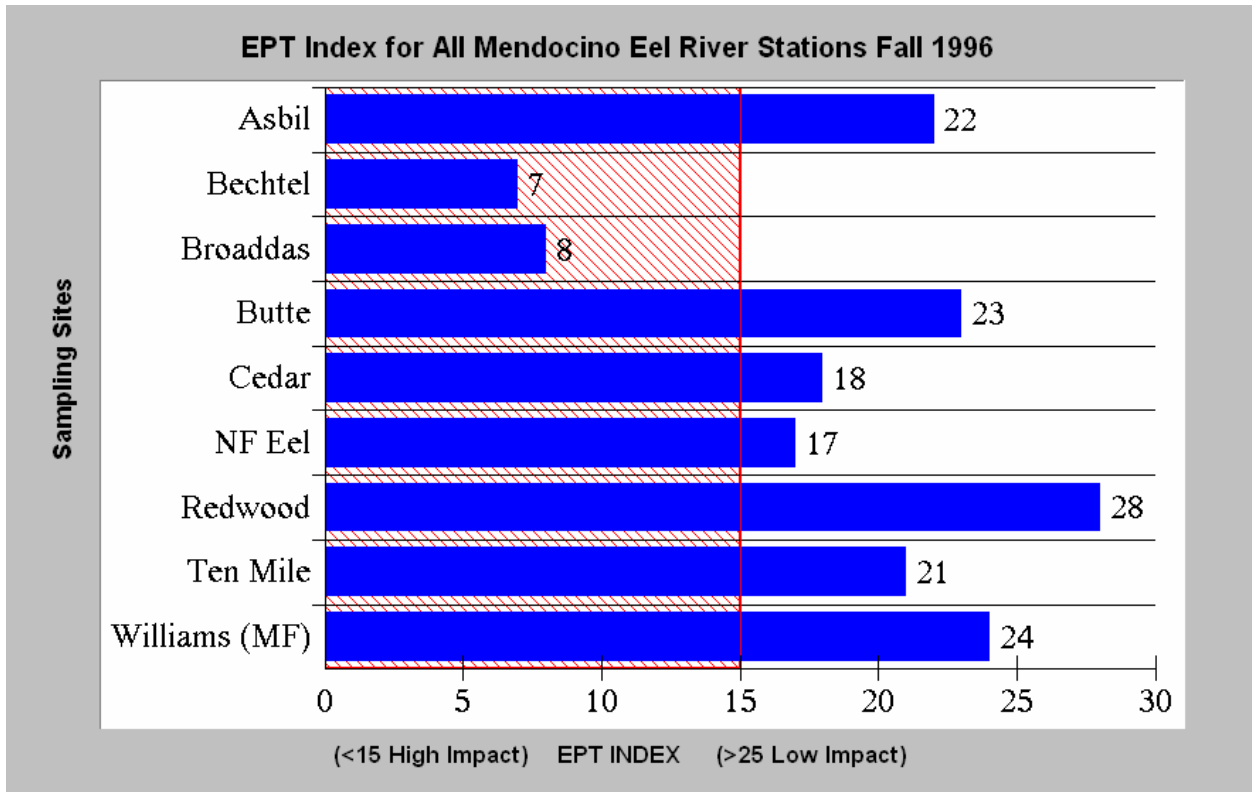


Figure 4. This chart shows Mendocino County Eel River tributary fall samples of aquatic macroinvertebrates, specifically mayfly, stonefly and caddisfly (EPT) species present, indicating very poor health for Willits urban streams Bechtel and Broaddas. Data from Friedrichsen (1997) and KRIS Coho.

DEIR Does Not Acknowledge Problems with Decreasing Water Availability

The DEIR does not acknowledge the decrease in surface water availability since 1981, when the Mendocino County General Plan was last adopted. Massive aggradation (geologic term to describe a stream being buried) has occurred as a result of cumulative watershed effects (CWE) due to logging and road building in too wide an area for the watershed and stream to maintain equilibrium. The DEIR also fails to acknowledge the dramatically increased demand for surface and groundwater due to rural residential and agricultural development, especially vineyards.

Cumulative Watershed Effects and Decreased Flows: The DEIR ignores recent regional scientific studies regarding how widespread watershed disturbance affects aquatic ecosystems (Ligon et al. 1999, Dunne et al. 2001, Collison et al. 2003). Dunne et al. (2001) described cumulative effects as follows:

“Generally speaking, the larger the proportion of the land surface that is disturbed at any time, and the larger the proportion of the land that is sensitive to severe disturbance, the larger is the downstream impact. These land-surface and channel changes can: increase runoff, degrade water quality, and alter channel and riparian conditions to make them less favorable for a large number of species that are valued by society.”

One of the species “valued by society” that is being lost because of watershed and aquatic disturbance that is too extensive is the coho salmon (See Endangered Pacific Salmon). Although Dunne et al. (2001) focused on the timber harvest process, their observations on problems with piece-meal planning apply equally to the Mendocino County General Plan:

“The concern about cumulative effects arises because it is increasingly acknowledged that, when reviewed on one parcel of terrain at a time, land use may appear to have little impact on plant and animal resources. But a multitude of independently reviewed land transformations may have a combined effect, which stresses and eventually destroys a biological population in the long run.”

Mendocino County streams were in recovery from the 1964 flood when the General Plan was last revised. Although the wave of timber harvest from 1985-2000 often caused less ground disturbance than the post WW II logging, it was even more widespread and associated with significant expansion of road networks (GMA 1999, GMA 2000; NCRWQCB 2001). Road densities in logged or developed Mendocino County watersheds often exceed 5 miles of road per square mile of basin area with many miles of streamside roads (GMA 1999, NCRWQCB 2001), whereas properly functioning watershed condition for Pacific salmon is 2 mi./mi.² with few or no streamside roads (NMFS 1996). Streamside roads cause both chronic and potential for catastrophic sediment yield (Spence et al. 1996). Jones and Grant (1996) point out that watershed hydrology can recovery rather quickly from timber effects, but that hydrologic perturbations from road networks such as increased peak flows and decreased base flows can persist for decades. The Mendocino General Plan and DEIS need to deal with these issues in a real way to comply with CEQA and to limit very undesirable impacts on aquatic resources and water supply. This problem is likely one that could be at least partially addressed through passage of a grading ordinance.

The combined effects of increased sediment yield (U.S. EPA 1998, 1999, 2000; GMA 1999, 2000, NCRWQCB 2001) and increased peak flows (Leopold and McBain 1995) resulting from timber harvest and roads is that stream channels within Mendocino County have profoundly changed. Formerly deep and cold streams ideal for salmon and steelhead are now wide, warm and open (Figure 5) and some completely lose surface flow in late summer and fall. Water extraction from rivers prior to disturbance



Figure 5 (at left). The lower mainstem Navarro River near Flume Gulch during low flow conditions on September 21, 2001 when the USGS gauge read 1.1 cfs. The algae on the margins of the stream indicate stagnation and no fish were present at the time of observation.

CDFG (Kimsey 1953) sampled this exact location in August 12, 1952 and found dozens of young of the year steelhead and yearling steelhead trout and a flow of 15 cfs during what was an average water year. See Pacific Salmon section below for more discussion.

Photo by Pat Higgins from KRIS Navarro (www.krisweb.com).

that had deep pools and healthy riparian zones did not seriously compromise beneficial uses, however, in their present condition these streams cannot support further water extraction and may not even be able to meet needs of priority water users without causing streams to become unsuitable for sensitive fish species.

The North Fork Gualala River serves as an example of cumulative effects of logging and diminishment of domestic surface water supply (Higgins 1997). The North Gualala River Water Company (NGRWC) originally drew its water in 1938 directly from Robinson Gulch and other lower Gualala River tributaries, but switched to the mainstem North Fork Gualala after intake systems were damaged by sediment transport in 1964 (Sommarstrom 1992). Ultimately a well was drilled adjacent to the North Fork to supply the needs of the community of Gualala but the well was found to be connected to surface water. NGRWC's water right allowed 2 cfs extraction with a required by-pass flow of 4 cfs (Sommarstrom 1992), but the company subsequently failed repeatedly to meet this requirement (Coast Action Group, 1995). The number of NGWD customers grew from 671 in 1985 to 902 as of 1995 but the California Department of Health Services has limited hook-ups to 1034 unless the storage and delivery system are substantially upgraded (Coast Action Group, 1995). Despite 40-70 inches of rainfall in the Noyo River watershed, the City of Fort Bragg has had concerns over its water supply (Richard LaVen personal communication) as surface flows and fish habitat have diminished due to erosion related logging and roads (Higgins 2006).

Vineyard development creates permanent disturbances that are unlike the forests they replace with regard to both sediment yield and hydrology. Whereas forest headwaters stored cold water in colluvium, vineyards reduce infiltration, tap groundwaters in these locations with wells and create

impoundments that reduce streamflow. Loss of soil is chronic, and may be massive if vineyards are constructed improperly on steep slopes (Higgins 1997). My comments on a proposed forest to vineyard conversion in the North Fork Gualala in Mendocino County (Higgins 2007) are an illustrative case study and are provided in electronic form for continuing use by planning staff.

According to McMahon (2008) “dams on ephemeral streams have the potential to greatly dampen the early fall/winter freshets important for access to the upper reaches of small spawning tributaries by their capture of the entire flow within the stream until the reservoir is filled, potentially resulting in significant dewatering downstream.” Band (2008) points out that October diversions to fill irrigation ponds may impede fall Chinook salmon migrations in Mendocino County and that synergistic effects between multiple diversions will lead to potential severe flow restrictions below tributary junctions. This increases risk of fine sediment deposition in these reaches that are often utilized by spawning salmonids (Band 2008).

Uncontrolled Surface Water Diversion and Groundwater Use: The recent study by the SWRCB Water Rights Division (2008), *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams* and its appendices (Stetson Engineers 2007, 2007a), show clearly that California Water Codes are not being enforced in Mendocino County and that there is an epidemic problem with unpermitted diversions (Higgins 2008). This needs to be taken into consideration in Mendocino County’s General Plan process and discussion incorporated as the DEIR is revised. Figure 6 shows the permitted impoundments in Mendocino County, but also those that have permits pending or are operating with no permits (non-filers) and Figure 7 is an aerial photo of the Navarro River basin showing legal and illegal impoundments. Volcker (1994) pointed out that the Navarro was losing surface flow in the early 1990s for the first time ever and filed a law suit based on public trust so that flows could be restored, although the law suit was not successful (SWRCB WDR 1998). Jackson (2008) examined Navarro River data and concluded that the 1980-2008 period had statistically significant lower minimum discharge, lower minimum 7-day discharge and lower median discharge than the period from 1951 to 1979 and there was a “statistically significant increase in the duration of low flows during the 1980-2008 time period.”

Both rural residences and vineyards use wells to tap groundwaters that are connected to surface waters and thereby reduce habitat for salmon and steelhead and supply for downstream water users with prior rights. The SWRCB WRD hired peer reviewers for its flow study and they (Band, 2008; Gearheart, 2008; McMahon, 2008) found that no real water budget can be calculated without knowing the influence of ground water withdrawals. The California Department of Water Resources (DWR) has oversight over ground water withdrawal, but all well logs are treated as proprietary and restriction of ground water use is uncommon. While off-stream use or impoundments require permits, riparian water extraction by streamside land owners is not limited under California Water Codes nor does it require a permit. The Mendocino County General Plan revision and DEIR need to acknowledge that water is over-allocated and that a crisis exists with regard to meeting beneficial uses, such as providing cold water fish habitat and recreational opportunities, and provision of water for long time agricultural users (priority water rights holders). Stream conditions will have to be improved and illegal appropriation problems resolved before there is likely to be any “surplus” water for new development.

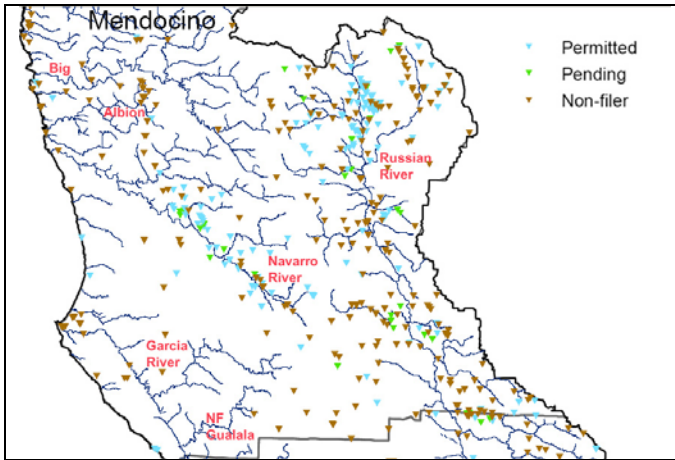


Figure 6. Map from Stetson engineers (2007) showing permitted, pending and illegal diversions (non-filer) for Mendocino County outside the Eel River basin.



Figure 7. Aerial photo of agricultural development in the Navarro River basin circa 1998 shows ten ponds of different types typical of water storage. Photo by Rixanne Wehren from KRIS Navarro

DEIR Does Not Address Pacific Salmon Status or Measures for Protection

The DEIR makes reference to coho salmon and other sensitive Pacific salmon species only in tables with no discussion of their status within Mendocino County or the potential impacts of development on their chances for persistence and recovery. Sommarstrom (1984) characterized populations of salmon and steelhead as already diminishing in the *Mendocino County Salmon and Steelhead Management Plan* but noted that the California Department of Fish and Game (CDFG) did not collect enough data to gauge trends. There are still no trend data for salmon and steelhead populations, however, CDFG presence and absence surveys for juvenile coho salmon from 2000-2002 show that this species is disappearing (Figure 8). One can also infer from the number of rivers and streams that are losing surface flow or have otherwise become unsuitable habitat for coho, Chinook and steelhead that all these species are declining in the Mendocino County and at risk of loss (IFR 2003).



Spawning coho salmon in Mendocino County. Photo provided by Wendell Jones, CDFG retired. Date unknown.



Summer steelhead holding in the Middle Fork of the Eel River. Photo courtesy of Mike Ward. Summer 1988.

Coho Salmon: Higgins et al. (1992) noted that most Mendocino County coho salmon populations were either at high risk of extinction or “stocks of concern” based on declining freshwater habitat conditions. Brown et al. (1994) noted that Mendocino County “coho salmon appear to be absent or very rare in many of the streams they occupied historically” but also that populations in Noyo and upper SF Eel Rivers within the County (Figure 9) were two of the last of seven adult coho populations

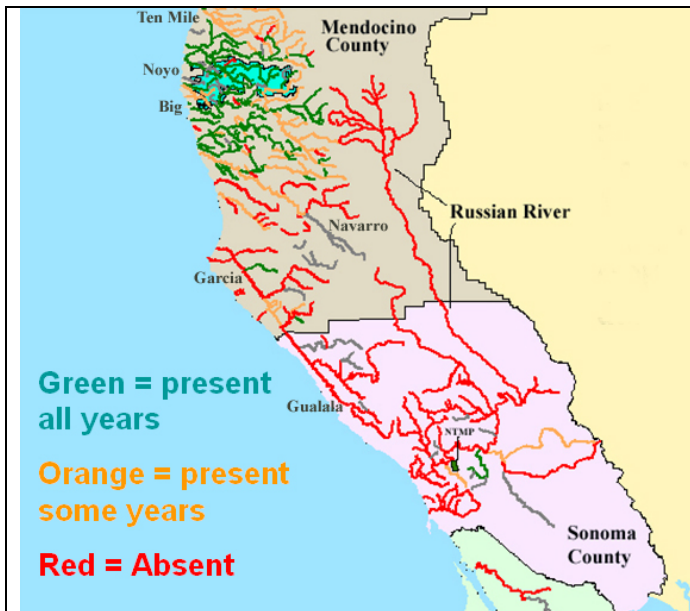


Figure 8. Map of CDFG coho salmon juvenile presence absence surveys conducted from 2000-2002. Absence for three years means extreme risk of local extinction.



Figure 9. This map above shows the last populations of coho salmon in the hundreds in all of northwestern California, according Brown et al. (1994). If these last populations are lost, then the coho recovery will not be possible.

in the hundreds. The National Marine Fisheries Service (NMFS, 2001) group Mendocino County coho within the Central California Coast Evolutionarily Significant Unit (ESU) which is “presently in danger of extinction with the condition of coho salmon populations in this ESU worse than indicated by previous reviews.”

The *Status Review of Coho Salmon North of San Francisco* (CDFG 2002) characterized the coho meta population including Mendocino County as follows:

“Extant populations in this region appear to be small. Small population size along with large-scale fragmentation and collapse of range observed in data for this area indicate that metapopulation structure may be severely compromised and remaining populations may face greatly increased threats of extinction because of it. For this reason, the Department concludes that coho salmon in the Central Coast Coho ESU are in serious danger of extinction throughout all or a significant portion of their range.”

Coho salmon were recognized as Threatened under the federal Endangered Species Act in 1997 (NMFS 1997) and subsequently upgraded to Endangered (Good et al. 2005). CDFG (2004a) also has recognized coho salmon as Threatened under California ESA.

The DEIS does not address or acknowledge the conditions described in status reviews nor use existing databases in Mendocino County KRIS projects (IFR 1999, 2003) to at least infer trends. For example, in the Noyo River basin data from historical memos and recent samples from CDFG show coho distribution shrinking from the 1960s (Figures 10) to the 1990s (Figure 11). In the 1960's, coho salmon dominated many of the tributaries of the Noyo River watershed, including the eastern portion of the watershed, except in reaches with steep gradient where steelhead were more numerous. By the 1990s, eastern Noyo sub-basins lacked coho or retained them at remnant levels, while the western Noyo watershed tributaries were dominated by steelhead, with coho still present but sub-dominant.

CDFG surveys of the Gualala River in 2001, including the North Fork in Mendocino County found coho salmon to be absent, despite planting of thousands yearling hatchery coho from 1995-1998,

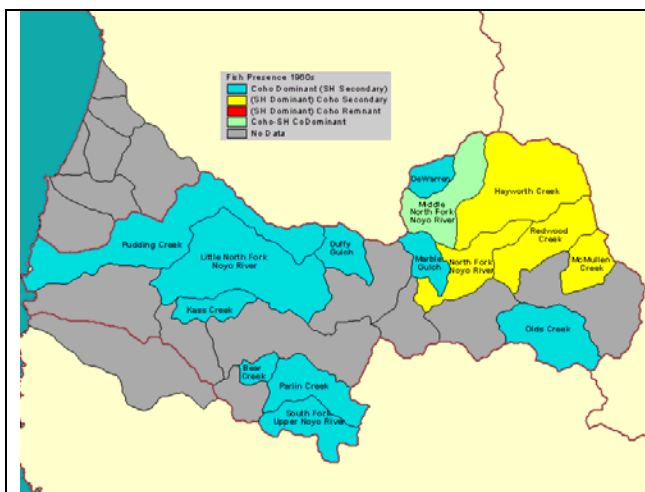


Figure 10. The light blue basins above are those dominated by coho salmon according to 1960's CDFG surveys, while yellow basins had coho present but less numerous than steelhead juveniles. From KRIS Noyo.

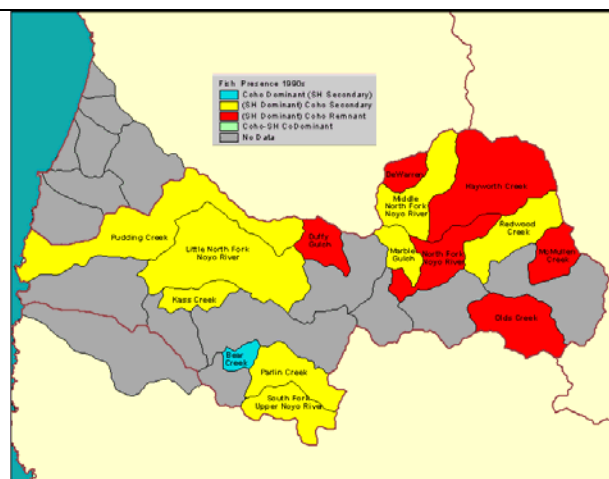


Figure 11. Electrofishing and dive samples in the 1990s show a shift in the distribution of coho in the Noyo River since the 1960s. Steelhead dominate western basins (yellow), except for Bear Creek (light blue), and coho are at remnant levels or absent (red). From KRIS Noyo.

indicating loss of ability to support the species (Higgins 2004). Similarly, coho salmon were not found in presence/absence surveys of Russian River tributaries within Mendocino County and these populations are likely extirpated (Figure 8).

Stocks of coho are plummeting in the Ten Mile River in response to intensive land use (IFR 2001). NMFS (2001) noted that coho were absent from 80% of tributaries to the Ten Mile River that formerly harbored them in 2000, with particular decline noted in the South Fork Ten Mile River. The period during which the decline occurred (1990-1999) coincided with logging in 76% of the South Fork watershed and expansion of road densities to 5-10 miles per square mile (GMA, 2000). The NMFS *Coho Status Review* (Weitkamp et al., 1995) regarded Ten Mile River coho as an important wild population, without history of hatchery introduction.

Caspar and Hare Creeks and Russian Gulch are some of the last streams that are still dominated by coho salmon (Higgins 2006). It is worthy of note that habitat conditions in the Garcia River are improving sufficiently to where coho salmon recovery is possible.

Steelhead: Steelhead of the North Central California Coast ESU, which includes Mendocino County, have been listed as Threatened under ESA (NMFS 1997, Good et al. 2005), although few populations are monitored and trend data are largely lacking. Sommarstrom (1984) noted a decline at Van Arsdale Dam of 86%; from 1938-1960 with a high of approximately 9500 adult winter steelhead diminishing to a low of just a few hundred fish. The only recent adult steelhead counts come from the Noyo River (Gallagher et al. 2000) where the estimated population was 300-400 fish, which is down an order of magnitude from former estimates of 6000 in the 1960s (Taylor, 1978). The extremely low return of adult steelhead suggests diminished Noyo River freshwater carrying capacity, and its watershed conditions are very similar to other Mendocino County rivers. An exception to downward steelhead population trends is likely the Garcia River, although no hard data are available. Pool depth is improving in the mainstem due to bank stabilization, cessation of gravel mining and less intensive upland management within the basin that is allowing habitat recovery (IFR 2003). Mendocino County has one of the larger summer steelhead populations in California in the Middle Fork Eel that deserves recognition and protection (Sommarstrom 1984).

Chinook salmon: Mendocino County fall Chinook salmon populations are grouped within the California Coastal Chinook salmon ESU that was recognized as Threatened in 1999 (NMFS, 1999) and that status was confirmed in 2006 (NMFS, 2006). Spring chinook salmon returned to the Middle Fork Eel River prior to 1964 and the upper Eel River before the construction of Pillsbury Dam in 1919 (Higgins et al. 1992), but are now extinct in the Eel River and in Mendocino County. Sommarstrom (1984) documented South Fork Eel River fall Chinook salmon declines at Benbow Dam (1940-1970) of 70%. Tomki Creek once had distinct early fall runs of Chinook and a later pulse of fish in December that were larger and more silver than the earlier group (Morford 1983). Although Chinook salmon were never dominant over coho and steelhead in the short coastal rivers of Mendocino County, they were likely present before European colonization and to have persisted in basins like the Ten Mile River and Garcia River, although the former also had some hatchery supplementation.(Maahs 1997). Chinook salmon are once again spawning in the mainstem Garcia River (Craig Bell personal communication), which is another sign that this ecosystem is trending in the opposite direction than the adjacent Navarro and Gualala Rivers, which have different watershed management intensity.

Gauging Historic Change Using Fish Community Structure: As aquatic habitats of Mendocino County have changed in response to intensive upland management, fish community structure has changed from one dominated by diverse species and age classes of Pacific salmon to less diverse communities dominated by warm water fishes. In August 2002 I used a mask and snorkel to do dive estimates on the lower Garcia, Gualala and Navarro Rivers at the same locations as those sampled by CDFG (Kimsey 1953) in August 1952 to see whether fish community structure had changed over 50 years. Kimsey (1953) counted 75 steelhead of four age classes along with sculpin, stickleback and dace on the lower Navarro River below Flume Gulch. In August 2002 the mainstem Navarro was nearly dry and no fish life was present (Figure 6). The Gualala River fish community below the North Fork was much different in August 2002 than when CDFG sampled 50 years earlier (Kimsey 1953). Only 12 young of the year steelhead were present in 2002 and they were significantly outnumbered by warm adapted stickleback and speckled dace where as in 1952 steelhead out numbered all other species combined and older age steelhead (1+ and 2+) made up a significant portion of the sample. Garcia River dive observations 100 yards upstream of Highway 101 in August 2002 found a community identical to that found by Kimsey (1953) with steelhead of several age classes predominating (Figure 12). This comparison is illustrative of differing watershed conditions and trends in the Gualala and Navarro Rivers versus those in the Garcia River.

U.C. Davis (Johnson et al. 2002) surveyed many miles of the Navarro River from 1999-2001 and found coho in only one tributary. Just as significantly, native suckers were observed at only one location whereas they were the dominant species in Mendocino County streams after the 1964 flood (CDFG 1968). Loss of suckers indicates that mainstem habitats are becoming unviable and that there are no islands of habitat for their winter survival because of homogeneously disturbed conditions. Collison et al. (2003) characterize this condition as a “press” disturbance which contrasts with natural watershed disturbance regimes where only a small fraction of a watershed would experience degradation from fires, floods or earthquakes over any 100 year cycle (Reeves et al. 1995). Similar aquatic ecosystem stress is evident in the Gualala River basin where CDFG electrofishing samples throughout the basin in 2001 also failed to capture suckers (Higgins 2004).

Garcia River Dive Survey Results Above Highway 1 (GAR 1) Aug 2002

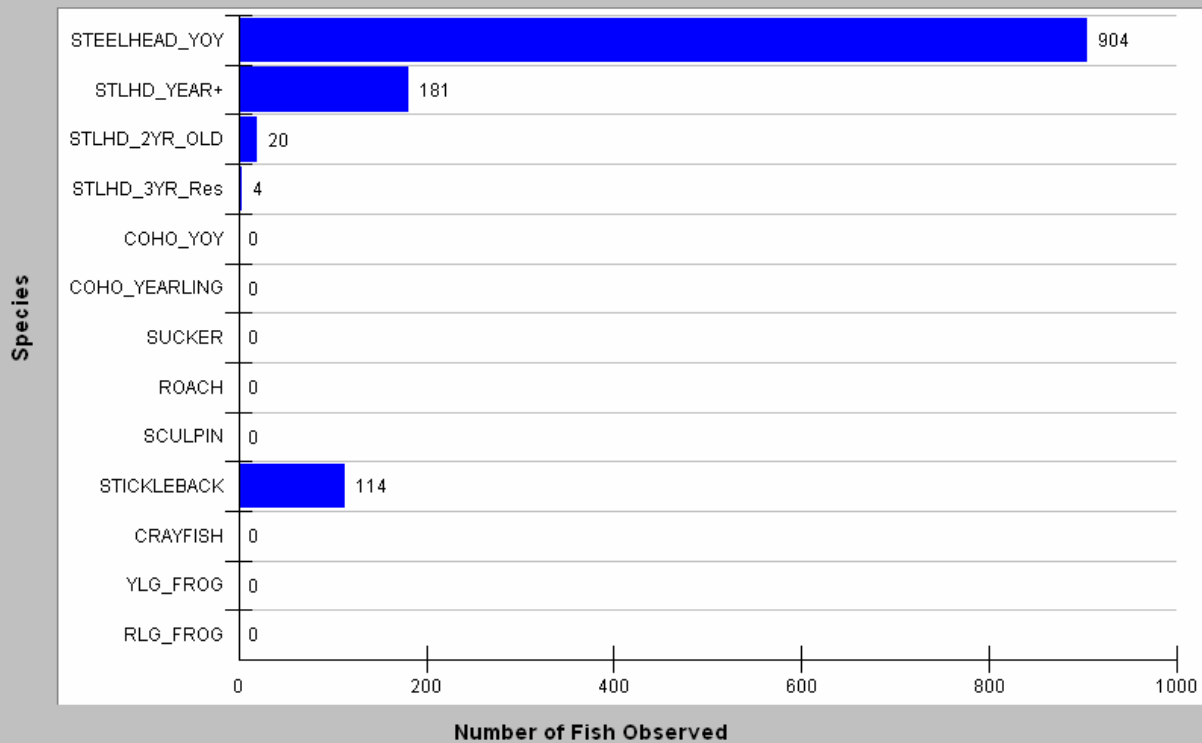


Figure 12. Dive observations in the mainstem Garcia River upstream of Highway 101 on August 21, 2002 demonstrate that, just as in 1952, steelhead are the predominant species and that multiple age classes (YOY = young of the year) are present. Data from Patrick Higgins and KRIS Garcia.

Mendocino County General Plan and DEIS Does Not Support Efforts of Other Agencies

The DEIR lists dozens of agencies and their authorities as if this absolves Mendocino County from any need to coordinate with them and to cooperate in attainment of things like TMDL implementation goals or recovery of endangered Pacific salmon species. In fact, many of the invoked processes can not succeed without County participation. Other areas of authority have been neglected, such as surface water allocation and groundwater oversight, and Mendocino County would be wise to take on more responsibility for oversight instead of ignoring the attendant problems. The following is an analysis of overlapping authorities with some suggestions for how the County should coordinate planning with other processes.

TMDL: The DEIS states the U.S. EPA and SWRCB have the authority under the Clean Water Act for pollution abatement as mapped out in TMDL reports. In fact, only the Garcia River TMDL (U.S. EPA 1998) has been implemented, while there has been no coordinated action in other basins. The NCRWQCB (2008) *Work Plan to Control Excess Sediment in Sediment Impaired Watersheds* is partially geared to accomplish TMDL implementation objectives and it envisions working closely with Mendocino County. With regard to continuing sediment pollution in the NCRWQCB jurisdiction, the document recommends use of “progressive enforcement” or development of Waivers of Discharge Requirements (WDRs) to develop a schedule of compliance. Mendocino County roads are specifically targeted for WDRs which would require 1) identification sediment sources related to roads, 2) prioritization of problem areas, 3) scheduling sediment reduction measures, 4) monitoring success and 5) adjusting future actions using adaptive management. The *Work Plan* (NCRWQCB 2008) specifically mentions close coordination with Mendocino County planning staff in updating the General Plan and also invokes the stalled grading ordinance:

“Work with Mendocino County to research and determine the adequacy of Mendocino County’s current grading regulations under the Uniform Building Code, the draft grading ordinance as of April 2007, and the draft road grading regulations currently under development. Propose changes based on Regional Water Board staff’s research of an adequate and effective grading ordinance. Work with County staff and the BOS to revise their draft ordinance/regulations if necessary. Encourage Mendocino County to develop and approve measures to better control excess sediment from grading activities.”

Mendocino County would be better served in working proactively with the NCRWQCB and embedding actions and implementation items in the revised General Plan or it may find itself out of compliance and ultimately subject to enforcement action. Furthermore, temperature pollution problems are even more pervasive and actions or implementation measures to protect shade or prevent other activities that contribute to thermal pollution should be considered. In fact, any Mendocino County planning document must not only acknowledge impaired status and define how actions will affect that status, it must also comply fully with the NCRWQCB *Basin Plan* (2006) and its anti-degradation language. Ultimately the County of Mendocino is responsible for insuring compliance with the *Basin Plan* on all projects that occur within its jurisdiction.

California Forest Practice Rules: The DEIR credits the California Department of Forestry with timber harvest oversight with the implicit assumption that they are sufficiently protecting resources, such as fisheries and wildlife. However, Collison et al. (2003) state that timber harvest and road building under the California Forest Practice Rules have significant sediment and hydrologic impacts. Ligon et al. (1999) also acknowledged cumulative watershed effects from timber harvest were causing the diminishment of Pacific salmon habitat, with specific deficiencies being lack of sufficient riparian protection or limits to the extent of watershed disturbance. Mendocino County has a history of involvement in forestry issues through its Forest Advisory Committee and it might be wise to have them revisit the issue of prudent risk limits to logging and vineyard conversion related watershed disturbance. CDF staff has no capacity to judge flow issues related to vineyard conversion and a shift of oversight and regulation authority to an other agency should be considered (Higgins 2003, 2004a, 2004b, 2007).

Flow Issues: Mendocino County needs to urge the SWRCB WRD to perform its duty and uphold Water Code Sections § 1052, 1055, 1243, and 1375 and also CDFG to maintain stream flow under Fish and Game Code § 5937. The County should consider monitoring groundwater and exercising authority in regulation of its extraction since DWR has abdicated its role in this regard. In addition the General Plan needs specific action items and measures for implementation that limit water consumption, maximize conservation and reduce cumulative effects that have negative impacts on water supply and other beneficial uses. Development restrictions should be greatest in basin where stream courses have lost surface flows, until watershed conditions and flows in streams are showing measurable progress toward recovery.

Endangered Salmon: The *Recovery Strategy for California Coho Salmon California* (CDFG 2004) that resulted from the California ESA listing and anticipates cooperation from Mendocino County as an “action entity.” The CDFG (2004) envisioned actions to protect and restore coho include:

- “Advise Mendocino County to consider recommendations to offset impacts from county policies and operations, as developed in the report, *Effects of County Land Use Policies and Management Practices on Anadromous Salmonids and Their Habitat* (Harris et al, 2001).

- Mendocino County should develop a grading and erosion control standard supported by a grading ordinance, to minimize sediment impacts to coho salmon habitat.
- Mendocino County’s Public Works, Water Agencies and Flood Control District’s should reduce native riparian vegetation clearing and sediment removal adjacent to and in streams with coho salmon. Retain large wood within streams to the extent possible. When woody material is removed it should be stored and made available for stream enhancement projects.
- Mendocino County planning and public works should promote alternatives to conventional bank stabilization for public and private projects, including bioengineering techniques.
- Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers.”

NMFS’s Santa Rosa office is also currently working on coho salmon recovery planning under federal ESA statutes and they will also need close coordination and assistance from Mendocino County. While Section 7 of the federal ESA compel compliance by federal agencies, the nexus for enforcement on private land is weak and has been insufficient to this point in preventing habitat alteration related to development and land management. The failure to even attempt protection of salmon and steelhead in the General Plan Update and DEIR is much different than the proactive approach anticipated by Sommarstrom (1984) and not at all in line with Mendocino County’s historic traditions. The call by CDFG under ESA and the NCRWQCB under the CWA for the County to finish its grading ordinance highlights the importance of this action in attaining both fish recovery and water pollution abatement.

Ocean Conditions and Salmon Populations

The DEIR makes an absurd statement without scientific support that the principal cause for Mendocino County salmon and steelhead population decline is ocean conditions. Collison et al. (2003) point out that northern California Pacific salmon respond to climatic and oceanic cycles of productivity known as the Pacific decadal oscillation (PDO) cycle (Hare, 1998, Hare et al., 1999). Positive ocean cycles coincide with wet on-land conditions in northwestern California for a period of about 25 years, then alternate with ocean conditions prone to warm El Nino events and periods of lesser rainfall. Positive PDO conditions prevailed from 1950-1975 and negative ocean and dry on-land conditions extended from 1975-1995. We are currently in a productive ocean and wet climatic phase that provides an opportunity to recovery coho and Chinook salmon and steelhead (Collison et al. 2003). Collison et al. (2003) concluded that, if freshwater habitat was not recovered by the time the next switch in the PDO occurred sometime between 2015-2025, then many Pacific salmon stocks will likely go extinct. Therefore, the DEIS needs to scientifically characterize the affect of ocean conditions on Mendocino County’s salmon and steelhead populations and the updated General Plan must incorporate action items and implementation measures that reverse the trend of aquatic habitat decline in a timely fashion.

What is Really Needed for Pacific Salmon Recovery?

Rieman et al. (1993) characterize extinction risk for salmonids: “When habitat disruption is spread among all populations, all populations are more likely to decline during unfavorable periods in the regional environment (for example, drought). Severe or prolonged conditions increase the potential for regional extinction.” Pacific salmon populations in Mendocino County face high risk of loss due to disturbed watershed conditions and continuing downward flow and aquatic habitat trends. The General Plan needs to urgently consider a new integrated approach to planning so that true sustainability can be achieved.

Get Water Back in Streams: Band (2008), Gearhart (2008) and McMahon (2008) all describe problems with current instream flow regimes and patterns of water use with regard to maintaining Pacific salmon species. Mendocino County needs to take a more proactive approach and become more engaged in water management issues to help better protect public trust, to insure future water supply and to assist in expeditious restoration of all beneficial uses.

Limit Watershed Disturbance: Reeves et al. (1995) recommend that primary consideration be given to historic disturbance regimes that Pacific salmon co-evolved with and that we try to make human disturbances more closely mimic those patterns. They recommend that high quality habitat (refugia) be protected and that redundancy is needed because of potential for catastrophic floods or fires in any given watershed. Studies from coastal Oregon by Reeves et al (1993) showed that logging in more than 25% of a watershed in 30 years or less lead to simplification of stream habitats and greatly diminished Pacific salmon species diversity. Developed areas of a watershed all depart from historic patterns of sediment and hydrologic function and, despite the assertion of the DEIR they cannot be mitigated to the point where they prevent cumulative effects. This is especially true of vineyards which not only increase sediment yield, but decrease water supply through changing infiltration rates and directly consume surface and groundwater.

Reduce Road Densities: NMFS (1995) has directed the U.S. Forest Service in the Columbia River basin to decrease road densities to less than 2.5 mi./mi.² to reduce sediment and hydrologic impacts to sensitive aquatic species. Mendocino County needs to target reduction of road densities through action items and clear implementation language in the General Plan and a meaningful grading ordinance.

Protect Riparian Zones and Wetlands: Vegetation on the margins of a stream in the zone of aquatic influence is known as the riparian zone and this area is recognized as directly linked to aquatic health. Riparian zones provide shade and a cool microclimate to buffer water temperatures and absorb or buffer nutrient runoff or non-point source pollution (Spence et al. 1996). Trees along the banks of streams help to define the channel and provide habitat for fish under root masses or when large trees fall in to streams. Surface water-groundwater connections are also often common in riparian wetland areas and equipment operation or building in these zones thereby decreases cold water availability and decreases other riparian functions. This problem is compounded if a well is drilled in the stream side zone and water withdrawn to support development. Therefore, the Mendocino County General Plan needs to have action items and implementation language that specifically addresses minimizing riparian impacts of development or land use.

Decrease Use of Toxic Herbicides and Pesticides: Ewing (1999) did a review of the literature on impacts of herbicides and pesticides on Pacific salmon and documents numerous sublethal effects in addition to numerous documented fish kills due to large scale spills. Effects may include altered swimming ability, reduced feeding, reduced ability to avoid predators, disruption of schooling behavior, inability to smolt and reduced resistance to disease. Some pesticides and hormones like estrogen from waste water facilities can “mimic or block of sex hormones, causing abnormal sexual development, feminization of males, abnormal sex ratios, and unusual mating behavior” even at low concentrations. Ewing (1999) recommended the following:

“Pest management approaches that do not depend on pesticide use in agricultural and non-agricultural settings should be encouraged and further developed. There is ample evidence that ecologically sound and economically viable methods can be successfully implemented. The adoption of such alternatives can be encouraged through technical assistance, financial incentives and disincentives, demonstration programs, and information exchange opportunities.”

Conclusion

In 20 years as a biological consultant I have never seen a land use planning document that was as patently flawed with regard to coverage of fisheries and cumulative effects as the Mendocino County General Plan revision and its associated DEIS. It may seem politically expedient and seemingly deft to pass off public trust responsibilities to other agencies, but Mendocino County shares these responsibilities and must act accordingly. The result of this pattern of avoidance of issues of substance and lack of clear action or implementation language makes these documents fundamentally flawed and doomed to failure, if tested in court for CEQA compliance. Mendocino County KRIS projects are available on the Internet, but I am attaching my previous environmental reports for your use and that of the Mendocino County Planning Department. I hope that Mendocino County begins to better integrate scientific knowledge into its planning framework not only to comply with CEQA but to achieve more enlightened planning outcomes that protect public trust resources and the quality of life of its citizens into the future. If Planning Department staff wants to have KRIS projects loaded on their computers, where they have greater analytical power and more functions for review, I would be happy to provide them CD or DVD copies.

Should you have any questions, please feel free to call me. I would also be happy to discuss these issues with Mendocino County Planning Department staff as well.

Sincerely,

A handwritten signature in black ink, appearing to read 'Patrick Higgins', with a large, sweeping flourish extending to the right.

Patrick Higgins

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Personal Communications

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