Quartz Valley Indian Reservation
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November 2, 2005

Catherine Kuhlman, Executive Officer
North Coast Regional Water Quality Control Board
5550 Skylane Blvd.,Suite A
Santa Rosa, CA 95403

Dear Ms. Kuhlman,

The Quartz Valley Indian Community of Quartz Valley Indian Reservation (QVIR), with the assistance of our consultants Kier Associates, have reviewed the public draft version of the North Coast Regional Water Quality Control Board's (RWB) Staff Report for the *Action Plan for the Scott River Watershed Sediment and Temperature Total Maximum Daily Loads* (Scott TMDL). As stated in previous comments, the Tribe hopes that the Scott TMDL will result in measurable and timely improvements in the water quality of the Scott River watershed. Please realize that QVIR is the only federally recognized, sovereign tribal government in the Scott Valley. The consideration that the Board gives to our comments should be representative of this fact.

We appreciate the efforts of your staff in the creation of this document and have worked with them to support the development of the Scott TMDL. With the assistance of our consultants, we have collaborated and shared data to assist in this process. The Board and its Staff should be well aware of QVIRs position on the Scott River TMDL. The Tribe has submitted past comments both verbally and in writing to the Board and Staff. Additionally, my staff and consultants have participated in the Scott River TMDL Technical Advisory Group. Regardless, please find attached the official comments of the Quartz Valley Indian Reservation regarding the Scott River TMDL and Implementation Plan.

The QVIR supports the concept of the TMDL. The Tribe would like to see the Scott River Watershed restored to historical healthy and sustainable conditions. Although we do have some remaining concerns with the document and question some of the implementation approaches, we feel overall that the Scott TMDL is a good place to begin with action towards restoring the historic water quality of the Scott River Watershed.

As stated previously, the Tribe supports a Scott Valley Groundwater Study. We question the sustainability of the current method of unlimited and unregulated groundwater extraction. The Tribe agrees with the TMDLs acknowledgement of the link between ground and surface water and was pleased to see the connection recognized by the Board. However, we

question the ability of Siskiyou County to adequately conduct the study based on limited funding and technical capabilities. Agencies such as the Department of Water Resources and United States Geological Survey are better equipped and experienced to undertake a study of this magnitude and nature. We request that QVIR be intimately involved in the development and implementation of the groundwater study. Additionally, all data and information used and produced in this study should be transparent and publicly accessible.

We understand the Regional Board has limited staff and funding, therefore we would like to provide assistance by being involved in the implementation of the TMDL and working on a government to government basis with monitoring and restoration. Additionally, the Tribe would like to be a party in the suggested Memorandums of Understanding between federal agencies and the Regional Board.

I would like to stress the Tribe's sentiment that the state of the Scott Watershed is in peril and needs immediate attention and action. The implementation schedule is not timely enough to protect the watershed in the face of climatic changes, future development, and increased land use. My people have seen the creeks and rivers of Scott Valley dry up and become seasonal waters. We have seen populations of coho, Chinook, steelhead, and lamprey severely decline in the Scott Watershed. To us, water is life. We are concerned about the future of our lives and call upon the North Coast and State Water Boards to protect and heal this watershed.

Attached, you will find technical comments and recommendations. Please contact myself or my environmental staff at 530-468-5907 for further information or clarification on the issues discussed.

Thank you,

Harold Bennett
Vice Chairman

Cc: Beverly Wasson, Chairperson, North Coast Regional Water Quality Control Board
John Corbett, Vice-Chair, North Coast Regional Water Quality Control Board
Dr. Ranjit Gill, North Coast Regional Water Quality Control Board
David Leland, North Coast Regional Water Quality Control Board
Bryan McFadin, North Coast Regional Water Quality Control Board
Rebecca Fitzgerald, North Coast Regional Water Quality Control Board
Art Baggett Jr., State Water Resources Control Board
Adrian Perez, State Water Resources Control Board
Tim Wilhite, United States Environmental Protection Agency
Janis Gomes, United States Environmental Protection Agency
Gail Louis, United States Environmental Protection Agency

Summary of Comments

The public draft Scott TMDL reflects a lot of hard work by the NCRWQCB staff and its consultants. The maps provided are useful, the Guidance for Development of Erosion Control Plans (Appendix C) is exhaustive, and the narrative concerning the processes which impact sediment and temperature conditions is revealing. The recognition of the relationship between water extraction and stream temperatures is laudable.

There are still critical deficiencies in the Scott TMDL technical analysis and implementation plan that are likely to frustrate the success of temperature and sediment pollution abatement efforts and the restoration of coho salmon and other at-risk Pacific salmon species.

Technical analysis:

- The failure to quantify the extent of important land uses that impact water quality, such as timber harvest, road densities, near-stream roads, and road-stream crossings.
- The failure to use all available tools to identify and manage risks to water quality. Use of the readily-available SHALSTAB shallow debris torrent model, for example, would enable the identification of erosion hazard areas that could then be used to evaluate the relationships among past watershed management activities and as a screen for guiding future watershed management decisions.

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- Remote-sensed vegetation data, including change scene detection data, should have been used to characterize forest health, growth and its relationship to cumulative watershed effects.
- The failure to spell out that peak flows in many watersheds within the Scott basin are unnaturally high due to land use impacts. Timber harvest and roads elevate the risk associated with rain-on-snow events and they increase peak flows, which, in turn, accelerate erosion and channel scouring which result in shallow, open streams that are then vulnerable to warming
- The lack of transparency of models and the data used in them is regrettable. All models and data utilized in the Scott TMDL should be available for public review. These datasets include all the GIS data (including roads, streams, and landslides), road surveys, temperature data, and macro-invertebrate data. In comments on the pre-draft, we requested access to these data so that we could evaluate them. Regional Water Board staff have sent only portions of the data, and have indicated that the rest of the data will be arrive later -- but have not yet delivered the missing data.

Implementation:

- Relies far too much on voluntary measures and needs to be strengthened to give dischargers more incentive to improve practices
- Failure to take necessary actions to ameliorate the impacts of water use on water quality.
- Failure to target essential coho salmon habitat and prioritize it for protection and restoration.

- While the technical analysis recognizes cottonwood gallery forest as the potential vegetation for valley riparian areas, the implementation chapter does not set forth a plan that will allow restoration of a more natural sinuous channel with a connection to its floodplain; without such changes, full riparian restoration will likely be confounded.
- Relies too heavily on the State's Forest Practice Rules program, which has been scientifically demonstrated, to both the California State Board of Forestry and the Regional Water Board, to be inadequate to protect stream habitat needed for the recovery of at-risk Pacific salmon like coho salmon. Waste Discharge Requirements are mentioned as a tool, but the TMDL should provide guidance for how they can effectively used to set prudent limits on cumulative watershed effects risks by reducing road densities, road stream crossing density, and restricting the percent of watershed area that can be harvested.

Monitoring:

- The lack of a clear and specific monitoring plan that would help track the success of mitigation and restoration measures, and which would allow for cooperative adaptive management, including Tribal participation, as an element of the TMDL's implementation. The TMDL asserts that a monitoring plan will be developed later, but it would be better to formulate a preliminary plan now.

Spence et al. (1996) point out that aquatic habitat conditions are directly correlated to upland watershed health. The Scott TMDL needs to recognize that in order to restore aquatic habitat diversity capable of supporting species like coho salmon, watershed and riparian conditions need to trend more toward the natural range of variability of vegetative seral stage conditions and hydrologic functions.

The TMDL Action Plan will become an amendment to the North Coast Basin Plan (NCRWQCB, 2003). This will require that the Plan meet the standards of Section 13242 of the California Water Code concerning specific actions, their timing, and the Regional Water Board's responsibility for monitoring such actions and timelines necessary to achieve the water quality objectives that the State sets. The Tribe will be evaluating the final Scott TMDL closely to make sure that it describes mechanisms of degradation, methods of remediation, a timeline to reverse impairment, and clear monitoring steps to gauge the attainment of its water quality restoration objectives.

Additional data produced to support review and implementation of the Scott TMDL

Please review the linked ArcView project assembled by Kier Associates for support of review of the Scott River Sediment and Temperature TMDL on behalf of the Klamath Basin Tribal Water Quality Work Group.

http://www.krisweb.com/ftp/TMDL/scott_tmdl_gis_map_project.zip

These data have also been enfolded into the Klamath Resource Information System (KRIS) database for the Scott, taking advantage of the KRIS Map Viewer feature. Spatial data augment KRIS Version 3.0 and allow all Tribes, the North Coast Regional Water Quality Control Board staff, U.S. Environmental Protection Agency and others

cooperating in development of the Scott River TMDL. Data may be used in revision of the Scott River Sediment and Temperature TMDL, but should also prove useful in the implementation phase.

Kier Associates, on behalf of the Klamath Basin Tribal Water Quality Working Group, also produced a SHALSTAB model run for the Scott River watershed, resulting in a map of predicted unstable areas in the watershed. Due to its file size, the SHALSTAB run is being distributed separately. It is available for download at:

http://www.krisweb.com/ftp/TMDL/ScottShalstab.zip

Chapter 1: Introduction

Watershed Restoration and Enhancement Efforts: Section 1.4 of the Scott TMDL lauds the success of Scott River restoration programs, but supplies no data other than that for French Creek to demonstrate benefits to water quality. The *Mid-term Evaluation of the Klamath River Basin Fisheries Restoration Program* (Kier Associates, 1999) is not referenced, although it provides a useful overview of the success of the projects and changes in habitat during the duration of the program efforts that began in 1985. The Scott TMDL needs to require that all data useful for evaluation of restoration projects be publicly shared and it needs to specifically define needed monitoring associated with current and future restoration projects, including organized photo points. Restoration and protective actions need to target those areas with the greatest existing aquatic and biological diversity as a priority (Bradbury et al., 1996).

1.5.6 Hydrology:
The following language was added to section 4.1.2.2, which addresses a pre-draft TMDL comment (QVIC 2005b) that aggradation can also contribute to diminished surface flow, "(Channel dewatering can also be affected by channel aggradation as a result of increased sediment loads.)"

The Hydrology section has discussions of ground water and its relationship to surface flows that would be improved if the effects of wells were included. (for additional comments on groundwater and wells, see section 4.1.2.2 and 5.1.8.2 below)

Chapter 2: Problem Statement

2.3.1 Salmonid Populations
The final Scott TMDL needs to explicitly recognize what is known about coho salmon in the Scott River basin as recommended in early comments by QVIC (2004, 2005b). We suggest that the following language be added to the end of the second paragraph on page 2-5 (after "… no population estimates were made from this information): "In recent years, many surveys have been conducted to identify locations where coho salmon spawn (Quigley, 2005, Maurer, 2002; Maurer, 2003; SRCD, 2004). These data provide clear indication of a difference in strength between year-classes (two are weak and one is strong), and that all

three brood years are showing positive trends (SRCD, 2005). CDFG (2004) and others have produced detailed maps of coho salmon distribution within the Scott River watershed (Figure 1).

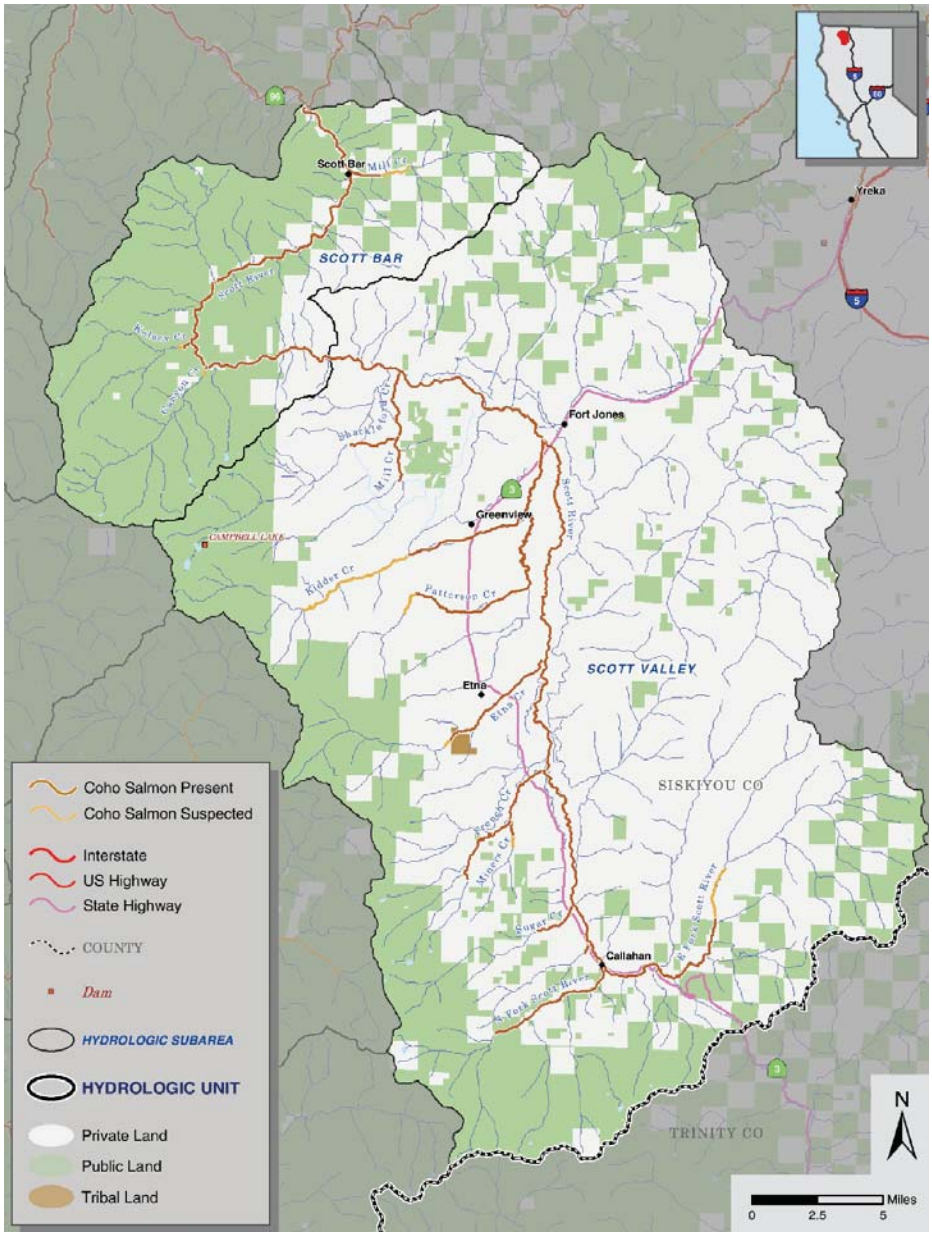

Figure 1. Suspected and confirmed range of coho salmon in the Scott River watershed. From CDFG (2004).

The risk of coho stock loss is high when there are very weak year classes (Rieman et al., 1993; CDFG, 2004). The Final Scott TMDLs in the Scott River basin need to recognize that aquatic habitat problems must be resolved or, at least, showing major recovery trends by 2015-2020, when ocean conditions are likely to enter a period of poor survival for salmon due to the Pacific Decadal Oscillation (Collison et al., 2003).

While the Scott River TMDL posted a chart of fall chinook salmon trends, it did not discuss the fact that the 2004 adult return was the lowest of all time. The South Fork Trinity TMDL (U.S. EPA, 1998c) has goals for recovery of fall and spring chinook populations and the final Scott TMDL should advance similar biological targets. Kier Associates (1999) point out that egg survival of fall chinook spawning in the Scott River canyon may be low due to the potential for intrusion of sand into redds. The final Scott TMDL needs to recognize the basin's pattern of use by fall chinook and specifically address the abatement of sediment problems in the canyon where California Department of Fish and Game data show they spawn (Figure 2).

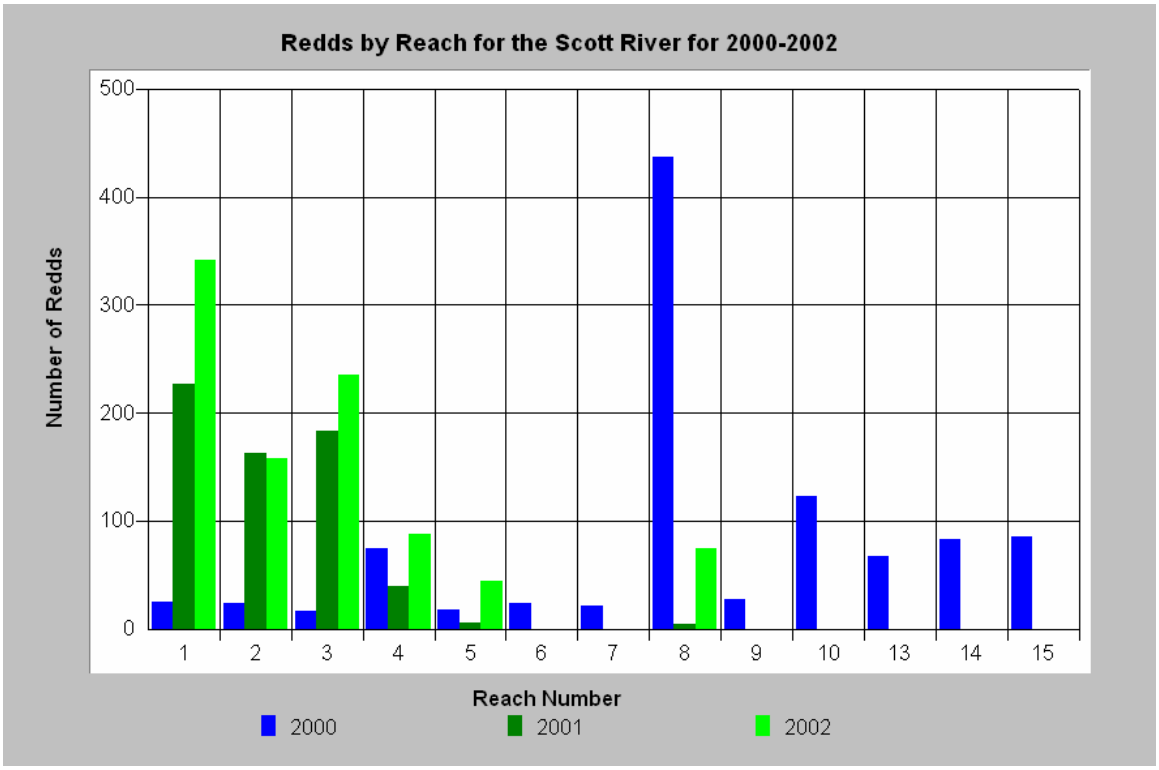

Figure 2. Data from CDFG spawner surveys show that fall chinook salmon spawned mostly in the lowest five reaches of the Scott River in 2001 and 2002, where eggs may be vulnerable due to high bed load of decomposed granitic sands.

The Scott TMDL should recognize also that spring chinook and summer steelhead recovery may be attainable, due to metapopulation function (Rieman et al., 1993), if coldwater refugia are restored in the lower Scott River, sediment burdens diminished, and stream flows improved.

2.4 Sediment Problem Statement: The Scott TMDL Problem Statement should specifically recognize the processes that are causing pollution and the linkages between human activities and water quality impairment. While the origin and mechanisms of water quality problems in the Scott River are well documented (Kier Associates, 1991; 1999; CH2M Hill, 1985), the problem statement describes these relationships only vaguely.

Section 2.4 of the Scott TMDL avoids clear discussion of major topics that must be addressed honestly if sediment pollution is to be abated: 1) road densities and crossings need

to be quantified and limits set to reduce the risk they represent for sediment pollution and damaging peak flows, 2) timber harvests and their links to cumulative watershed effects must be described and disturbance limits set, 3) forest growth needs to be assessed to confirm the assumptions made concerning watershed recovery to background levels for sediment yield and natural hydrologic function, and 4) unstable areas need clear identification so that activities on these areas can be limited.

2.4.1.2 Sediment Desired Conditions and 2.4.3 Watershed Sediment Conditions in the Scott River Watershed

Our comments on these sections are combined. See below for details on each topic.

Road Densities and Road Effects

The issues raised by Kier Associates (2004, 2005a, 2005b) regarding road density have not addressed in the draft Scott TMDL. While recognizing that problems are sometimes associated with roads, there is no target or threshold set to remedy impairment. Although the Scott TMDL mentions road density limits of 2.5 mi. /sq. mi. set by Armentrout et al. (1999) for those Lassen National Forest streams which harbor anadromous salmonids, it fails to set a similar standard**:** "The Scott River TMDL Action Plan does not propose road density as a specific desired condition for the Scott River watershed, although a decreasing trend in road densities would be beneficial." This is only one of many areas where there is no enforceable, follow-up action to assure the abatement of water quality problems. A target for road densities of less than 2.5 mi./sq. mi should be included in Table 2.4.

Cedarholm et al. (1981) found a direct correlation between road densities and increases in fine sediment harmful to salmonid spawning in streams. The U.S. Forest Service (1996) compared data for bull trout and other salmonid species with road densities over 3,000 interior Columbia River basin watersheds. They concluded that**:** "the higher the road density, the lower the proportion of sub-watersheds that support strong populations of key salmonids" and that bull trout were absent from watersheds with more than 1.7 mi. /sq. mi. of watershed area. They also found a relationship between fine sediment in streams and road density. The USFS (1996) road density classification is shown as Figure 3. The National Marine Fisheries Service (1996) has required that road mileage be reduced in USFS and BLM lands in the interior Columbia River basin with an emphasis on "road closure, obliteration, and revegetation" where road densities exceed 2 mi. /sq. mi. on.

Roads are known to cause higher erosion on unstable rock types, such as decomposed granite (DG), in the Scott River basin (Sommarstrom et al., 1990). Consequently road density targets for sub-basins with DG need lower targets than 2.5 miles per square mile. Sommarstrom et al. (1990) found that road densities were already 3.7 miles per square mile in the Scott's DG areas in 1990. The only analysis of road density in the Scott TMDL is in Table 3.3, where densities are amalgamated into TMDL sub-basins, which may ignore extremely high localized road conditions, such as the 8.9 mi./sq. mi. of roads on private industrial timber land in Shackleford and Mill Creeks (SHN, 1999).

The VESTRA-developed GIS layer of roads used by the RWB for its TMDL under-represents roads and skid trails in some areas of the Scott watershed (Figure 4). Only major haul roads are included, which means that many temporary roads and skid roads that can increase erosion remain unaccounted. This should be noted under margins of safety in 3.5.4.

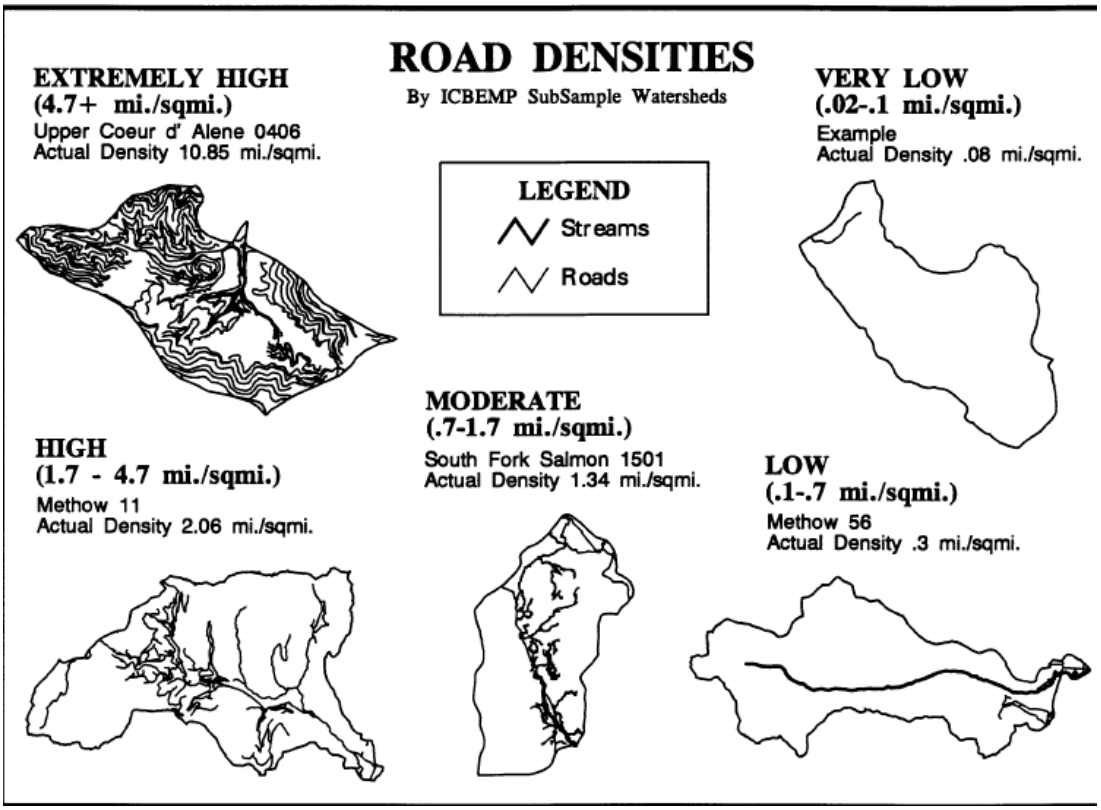

Figure 3. This figure shows the road density classification for the Interior Columbia River basin that is recognized by the USFS (1996) in relationship to maintaining aquatic biodiversity.

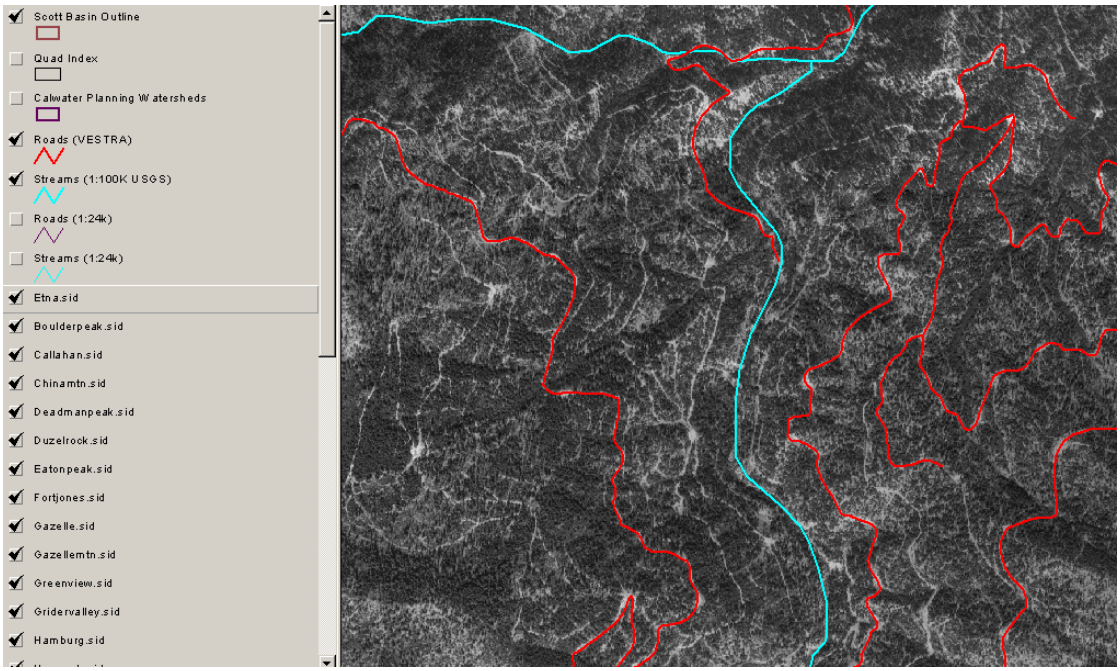

Figure 4. This map is of the upper Patterson Creek drainage and shows mapped roads in red, but USGS orthophotos also displayed show many more roads than are mapped.

The final Scott TMDL should provide a table of road densities by Calwater Planning Watershed. There are 68 Calwater Planning Watersheds in the Scott River basin. A chart should be made for each of the sub-basins where there is high road densities associated with land management. These charts and tables could be easily made from existing data by a capable GIS analyst, of which the RWB has several. In the sediment source analysis for the mainstem Trinity River (Graham Matthews and Associates, 2001), table 37 (page 127) were presented showing road lengths, drainage area, and road densities. An example of a chart made from such data by Graham Matthews and Associates (2001) may be seen at http://www.krisweb.com/krisklamthtrinity/krisdb/webbuilder/nt_c17.htm

A major reason that Scott River basin road densities need to be reduced is that they can alter the hydrology of the watershed as described by Jones and Grant (1996). Roads that cut into hillsides often disrupt sub-surface drainage increasing peak flows during storm events and decreasing ground water recharge that supports summer base flows. Increased peak discharge can also simplify channels, wash away large woody debris, fill pools and cause bank erosion (Montgomery and Buffington, 1993). Without reducing road densities and restoring natural hydrology, natural flow regimes with which salmon co-evolved cannot be restored.

Stream Crossings with Diversion- or Significant Failure Potential

Section 2.4.3.1 of the Scott TMDL deals with the potential for failure at road crossings, but fails to note that some stream crossings in steep areas may cross the paths of debris torrents. The USFS replaced culverts with concrete fords in such high-risk areas of high in the lower Scott River (Kier Associates, 1999). The Klamath National Forest (KNF) study of the 1997 flood (de la Fuente and Elder, 1998) indicated that channel scour in many tributaries was caused by multiple culvert failures at different locations on the same stream. In a study of Sierra streams, Armentrout et al. (1998) recommended that stream crossings be limited to less than 2 per mile of stream to prevent catastrophic failure of "stacked culverts." The TMDL should limit the number of stream crossings and recommend that the USFS method of changing crossing types in high-risk locations be carried out on private land as well. A target of less than 2 crossings per mile of stream in high-risk areas should be added to Table 2.4.

Information should be included in this section from Klamath National Forest data collected as part of the de la Fuente and Elder (1998). The KNF coverage "damage_all" contains information from Emergency Relief Federally Owned (ERFO) Damage Site Reports from the 1997 post-flood field assessments by Forest Engineering. Joining that coverage with its lookup table "all_lut.xls" allows for the viewing of flood damage sites by type. Of the 39 sites identified in the Scott River watershed, 29 were road/stream crossing failures (type "S" in lookup table). It is unknown how many road-stream crossings were surveyed, but the failure rate is likely higher than the TMDL target of 1% of crossings failing in a 100-yr return interval storm, given that the 1997 storm was only a 14-year return interval storm.

Hydrologic Connectivity

The Scott TMDL discussion on Hydrologic Connectivity (in 2.4.1.2) makes assumptions with regard to road-related projects on timberlands that may not be supported. For example, it implies that roads can be hydrologically disconnected and that impacts from roads can be fully mitigated without reducing road densities. A RWB commissioned study

by an independent science review panel on coastal streams (Collison et al., 2003) indicated that similar assertions made by Pacific Lumber Company in their watershed analyses (PL, 2002) were unfounded. Collison et al. (2003) noted that "storm-proofing and road upgrading are suggested in the prescriptions to overcome excess sediment production; however, no data have been presented that demonstrates the effectiveness of these programs." Upgrading roads can reduce but not eliminate hydrologic and sediment impacts. Even if roads are well-built and maintained, dense road networks can still cause problems due simply to the sheer number of road miles. If the Scott TMDL applies assumptions related to roads and erosion, the Implementation Plan should require a validation of such assumptions, both with respect to sediment yield and changes in hydrology.

Annual Road Inspection and Correction

Section 2.4.3.3 of the TMDL recognizes the need to inspect roads at least annually and to correct problems promptly when they occur, but it fails to include any enforceable language to meet that objective. The KNF has approximately three times more road miles than can be annually inspected and actively maintained (de la Fuente and Elder, 1998). This suggests that the KNF road network needs to be substantially reduced if road-related erosion is to be controlled. The Redwood Creek TMDL (U.S. EPA, 1998) specifies that "All roads are inspected and maintained annually or decommissioned" and that "Roads that are closed, abandoned, or obliterated are hydrologically maintenance free." The road network in the Scott River basin is well beyond that which can be maintained, and a similar requirement to that in the Redwood Creek TMDL is needed for the Scott TMDL.

Activity in Unstable Areas

There is no specific discussion of disturbance of chronically unstable areas by timber harvest or road building in the Scott TMDL**:** "analysis of activities in unstable areas was not conducted for this report." The document recognizes that the shallow landslide stability (SHALSTAB) model can be used to successfully predict "chronic risk areas including steep slopes, inner gorges, and headwall swales" (Dietrich et al., 1998) and it also notes the increased failure risk associated with inner gorge locations (Graham Matthews and Associates, 2001). Kier Associates (Derksen, 2005) used 10 meter USGS DEM data to run the SHALSTAB model for the Scott River watershed and has provided that data to RWB staff for use in drafting the final Scott TMDL (Figure 5). This reconnaissance-level activity showed a high correlation between high-risk areas for shallow landslides and those landslides actually mapped by the USFS (de la Fuente and Elder, 1998).

We recommend that the RWB and other use SHALSTAB as a preliminary screen, not necessarily as the ultimate decision tool, to identify unstable areas requiring protection in the Scott TMDL. If actions are proposed in the identified areas, then an on-the-ground survey by a geologist could provide field-based information to supplement the SHALSTAB model.

SHALSTAB maps should be included in Section 2.4.3.6 of the TMDL, and should also be made available electronically in a GIS format. The SHALSTAB maps should also be used in GIS analyses to quantify the percentage of the predicted unstable areas that have been disturbed in each Calwater Planning Watershed.

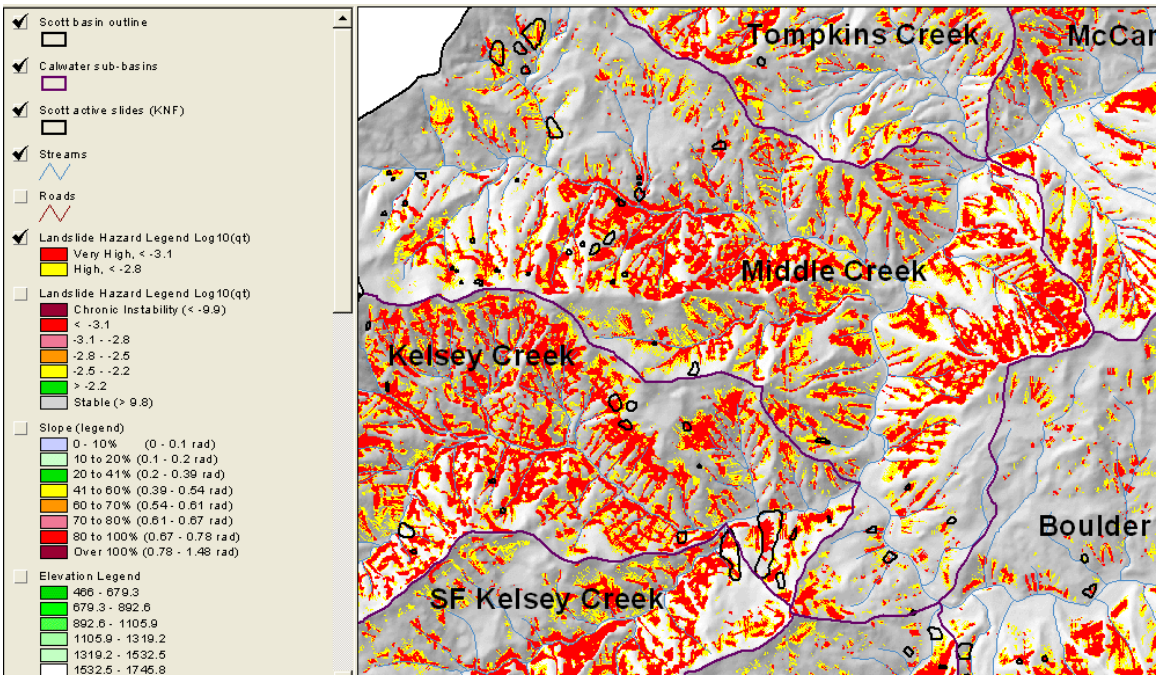

Figure 5. This map is taken from an ArcView project by Derksen (2005) and shows that the risk of shallow debris torrents in the lower Scott River is high and that the large majority of landslides mapped by Klamath National Forest scientists occurred on areas shown here as high risk.

Disturbed Areas

While Section 2.4.3.5 of the Draft TMDL is correct in stating that the there no information or analysis "sufficient to identify a threshold below which effects on the Scott River watershed would be insignificant", it would still be valuable to use existing data to calculate disturbed areas. Timber harvest data are available for all periods from the Klamath National Forest, but only between 1991 and 2001 on private land from CDF. Similar to the road density and road location maps requested above, we recommend that the RWB include TMDL tables and charts of the percentage of each Calwater Planning Watershed that has been timber harvested over the period of available data, and include them in section 2.4.3.5.

There is no indication there was any serious effort by the TMDL authors to quantify timber harvest, except generally under "activities", on unstable lands even though timber harvest has been linked to sediment production and changes in hydrology by recent northern California studies conducted for the State, including for the RWB itself (Ligon et al, 1999; Dunne et al, 2001; Collison et al., 2003). Reeves et al. (1993) suggest that a maximum of 25% of a watershed should be harvested in 30 years in order to maintain diverse assemblages of Pacific salmon. Ligon et al. (1999) pointed out that the lack of quantification and limits on timber harvest was confounding efforts to control watershed impacts and protect Pacific salmon in California.

Sommarstrom et al. (1990) indicated that "39% of the granitic area has been harvested, not including site re-entries, based on data from 1958-1988 for public lands and 1974-present for private lands." Decomposed granitic soils are notoriously xeric after timber harvest and the regeneration of forest vegetation can be slow (TCRCD, 1998). Consequently, timber

harvests not mapped by the RWB and its staff that occurred between the late 1970s and 1992 may still be contributing to cumulative watershed effects, including sediment yield.

Analysis of Cumulative Watershed Effects

The RWB staff should be using remote sensing data for reconnaissance and analysis, such as change scene detection, to understand the patterns of landscape disturbance and forest growth and to build that knowledge into the TMDL. Change scene detection involves the use of a series of Landsat scenes from different years in order to compare patterns in landscape change over a given period (Levien et al., 2002). The necessary data are available from the California Department of Forestry (CDF) and U.S. Forest Service Spatial Analysis Lab in Sacramento for the period 1994-1998.

Figure 6 shows a summary of change scene data from 40 of the 68 Scott River Calwater Planning Watersheds sorted by the highest level of disturbance. Areas with the highest rates of recent disturbance have the greatest risk of CWE and should be studied as a priority and called out as a concern. The northeastern and northwestern parts of the Scott Valley (the West Canyon and East Canyon sub-basins) watersheds had the highest change in vegetation owing to the high rates of timber harvest on both private and USFS lands. Patterns of disturbance include sensitive headwaters areas, inner gorge locations, and riparian zones (Figures 7 and 8).

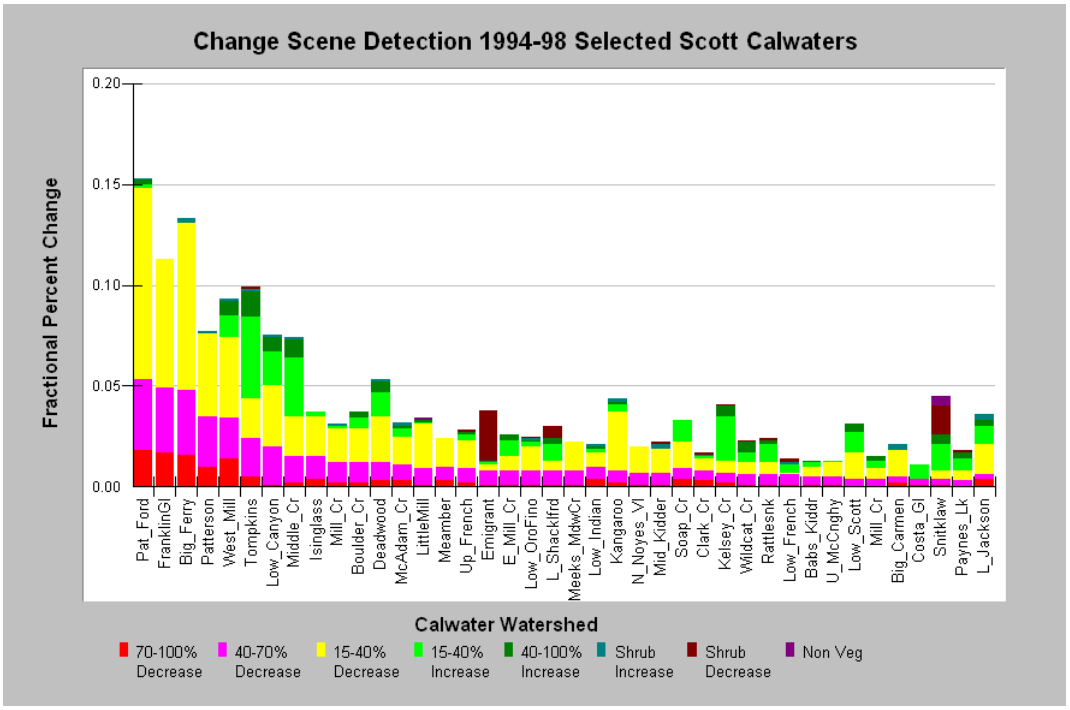

Figure 6. This chart shows change scene detection for 40 Calwater Planning Watersheds in the Scott River basin based on USFS and CDF interpretation of Landsat scenes from 1994 and 1998.

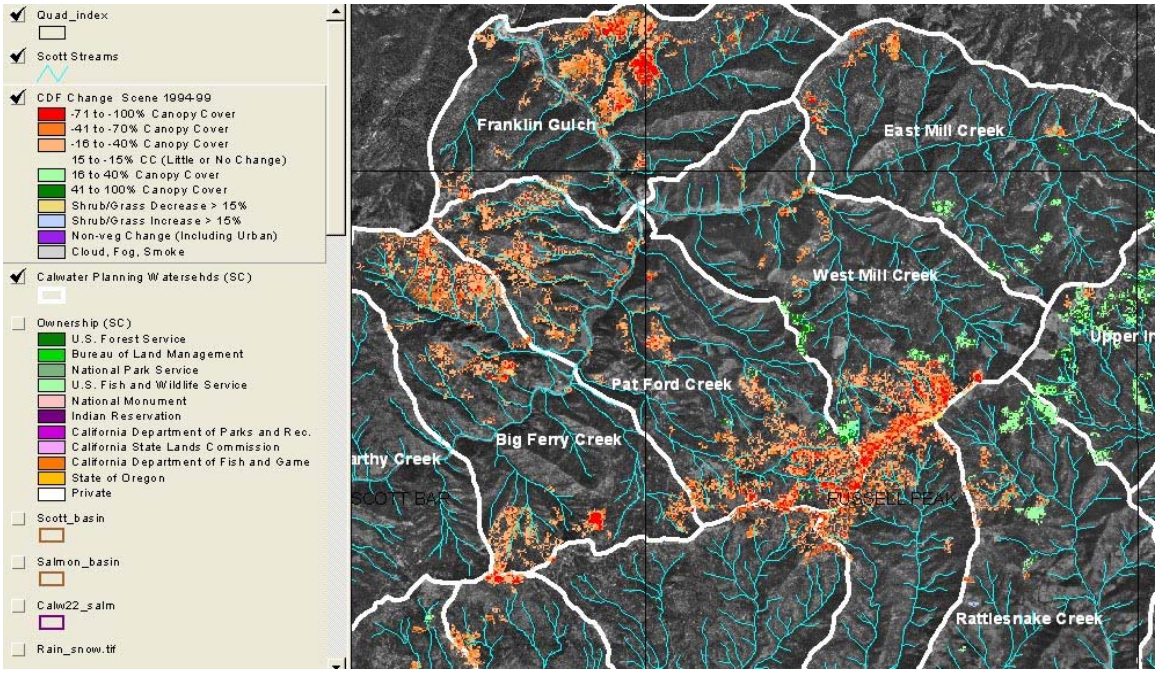

Figure 7. Landsat change scene detection from 1994-1998 shows major canopy reduction.

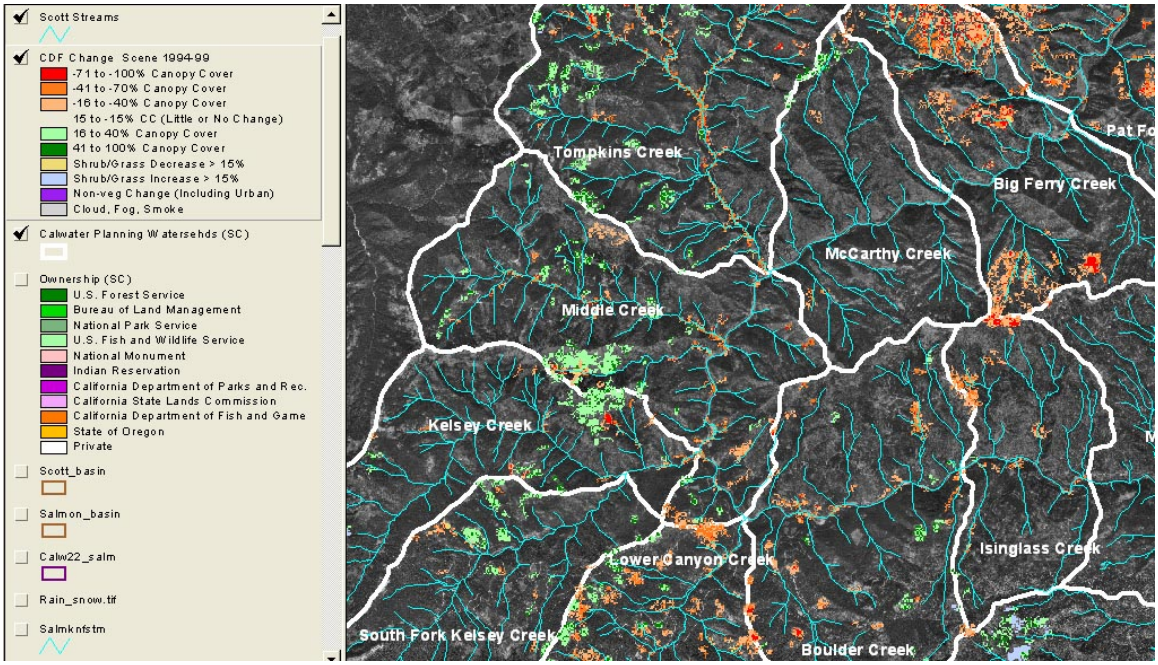

Figure 8. Change scene detection from 1994 and 1998 Landsat images for West Canyon sub-basin areas shows forest canopy reduction from logging (orange and red) and forest regrowth (green) where trees are growing back in areas formerly harvested or burned.

The West Canyon (northwestern area of Scott watershed) is largely owned and managed by the U.S. Forest Service, but timber harvest activity is widespread (Figures 7 and 8). While canopy reduction shows areas recently harvested, it shows tracks of debris torrents and channel scour as linear patterns bordering Tomkins Gulch and lower Middle and Kelsey

Creeks. The channel-resetting debris torrents caused by the January 1997 storm were a very high level of impact for a 14-35 year return interval event (de la Fuente and Elder, 1998). Patterns of disturbance indicated that roads, clear cuts, and previous fires tended to elevate contributions of sediment (Figure 7) and those failures often occurred in the rain on snow zone. Green polygons displayed in change scene data indicate growth in areas that were logged previously or disturbed by fire in the 1980's. Forest recovery after logging in this geographic area is good because it is the wettest portion of the Scott River basin, but regeneration in more arid sub-basin areas appears much lower.

Although the TMDL did not identify impacts from landslides and sediment to the East Fork Scott River sub-basin, the East Fork experienced channel scour and flood damage as a result of the January 1997 storm event (Kier Associates, 1999). Timber harvest was high during the period of 1994-1998 on public and private land in some areas that are likely subject to rain-on-snow events in this sub-basin (Figure 8). Patterns of disturbance in transient snow zone and linkage to increased peak flow and channel scour of the East Fork need to be explored. Lack of tree growth in areas previously harvested may cause a window of extended risk for rain-on-snow events (Figure 9). Patterns of road failures from de la Fuente and Elder (1998) are similar to other areas in the transient snow zone. These patterns likely extended to private timber lands in the Westside TMDL sub-basin but lack of access to private lands prevented appropriate assessment by RWB staff.

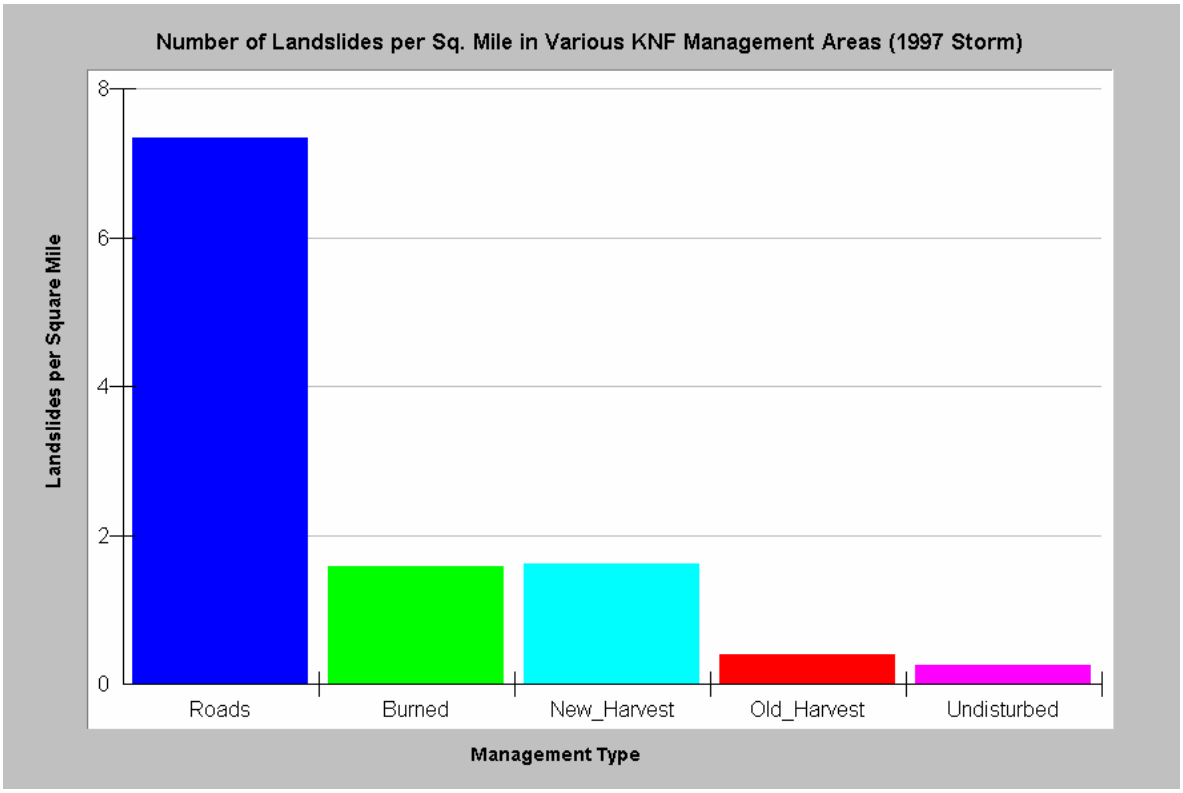

Figure 9. This summary chart is based on data from de la Fuente and Elder (1998) regarding 1997 flood effects and shows few landslides occurred on undisturbed lands of the Klamath National Forest, and slide frequency was associated with human disturbance.

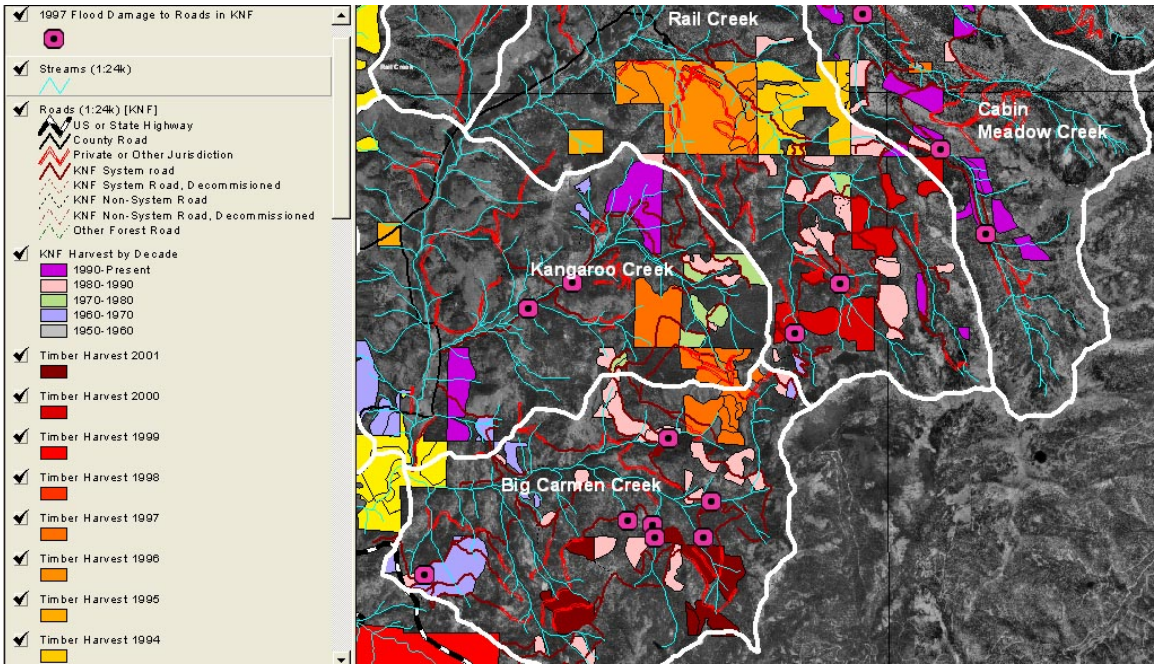

Figure 10. Several East Fork Scott River Calwater Planning Watersheds are shown here with timber harvests, roads and 1997 flood damage sites indicating cumulative effects. Lands include a mix of private and USFS ownership. Data are from the USFS and CDF. Discussion below.

Berris and Harr (1987) and Coffin and Harr (1991) found that old forests trap snow in the canopy and return moisture directly to the atmosphere as a result of ablation. They found that snowfall in a heavily managed or clear-cut forest tends to build up in a snow pack that is less subject to ablation. Consequently peak flows in the transient snow zone may be increased over normal by rain-on-snow events.

Figure 8 shows change scene data for 1994-1998 in the East Headwater TMDL sub-basin with extensive timber harvest, but little forest re-growth. Figures 9 shows Klamath National Forest timber harvests by decade in the Kangaroo Creek and Big Carmen Calwater Planning Watersheds, followed by remote sensing vegetation data in the same area (Figure 10). Comparing the two maps shows that there was little or no re-growth after timber harvest in the 1980s with the polygons of previously logged areas showing up clearly as Non-Forest or Saplings. This indicates problems with forest regeneration. Such stunting would lead to increased and continuing risk of damaging flows due to rain-on-snow events.

A map of the transient snow zone (Figure 11) needs to be added to the Scott TMDL as well as a discussion of increased peak flow, channel scour and resulting increased water temperature. The rain-on-snow zone information provided by Kier Associates is based on Armentrout et al. (1999) and recognizes 3,500 to 5,000 feet in elevation as the area of greatest risk. In order to truly remediate problems as required by law, the TMDL should call for reduced road densities and timber harvest, especially in the transient snow zone.

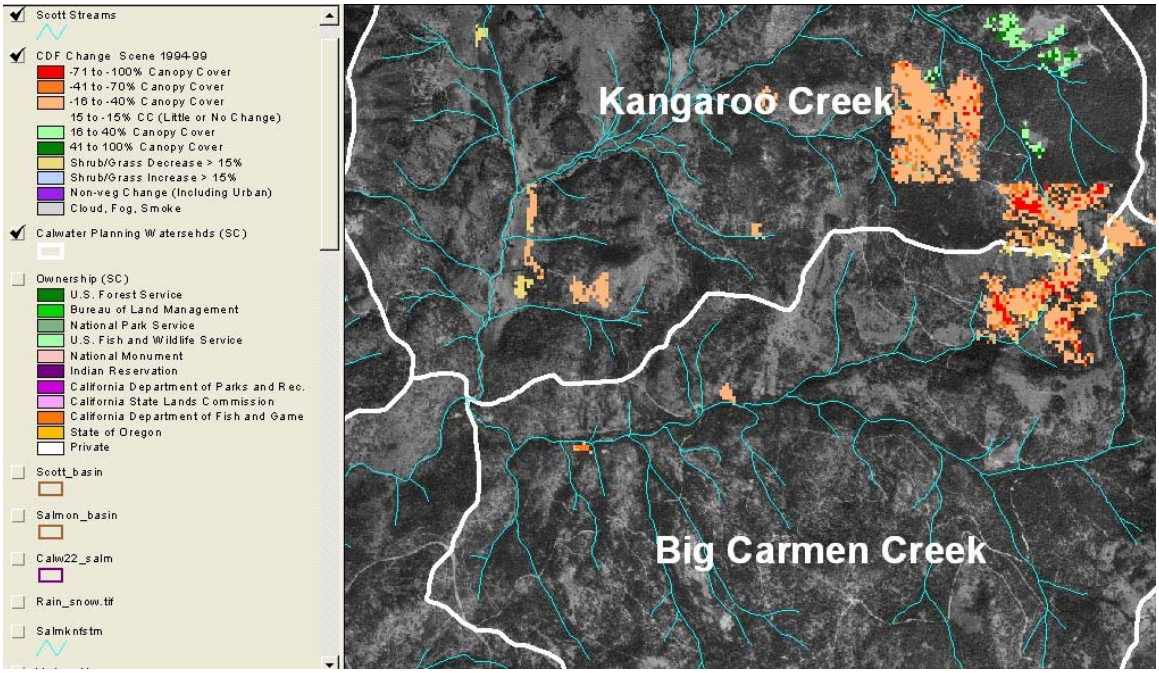

Figure 11. Change scene detection from the USFS and CDF (1994-1998) in East Headwater TMDL basin shows decrease in canopy due to timber harvest, but little forest growth (green). Note that Big Carmen Calwater has widespread indication of earlier logging, sparse tree cover, but no signs of canopy increase.

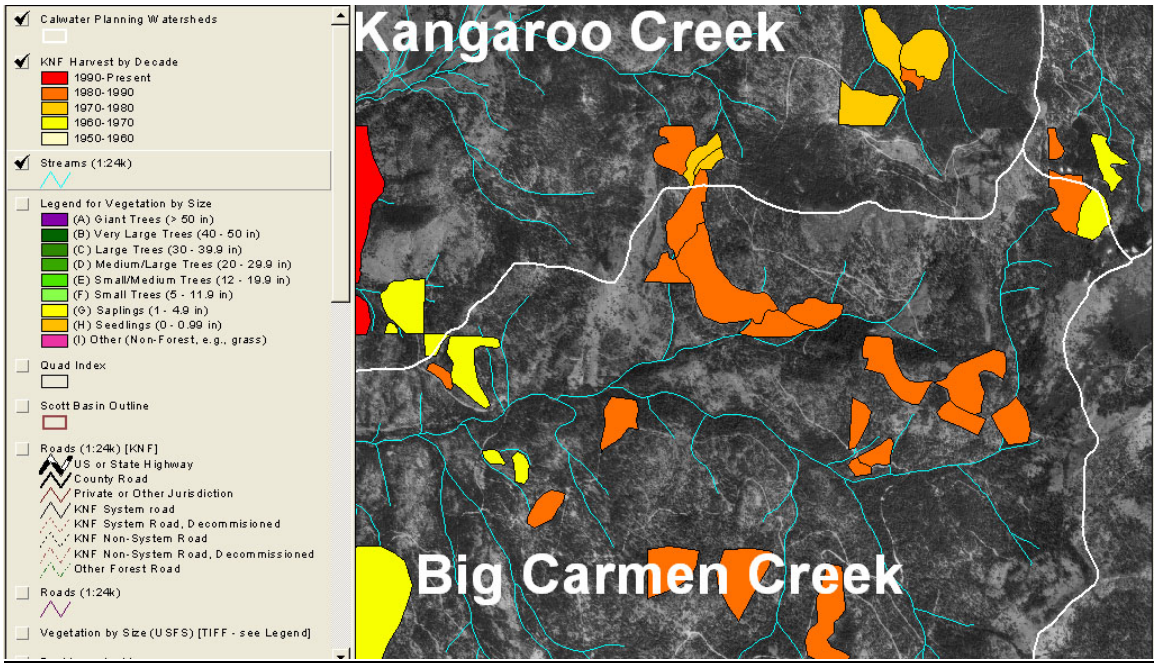

Figure 12. Klamath National Forest timber harvests by decade are displayed for parts of the East Fork Scott in the Kangaroo and Big Carmen Creek Calwater Planning Watersheds. Note the shape of polygons of timber harvest in the 1980s for comparison with Figure 9.

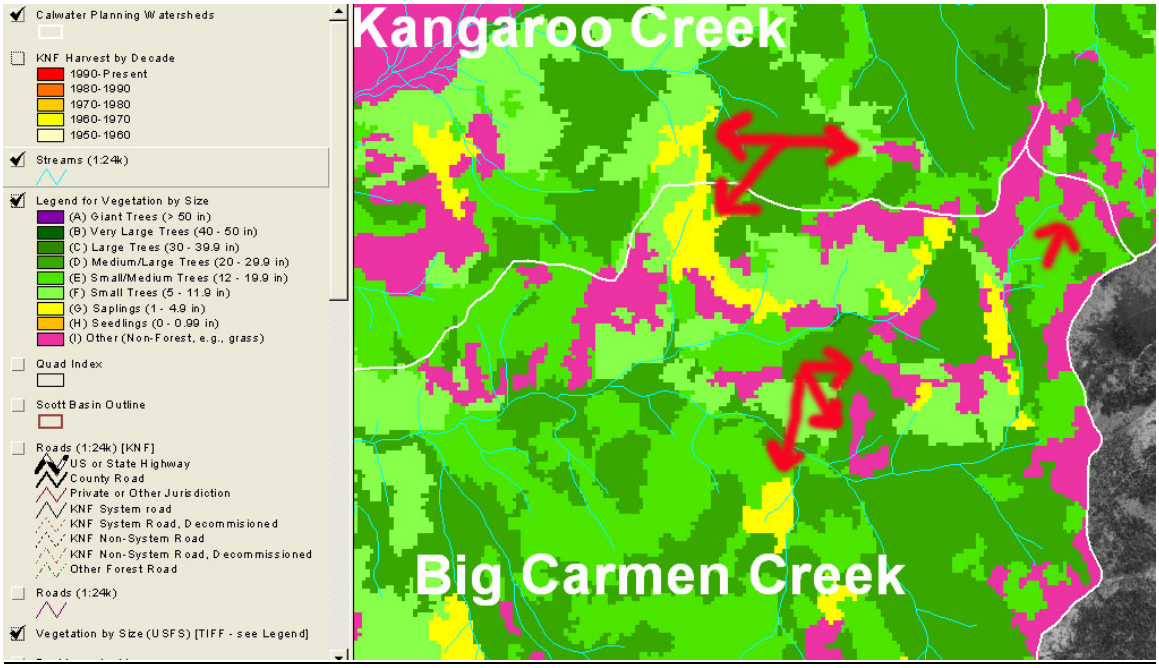

Figure 13. This map of vegetation and tree size is derived from a 1998 Landsat image and shows the same geographic extent as Figure 8. Note that polygons from previous harvest in the 1980s are clearly visible as Non-Forest and Saplings (red arrows point out), indicating extremely slow vegetation growth, which extends the duration of cumulative effects risk of increased flows, especially since this area is in the rain-on-snow events zone.

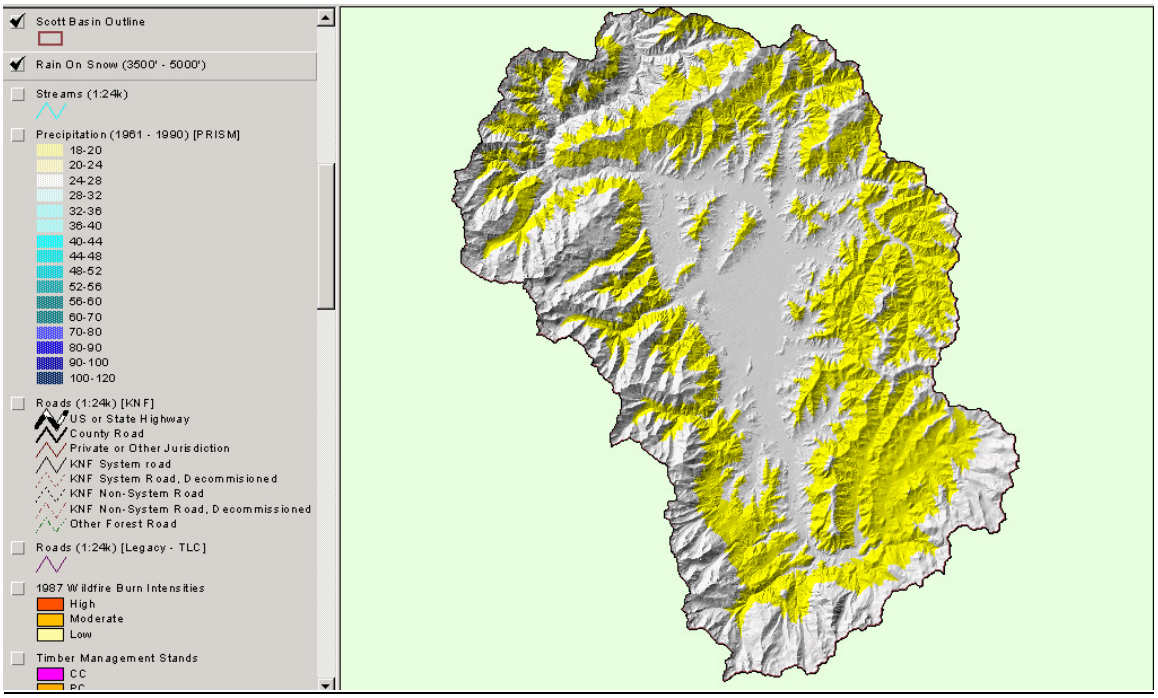

Figure 14. This map shows a band of elevation from 3500 feet to 5000 feet to represent the transient snow zone in the Scott River basin following the convention of Armentrout et al. (1999).

2.4.2 In Stream Sediment Conditions: Table 2.2 in section 2.4.1.1 of the Draft Scott River TMDL partially remedies deficiencies pointed out in pre-draft TMDL comments (Kier Associates, 2005b) by including reference targets for some instream conditions. While many targets are those adopted by previous TMDL processes (U.S. EPA, 1998a; 2001), several found in other north coast studies have been overlooked. The following parameters should be added to Table 2.2: cross-sections, median particle size distribution, volume of sediment in pools (V*), turbidity, mainstem pool depths, and tributary pool depths (see details below). The RWB staff acquired a great deal of data related to channel conditions for the Scott TMDL, but useful summaries (i.e. charts or tables) for most of the datasets are missing from the document.

2.4.2.1 Benthic Macroinvertebrate Assemblages: The Scott TMDL sets target conditions using the Russian River Index of Biotic Integrity (IBI) for comparison. Although the IBI was derived without control streams as part of sampling regimes, values seen in Table 3.2 seem similar to those used nationally to describe healthy streams (Barbour et al., 1999; Barbour and Hill, 2003). The use of the IBI index score of 18 is appropriate, but the EPT Index, Percent Dominance Index and Richness targets in Table 3.2 should also be applied.

2.4.2.2 Riffle Embeddedness: While riffle embeddedness is one measure of suitability for salmonid spawning, it is more subjective than fine sediment measurements. The USFS survey data acquired by the RWB for the Scott TMDL were not provided with any metadata, so it is not known whether all reaches measured were of the same gradient or if channel confinement varied between sites. Habitat typing data for the Scott River basin should have been acquired and queries run for embeddedness so that in-stream conditions could be compared between watersheds with varying upland conditions. (See chart example at http://www.krisweb.com/kristenmile/krisdb/webbuilder/bw_c15.htm)

2.4.2.3 Large Woody Debris: Because there are no data regarding large wood in streams, discussion of its abundance and distribution are lacking in the Scott TMDL. This is a substantial problem because of the importance to coho salmon of pools formed by large wood (Reeves et al., 1988) and because large woody debris may be linked to downwelling and improved local water temperature conditions (Poole and Berman, 2001). Change scene detection shows extensive timber harvest in riparian zones (see Temperature section below). Reeves et al. (1993) found that timber harvest reduced large wood supply to streams, which compromised habitat diversity and caused loss of Pacific salmon species diversity. McHenry et al. (1998) described major reduction of large wood in Olympic Peninsula streams and noted that time required for re-growth of trees large enough to assist aquatic habitat complexity could require over 100 years.

Large wood delivery in steep, headwater swales is largely a result of landslides. If areas with high risk of debris sliding are harvested, the rate of failure increases as a result of loss of root strength (Ziemer, 1981), but large wood that would help meter sediment can be greatly reduced (PWA, 1998). The Scott TMDL needs to follow the guidance of Dunne et al. (2001) and use the best available tools, including remote sensing data and models to examine the relationship of timber harvest and large wood recruitment, particularly in tributaries that are known to be critical habitat for juvenile coho salmon rearing. The final TMDL should specifically describe problems with timber harvest in riparian zones in or above reaches

inhabited by coho salmon so that large wood recruitment can be protected as part of waste discharge requirements under the timber harvest planning process.

2.4.2.4 Pool Distribution and Depth Conditions: Based on comments submitted on the pre-draft, staff added information on pool distribution and depth conditions to the TMDL. These data further confirm sediment impairment in the Scott River watershed. If RWB staff have habitat typing data in electronic form, then summary charts of pool frequency and depth should be constructed similar to one for the Ten Mile River (IFR, 2001) (see http://www.krisweb.com/kristenmile/krisdb/webbuilder/bw_c16.htm). The Redwood Creek TMDL (U.S. EPA, 1998b) specifies that pool depths in streams larger than 3rd order in size have pools at least 1-1.5 meters in depth, which should be applied to Scott River tributaries. Targets for mainstem Scott River pool depth should be set based on historic accounts and should be at least ten feet based on watershed size.

2.4.2.5 Percent Fines Conditions: The Scott TMDL should avoid making references that upper limits, such as 30% fines < 6.4mm, are fully acceptable. Kondolf (2000) showed that this is a level where 50% mortality of salmonid eggs can be expected. Fine sediment data from Lester (1999) for lower Scott River tributaries should be listed in a table and reaches where study was conducted shown on a map.

Discussions of sediment trends as measured by Sommarstrom et al. (1990) and Sommarstrom (2001) need to acknowledge that pollution from sand sized sediment is increasing at most locations, not decreasing (Figure 12). The extremely high fine sediment levels at mainstem Scott River locations indicate that there is still a substantial over-supply, although French Creek and Etna Creek sediment less than 6.4 mm decreased.

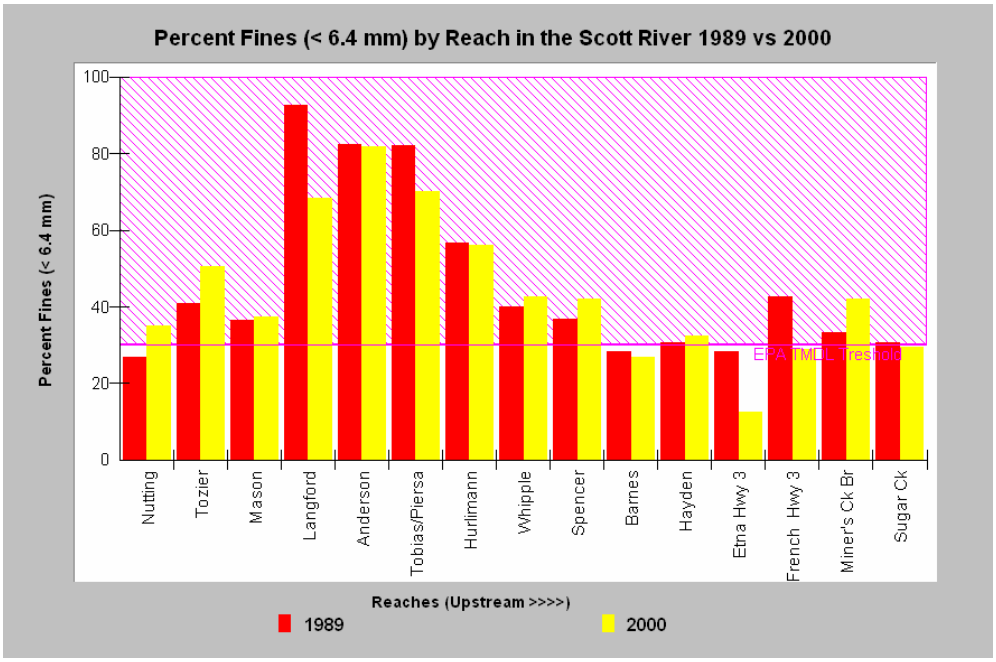

Figure 15. Summary chart showing fine sediment less than 6.4 mm at 11 mainstem Scott River locations and at four tributary locations.

Cross Sections and Longitudinal Profiles: The Scott TMDL does not deal with fine sediment transport and habitat impairment in the lower Scott River, where no data were collected by Sommartstrom et al. (1990). The results of fine sediment (<6.4 mm) indicate a continuing supply of sand to the Scott River. The high amount of sand in the valley is transported through the lower Scott River Canyon (Figure 13) where the highest annual fall chinook spawning takes place. Long term trends in sand supply and bedload transport are needed to see whether the requirements of fall chinook salmon are improving. The TMDL needs to provide a mechanism for measuring impairment and trends toward recovery.

Volume of Sediment in Pools (V*): The volume of fine sediment in pools relative to water and fine sediment combined or V* (Lisle and Hilton, 1992) has been used in French Creek in the Scott River watershed to show decreased sediment supply in response to road related restoration. Discussions of V* data in the Scott River watershed in section 2.4.2.7 are good but the V* should also be included in Table 2.2, with a target value of <0.10.

Median Particle Size Distribution: The work of Knopp (1993) also justifies the use of a target for a minimum median particle size distribution of 37 mm. Median particle size may also become very large in response to increased peak flows related to rain on snow events (Montgomery and Buffington, 1993). An upper limit for salmonid suitability should be adopted into the final Scott TMDL based on U.S. Forest Service studies (Gallo, 2002). Reynolds (2001) used median particle size with an upper limit of 90 mm for optimal size for salmonids and 128 mm as fully unsuitable in the Ecosystem Management Decision Support (EMDS) model.

Turbidity: The relationship between turbidity and timber harvest in northwestern California have been well studied in recent years (Klein, 2004), with increasing disturbance leading to both increase in peaks and duration of turbidity. Sigler et al. (1984) demonstrated that turbidity over 25 nephelometric units (ntu) limited steelhead juvenile growth. The latter threshold should be adopted by the Scott TMDL. Elevated turbidity has been noted as a specific problem in Moffett Creek (Kier Associates, 1999).

2.5 Temperature Problem Statement

The discussion of temperature problems in the Scott River lacks an interdisciplinary approach needed to show complex interactions that can ultimately result in water pollution. Discussions above note that channel changes related to increased peak discharge can make channels wide, shallow and open, which promotes stream warming. The TMDL did not use all available water temperature, which hampered examination of cumulative effects and elevation of water temperatures. The final Scott TMDL also needs to clearly recognize that water temperatures in smaller tributary basins accessible to coho salmon or that feed salmonid refugia in the Scott River canyon are controllable and that they need to meet water temperature requirements of coho salmon. Data from Thermal Infrared Radar (TIR) clearly indicates that water depletion drives water pollution, yet information from that survey was not used to draw that conclusion in the Scott TMDL.

Figure 16. Sand-sized particles dominate this pool tail crest on the Scott River near Ft. Jones. Photo by Pat Higgins from KRIS Version 3.0.

2.5.3 Summary of Temperature Conditions: The charts of stream temperature presented in this section go back to only 1996 (with some mainstem Scott data back to 1995). KRIS contains USFS data from 1994 and 1995 for the mainstem Scott and tributaries in the West Canyon sub-basin. These data are important because they date before the January 1, 1997 flood, when many streams in the Scott basin torrented, widening channels and removing riparian vegetation. Comparing these data with 1997-2004 data would show if temperatures increased as a result of the 1997 flood. These data should be incorporated into the West Canyon and mainstem charts in this section of the TMDL. The data are available online, with a list of charts located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/selecttopic_scott_river.htm
The source table for the 1994 USFS data is located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sc_cst5.htm
The source table for the 1995 USFS data is located at:
http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sc_cst8.htm

2.5.2 Temperature-Related Desired Conditions: Coho salmon represent the most sensitive beneficial use in the Scott River basin and the final Scott TMDL must recognize the findings of Welsh et al. (2001) and the recommendations of the U.S. EPA (2003) in establishing a floating weekly average temperature of 16.8 C or less in any habitat inhabited by coho juveniles. In order to attain these conditions, impacts from riparian zone timber harvest must be limited and the interval of damaging flood flows must be decreased. In fact, logging in the riparian zone of Scott River tributaries has been active (Figure 17).

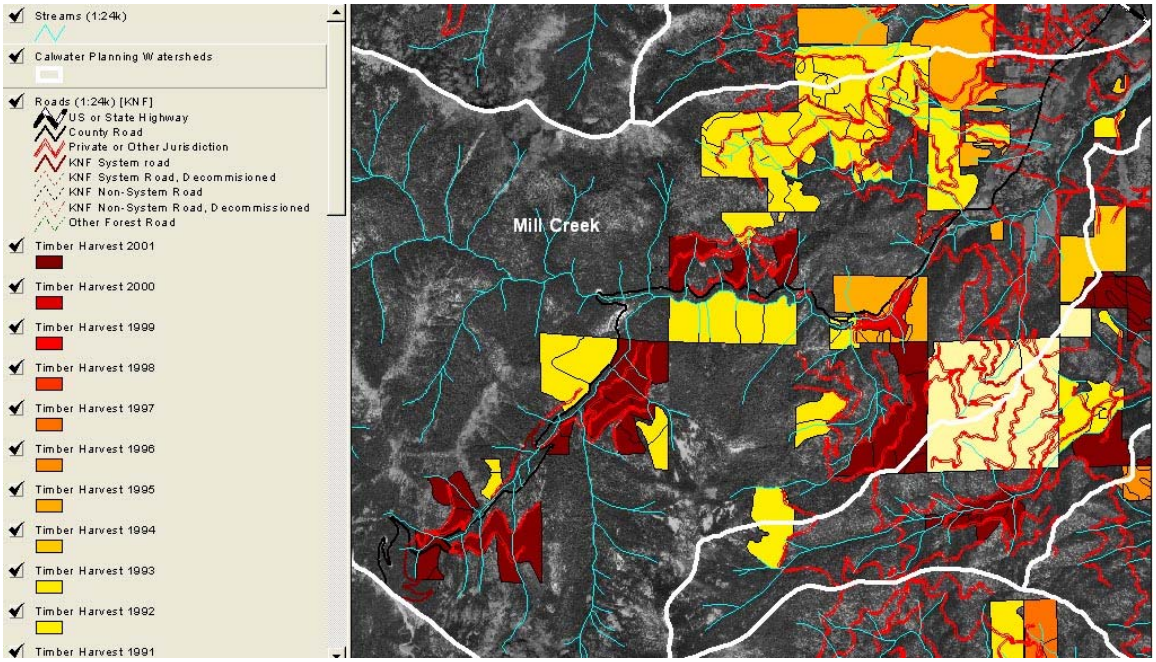

Figure 17. This map shows timber harvests on private land between 1991 and 2001, according to CDF, for the Mill Creek Calwater (upper Etna Creek). Timber harvest in recent years seems concentrated in near stream areas and other larger harvests overlap riparian zones.

Change scene detection data using 1994 and 1998 Landsat images (Levien et al, 2002) also show active timber harvest in riparian zones in recent years (Figure 18). Desired future watershed conditions should include riparian zones that approach the natural range of variability in size and height so that thermal buffering and large wood recruitment potential can be protected and improved. The TMDL needs to specifically recognize this problem so that RWB staff can prevent damage to core habitat areas and to provide for appropriate large wood recruitment. Riparian zones of headwater areas are often not delineated because the USGS 1:24000 stream maps are incomplete. Use of the SHALSTAB model will help highlight sensitive headwater swales, where logging may trigger failures and where natural landslides in unlogged areas may help recruit large wood to streams.

Desired future conditions for Scott River tributaries must also include sufficient flow to maintain water quality. The Watershed Sciences (2003) evaluation of water temperature problems in the Scott River shows an important relationship in Shackleford Creek (Figure 19). Shackleford Creek shows impacts of diversion as it goes from optimal for salmonids, to stressful or lethal for salmonids to a dry stream bed within a few miles.

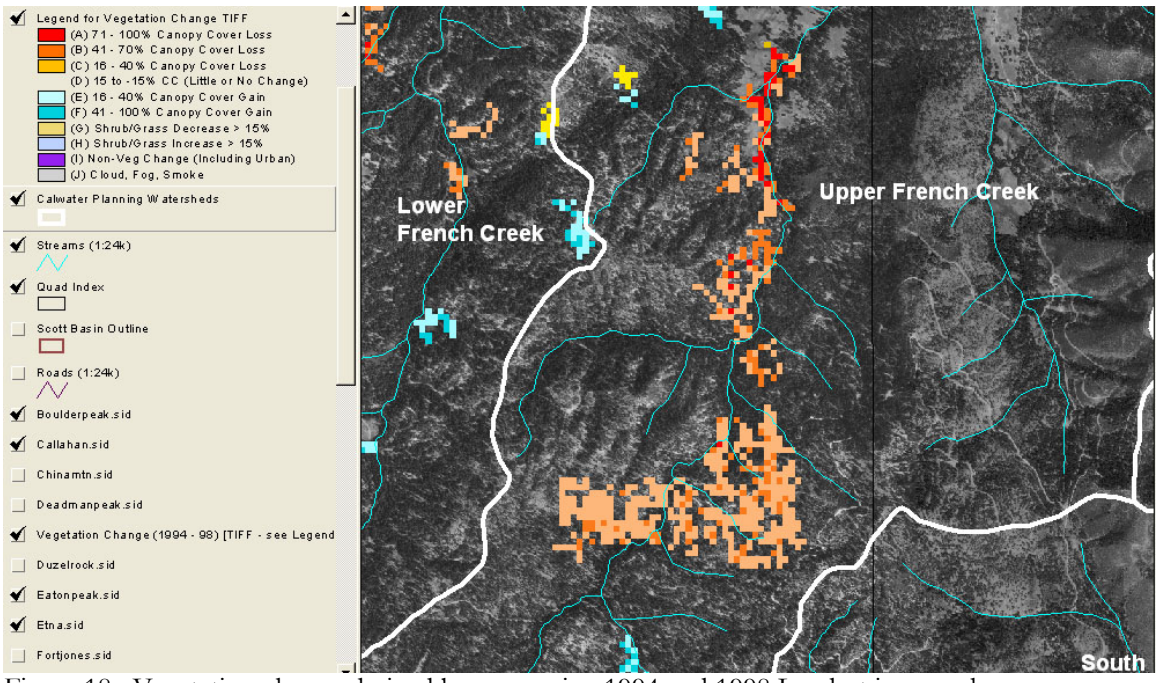

Figure 18. Vegetation change derived by comparing 1994 and 1998 Landsat images shows substantial decrease in canopy of reaches of lower French Creek. Data are from CDF and USFS Spatial Analysis Lab.

Figure 19. This map shows summary data of Scott River Thermal Infrared Radar (TIR) surveys for Shackleford Creek. Shackelford Creek flows northeast, then north to meet up with the mainstem Scott at the top of the figure. Note that temperature increases as flow is depleted. Missing temperatures (shown as grey reaches) indicates the stream is dry.

2.5.2.1 Effective Shade: The Scott TMDL states that "target shade conditions are those that result from achieving the natural mature vegetation conditions that occur along stream

channels in the watershed." The TMDL then fails to note that timber harvests have been active in riparian zones, despite availability of USFS and CDF 1991-2002 timber harvest data.

2.5.2.2 Thermal Refugia: The Scott TMDL mentions cold water at creek mouths as being important as coldwater refugia, but fails to make important links in discussion. *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (U.S. EPA, 2003) clearly states that the spatial distribution of refugia is critical to Pacific salmon survival, especially in circumstances where mainstem river temperatures are well over suitable. All refugia need to be identified and protected in the Scott TMDL and implementation should follow Bradbury et al. (1995) in protecting these areas as a priority and focusing restoration in restorable areas adjacent. Intensive management in the West Canyon TMDL sub-basin on Klamath National Forest lands prior to the 1997 storm caused massive landsliding, channel scour and significant elevation of water temperatures. The damage to salmonid carrying capacity was significant and future similar damage on low recurrence interval storms must be prevented, but the only way to do so is for the Scott TMDL to set limits of disturbance that minimize risk of cumulative watershed effects (see Chapter 5 comments below for recommended limits).

The Scott TMDL has a stated goal of "increased volume of thermally stratified pools." While this is a laudable objective, pools are unlikely to become deeper and tend toward their natural range of variability of volume and depth if the landscape is not closer to its normal hydrologic range of variability due to early seral stage conditions and high road densities. Similarly, channels will tend to have reduced pool frequency below high risk landslide zones that are disturbed by timber harvest or road building.

Chapter 3: Sediment

3.2 Road Related Sediment Delivery
3.2.1 Two Estimates Made:
"Because this type of road inventory was not available in other subwatersheds, the rates estimated in the South Fork were extrapolated to the rest of the mountainous subbasins in the Scott River watershed."

This extrapolation from the South Fork to the entire Scott basin required some assumptions. Based on comments on the pre-draft (Kier Associates, 2005b), information was added to the TMDL stating those assumptions. If only about 5.5 of 813 square miles of the watershed were surveyed, that is approximately only 0.6% of the watershed. This percentage should be stated in section 3.2.1.

3.2.2 Discrete Sediment Sources (Road Inventory and field-check):
The pre-draft of the TMDL noted that the field data collection in the South Fork found twice as many road-stream crossings than were contained in the GIS layers. Because of this, apparently the number of road-stream crossings in each of the rest of the sub-basins was doubled. Comments on the pre-draft (Kier Associates, 2005b) requested that if possible, some attempt should be made to determine if that is a valid assumption. Data from Klamath National Forest road surveys (mentioned on page 2-23) could provide a means to check the

accuracy of the 50% assumption. The RWB should determine the extent of the Scott River basin that has been surveyed by the USFS and compare the number of road/stream crossings identified in the USFS surveys in that area with the number of roads/stream crossings identified in that area from the GIS data.

In the public draft, the paragraph that mentions the doubling of road-stream crossing was removed and replaced with a new paragraph stating the Resources Management's (RM) SEDMODL estimate of stream crossings matched well with the RWB GIS estimate, so RM's estimate was used. Sediment calculations do not appeared to have changed. This situation is unclear and confusing.

This section also states that:

> "In the RM South Fork road survey, the largest contributing features were all located within a single quarter-mile-long section of failing road. These few features accounted for 75 percent of the total contribution from road failures. Thus, these features are anomalous in context. For that reason they were not included in the group that was used to calculate the rates used to extrapolate to the South Fork watershed but instead were combined and treated separately as a single discrete feature added to the South Fork Subwatershed sediment summary." (p 3-8)

While the RWB staff likely made the most correct decision possible under the circumstances, this fact points out the uncertainty in extrapolating from one sub-basin to the entire basin. Given that only approximately 0.6% of Scott basin was surveyed (see calculations above in comments on 3.2.2), and these large features were found, there are almost certainly "anomalous" major features in other areas of the Scott basin. By not including those "anomalous" features, the RWB has likely skewed its estimate of road-related sediment production low, perhaps substantially. In response to comments on the pre-draft TMDL, RWB staff added the following acknowledgement:

> "So we may have underestimated anthropogenic sediment contributions. Sediment source inventory may be slightly underestimated because some anomalous features that were not large enough to be found on the landslide analysis may have not been counted." (p 3-11).

This may run counter to the RWB's directive (Clean Water Act, Section 303(d) and the associated regulations at 40 CFR §130.7) to include a margin of safety in the TMDL, and hence should be stated in discussions of the margin of safety in section 3.5.4.

<u>3.4.2 Streamside Mass Wasting and Erosion Features - Stratified Random Sampling:</u>
In response to comments on the pre-draft (Kier Associates, 2005b), language was added to this section of the TMDL stating that 21 of the approximately 2500 total miles of streams in the Scott watershed were sampled, which is approximately 0.8 percent. Any embedded assumptions should be stated. For instance, this analysis assumes does not take into account differences in watershed disturbance regimes between watersheds.

Chapter 4: Temperature

4.1.1 Temperature Sources: Stream Heating Processes: Scott TMDL discussions of temperature pollution do not reflect a current "best science" understanding of riparian conditions, air flow over the stream and their relationship to water temperature. The final document needs to reference Bartholow (1989), Essig (1998) and Poole and Berman (2001). Bartholow (1989) demonstrated that air temperature over the stream is by far the most significant driver of maximum water temperature (Figure 19).

Poole and Berman (2001) describe the relationship between riparian conditions and microclimate over the stream, which can have a major influence on water temperature in smaller upland tributaries. For example, forest harvest back from the area where direct shade is provided to the stream may open air flow and allow more heat exchange with the water. This presents a potential problem in the Scott River basin Westside tributaries, where such shifts that could eliminate coho habitat without changing the shade.

The TMDL for temperature in Idaho (Essig, 1998) recognized the water temperature air temperature relationship presented by Bartholow (1989). The Scott TMDL model runs mention that microclimatic effects were considered, but the description of model parameters and assumptions is lacking.

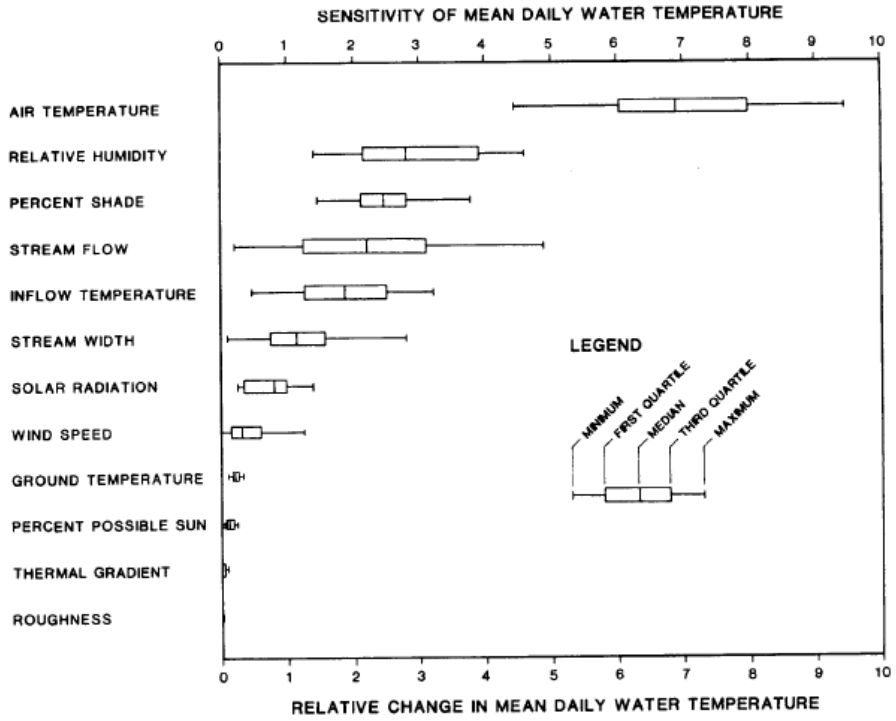

Figure 19. This chart from Bartholow (1989) shows that air temperature and relative humidity have a greater effect on mean daily water temperature than shade.

Science associated with the Northwest Forest Plan (FEMAT, 1993) indicates that the zone of riparian influence is two site potential tree heights or more (Figure 20). Water temperature

buffering, in the form of cool air temperatures and high humidity over the stream, rapidly deteriorates under one site potential tree height protection (Chen, 1991). As mentioned in discussion of section 2.5.2.1, timber harvest has been active in riparian zones in the Scott River basin, which is decreasing desired conditions for optimum temperature buffer potential. The Scott TMDL states that the timber harvest permit process under CDF's jurisdiction will prevent future riparian damage despite previous studies (Ligon et al., 1999) and experience in the Scott River basin show that that process has not worked previously in this regard. The discussion in the Scott TMDL of modeling of riparian shade included the following: "Our analysis of factors affecting stream temperatures has determined that reductions of stream shade cause increases in stream temperature. Therefore, the California Forest Practice Rules do not ensure that water quality objectives set in the Basin Plan will be met." (p. 4-35)

Page 4-38 states that, "The load allocations for this TMDL are the shade provided by topography and potential vegetation conditions at a site with an allowance for natural disturbances such as floods, wind throw, disease, landslides, and fire, and is approximated as adjusted potential shade conditions as described in Section 4.4.1" This statement from the Scott TMDL infers that where topographic exists, retention of trees for shade might be decreased during timber harvests. This ignores the effects of riparian timber harvest on large wood recruitment and the implications for aquatic habitat.

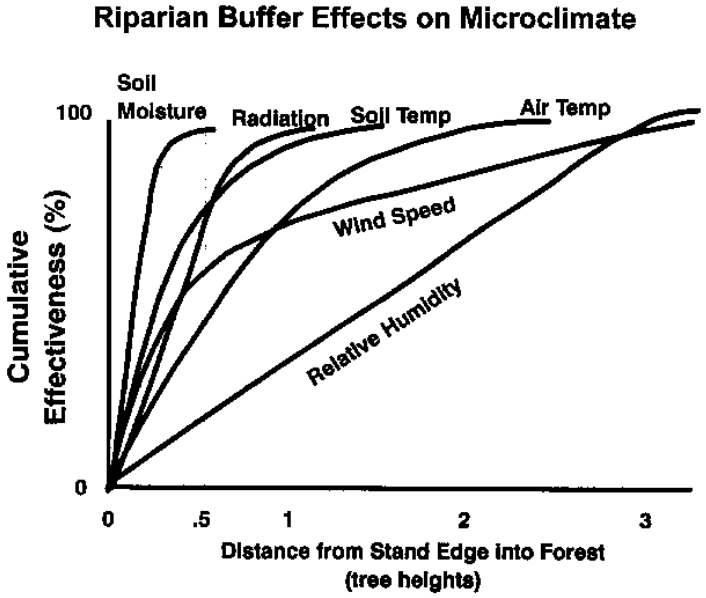

Figure 20. This figure taken from Chen (1991) shows how various riparian functions important to streams deteriorate as disturbance encroaches into stream side areas. One site potential tree height is likely 150-180 feet in Scott River basin forested areas.

4.1.2.2 Stream Heating Processes Affected by Human Activities in the Scott River Watershed:

The Groundwater section of the Scott TMDL on page 4-4 to 4-5 states:

> "The only readily available data that provide a glimpse of recent groundwater conditions are water table measurements at five wells in Scott Valley. Analysis of these data shows that in general drawdown is greater in dry years. The water table measurements for one of the wells are presented in Figure 4.1."

Comments submitted by Quartz Valley Indian Community (2005) to the Scott River Watershed Council contain a map and graphs for each of the five Scott Valley monitoring wells (included here as Appendix A). The graphs show the annual minimum and maximum measurements at each well, along with annual precipitation at the Fort Jones rain gage. The charts suggest that while annual maximum levels have remained relatively constant over time (fluctuating with precipitation), annual minimum levels have declined since 1965 (though they fluctuate with precipitation). Comments on the pre-draft (QVIC, 2005b) requested that the RWB consider including these graphs and map in the TMDL. RWB staff responded verbally that in their opinion the wells were not strategically placed, do not represent overall conditions in the valley, and hence do not support the suggestion above that annual minimum levels appear to be dropping. Graphs for the five wells should be included in the TMDL, or written justification provided as to why they were not utilized.

4.3.1.7 Results and Discussion: This section discusses the results of modeling scenarios. The combined scenarios included combinations of changes to individual factors such shade, groundwater accretion, surface diversions, and channel geometry. In the pre-draft, no figure was included showing the results of combined scenarios. As a result of comments on the pre-draft (Kier Associates, 2005), figure 4.17 was included in the public draft TMDL. It indicates that with potential riparian shade and a 50% increase in groundwater accretion, temperatures could be reduced approximately 5 to 7 degrees C in most of the Scott Valley and in the upper section of the Scott Canyon, with almost the entire Scott Valley being under 22 degrees C.

4.3.2.1 Boundary Conditions: This section contains a typo. The reference to Figure 4.18 should be a reference to Figure 4.19 instead. The reference to Figure 4.19 should be a reference to Figure 4.20 instead.

4.3.2.7 Results and Discussion: This section contains a typo. The reference to Figure 4.20 should be a reference to Figure 4.21 instead.

4.5.2 Synthesis: Scott River Tributaries: This section provides important recognition that forest management activities caused debris flows that damaged channels and riparian vegetation in Scott River tributaries, negatively impacting water temperatures.

4.6 Recommendations for Additional Study and Future Action: Changes suggested in pre-draft comments (QVIC, 2005) about the wording of regarding riparian grazing workshops were made.

Chapter 5: Implementation

The RWB has an obligation to make sure that the water quality objectives are met, and beneficial uses restored and protected, particularly because the final Scott TMDL Action

Plan will be amended to the Basin Plan (RWB, 2003). If there are multiple ways to meet the objectives, we support giving landowners the flexibility to decide how they want to meet those objectives. For example, if other regulatory and policy processes such as the Scott Incidental Take Permit (SRCD, In Draft), Coho Recovery Plan (CDFG, 2004), and Timber Harvest Plans will result in the attainment of water quality objectives, then further regulation by the RWB is not necessary.

Duplicative and overlapping regulation benefits no one. Unfortunately, these other processes rely almost wholly on voluntary measures that neither guarantee that water quality problems will be remedied nor that TMDL objectives will be achieved. When other policy approaches and voluntary landowner actions fail to achieve the TMDL objectives, then the RWB must use its considerable regulatory and enforcement authority to take necessary actions to ensure results.

The implementation actions requested in these comments are summarized below as Table 1 (a revised version of Table 4 from the proposed Scott TMDL Basin Plan amendment language).

5.1.1.1 Prioritization of Implementation Actions
This section has been added since the pre-draft, likely in response to the Tribes comments on the pre-draft (Kier Associates 2005b). The statement "Where reaches of the Scott River and its tributaries are providing suitable freshwater salmonid habitat, protection of these areas should be a priority for restoration efforts." (p 5-4) is somewhat helpful, but could be improved by specifically mentioning coho salmon and their coldwater refugia needs.

The final Scott TMDL should follow the approach of Bradbury et al. (1995), which is to identify the most intact habitat patches and to begin restoration by making sure that these areas are protected and enhanced as a top priority. In the Scott River basin, these would be the stream reaches with coho salmon (Figure 1) or those that provide coldwater refugia for other Pacific salmon species. As we indicated above, many surveys have been conducted in recent years to identify locations where coho salmon spawn (Quigley, 2005, Maurer, 2002; Maurer, 2003; SRCD, 2004). RWB staff will need to prevent timber harvest in riparian zones or sensitive headwater areas through its authority to condition waste discharge requirements on timber harvest plans and the final Scott TMDL should explicitly articulate that need and action. The protection of refugia and the restoration of water quality will also require protecting and restoring tributary stream flows.

5.1.7 Implementation Actions to Address Water Temperature and Vegetation that Provides Shade to the Water Bodies: In order for TMDL implementation to succeed it is important that the RWB (and other agencies and stakeholders) not suffer from "tunnel vision", but instead view the watershed in a system-wide, holistic fashion with its attendant complexities and interrelationships. The RWB's primary concern is protection and restoration of water quality, but the restoration of water quality can only succeed in the context of a broader ecological recovery effort. For example, if low recurrence interval storm events continue to cause channel damage that triggers elevated water temperatures and takes decades to recover, then success of the Scott TMDL implementation will be confounded.

Alterations in stream channel morphology are a source of sediment and temperature problems in the Scott River and its tributaries. Factors likely contributing to these alterations include increased sediment supply and increased peak flows (i.e., from upslope watershed disturbance), overgrazing, and a variety of flood control efforts including riparian vegetation removal, channel straightening, levee construction, and the placement of riprap. The Scott TMDL does a fairly good job of outlining the effects of these various watershed processes except for the risk of increased flows due to rain on snow events.

While the RWB's authority may be confined, that should not prevent it from fostering a long-term vision of what a restored Scott basin could look like. Appendix A of the draft TMDL includes historic channel and riparian condition descriptions that can guide efforts toward desired future conditions. While the technical portion of the TMDL sets gallery cottonwood forest as the "potential" vegetation for much of the Scott Valley, the proposed draft implementation plan needs to define the steps necessary to achieve that potential.

Appendix A provides a good discussion of the ecology and management of various riparian tree species present in the Scott Valley. The information presented on black cottonwood suggests that while Scott Valley historically provided excellent habitat for cottonwoods, the cottonwood population has declined dramatically over the 20th century. Key reasons include clearing of riparian vegetation, channelization, and lowering of the ground water table.

Restoring channel processes, including giving the river room to meander through multiple channels, is key to the restoration of stream temperatures and aquatic habitat complexity in the Scott River and its tributaries. Absent restoring a sinuous and meandering channel, the re-establishment of cottonwood gallery forests throughout the Scott Valley may not possible. Establishing a cottonwood forest would have major benefits for water temperatures and channel processes and achievement of TMDL objectives (see discussion under 5.1.9 below).

5.1.9 Flood Control and Bank Stabilization Implementation Actions

Much of the riprap and levees built along the mainstem Scott River were publicly funded through the U.S. Soil Conservation Service (now Natural Resources Conservation Service) and the U.S. Army Corps of Engineers. As noted on page 5-17 of the TMDL, "The Corps and the NRCS do not retain jurisdiction or ownership over these levees and flood control structures." It is likely that with the passage of time and the occurrence of floods that these structures will weaken and eventually fail. Failure may happen piecemeal or all at once, but eventual failure is inevitable.

It is unlikely that individual landowners will have the resources with which to repair these structures. The state and federal governments are not likely to provide the resources to maintain the Scott Valley's levee system. The Scott TMDL should recommend that future levee repairs have as a goal creation of a more sinuous channel with added cottonwood and willow trees to meet both long term flood control objectives and the water quality objectives of the TMDL.

Given the degraded state of riparian vegetation in the Scott River basin, we would urge the RWB to use its Clean Water Act Section 401 authority to ensure that bank stabilization projects conducted in the Scott basin incorporate riparian planting, and that no rock-only bank stabilization projects are permitted.

The Scott TMDL needs to specifically address actions that are recommended and those that the RWB staff would oppose when future large floods cause extensive riparian damage similar to January 1997. After the 1997 flood, federal emergency funds were used to clear and straighten channels, with damaging impacts on the channels and their riparian vegetation (Kier Associates, 1999) and recurrence of this pattern of action must not be allowed. Possible alternative flood-control scenarios include setting levees back on the floodplain away from the active channel, providing the river with some space to meander within levees.

As noted on page 5-18, it is possible to stabilize banks, without having a detrimental effect on stream temperatures, by incorporating vegetation into bank stabilization design. An innovative technique that may have application in the Scott Valley was developed in Anderson Creek, a tributary to the Navarro River in western Mendocino County, by Chris Tebbutt (IFR, 2003).

During a large flood in 1983, the channel at Mr. Tebbutt's property went from about 100 feet in width to over 800 feet, washing away valuable farmland and leaving a wide, warm and open reach of creek. Shortly after this erosional event, wing deflectors with boulders were installed and trees were planted behind the deflectors. These provided mass to turn the energy of the river at much less cost than boulders.

The deep planting of cottonwoods accelerated the trees' growth. The sections both above and below the Tebbutt property have now been treated and the channel was approaching its pre-disturbance width in 2003. Riparian vegetation is trapping sediment and building new streambanks. Stratification of deep pools formed off structures provide rare summer juvenile salmonid rearing habitat. While Anderson Creek is not quite as large as the Scott River, it does have substantial stream power and bioengineering methods used are likely transferable. A description of the Anderson Creek projects, with before, during, and after photographs is available online by viewing the "Restoration Tebbutt's" photo tours topics at: http://www.krisweb.com/krisnavarro/krisdb/webbuilder/selecttopic_tour.htm
A selection of photographs is included here as Figures 20-22.

The Scott TMDL and Kier Associates (1999) point out that many miles of mainstem Scott River riparian zones have cattle exclusion fencing and many reaches have also been tree planting project sites. The resulting narrow leave strips may not be sufficient to assure riparian function and protection of agricultural land from flood damage (Kier Associates, 1999). Another possible avenue for riparian restoration would be the use of conservation easements, which typically involve compensation to the landowner in exchange for long-term restrictions on the use of their property. With conservation easements, landowners would reduce agricultural activities in areas near stream channels, facilitating riparian restoration and reducing flooding of agricultural land.

The final Scott TMDL should recommend the use of computer modeling software to involve the community in the creation of positive future scenarios that allow for both conservation and a thriving agricultural economy. Software like CommunityViz and Ecomodeler can be employed to show both ecological and economic scenarios. These could be used, for example, to explain why it is in the landowners' interest to negotiate the acquisition of riparian easements on the mainstem Scott River in Scott Valley.

1984

Figure 20. This photo shows Chris Tebbutt deep planting cottonwood and willows in 1984. The dark branches at the left are fence post-sized black willows. Photo by Chris Tebbutt.

1986

Figure 21. Two years later the outside curve of Anderson Creek on the Tebbutt property is unprotected but the trees are growing. The stream channel in 1986 shifted into the planted areas. Photo by Chris Tebbutt.

2001

Figure 22. Cottonwoods, willows and alders line both banks of Anderson Creek in this photo taken looking upstream on the Tebbutt property in spring 2001. Many trees at the left of the photo are actually rooted in vegetated hard points with massive rock structures. The deep planting of cottonwoods was used on both sides of the creek. Photo by Chris Tebbutt.

5.1.8.2 Water Use Implementation Actions: Many previous studies (CH2M Hill, 1985; Kier Associates, 1991 and 1999) described flow depletion and the loss of coldwater fisheries in the Scott River basin and recognize that recovery of salmon and water quality will not succeed without solutions to problems involving water rights, water use and groundwater pumping.

Long-term USGS flow records show clearly that base flows in the Scott River have diminished (Figure 23). Reduced flows result from increased surface diversions, changes in cropping patterns, decreased base flows due to changes in upland conditions, decreased available surface water due to aggradation, and increased groundwater pumping.

The final TMDL should explicitly recognize that the flow trends of recent years are precisely the opposite of those necessary for the recovery of water quality and fish resources. Remedies for flow changes related to watershed conditions and aggradation have been described in previous sections. The final TMDL needs to also recommend that changes in crops from water-hungry alfalfa to high-value dry-farmed species be considered and that implementation of available water conservation measures be instituted by a date certain.

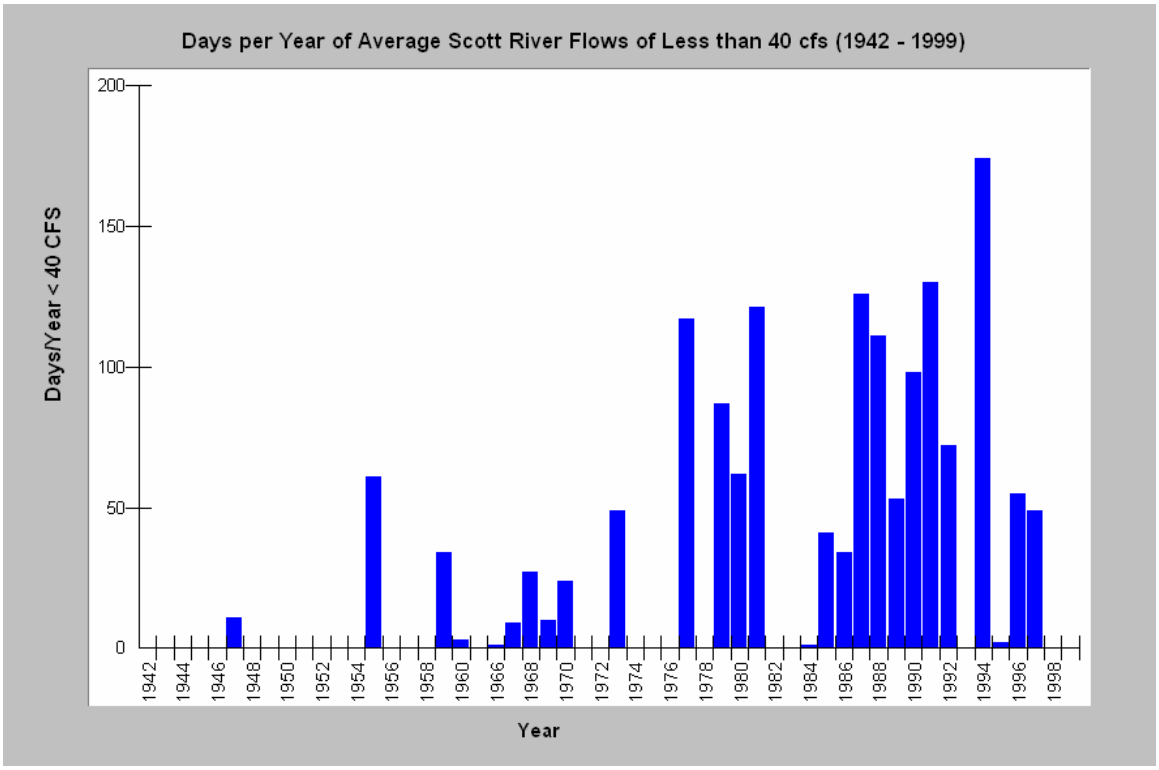

Figure 23. USGS flow data for the Scott River were used to create the above chart showing an increase in the days with less than 40 cubic feet per second at Fort Jones with a major increase over the period of record.

The final Scott TMDL needs to call for the RWB to exert authority in cases such as Shackleford Creek (Figure 19) where the depletion of flows makes achievement of water quality objectives impossible. The State Water Resources Control Board has the authority to require increased bypass flows to meet water quality standards as established in Supreme

Court case No. 92-1911 (*Jefferson County PUD and City of Tacoma vs. Washington Dept. of Ecology,* see http://chrome.law.cornell.edu/supct/html/92-1911.ZD.html*).* This case explicitly states that water quality regulatory agencies can, under the Clean Water Act, require bypass flows to achieve water quality protection purposes – that, as has been demonstrated so many times, the management of water quality and water quantity are inseparable:

> "Petitioners also assert more generally that the Clean Water Act is only concerned with water 'quality,' and does not allow the regulation of water 'quantity.' This is an artificial distinction. In many cases, water quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or, as here, as a fishery. In any event, there is recognition in the Clean Water Act itself that reduced stream flow, i.e., diminishment of water quantity, can constitute water pollution. First, the Act's definition of pollution as "the man made or man induced alteration of the chemical, physical, biological, and radiological integrity of water" encompasses the effects of reduced water quantity. 33 U.S.C. § 1362(19). This broad conception of pollution – one which expressly evinces Congress' concern with the physical and biological integrity of water – refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water "quantity" and water "quality." Moreover, §304 of the Act expressly recognizes that water "pollution" may result from "changes in the movement, flow, or circulation of any navigable waters . . . including changes caused by the construction of dams." 33 U.S.C. § 1314(f). This concern with the flowage effects of dams and other diversions is also embodied in the EPA regulations, which expressly require existing dams to be operated to attain designated uses. 40 CFR § 131.10(g)(4)."

Figure 4.13 indicates that water temperatures in the mainstem Scott are highly influenced by groundwater accretion. Based on Figure 4.13 and other modeling results presented in the Scott TMDL, it is apparent that water temperature problems cannot be fully resolved without appropriate action taken to limit ground water pumping. The Scott TMDL changed recommendations for a State Water Resources Control Board Water Rights Division groundwater study to one overseen by the County of Siskiyou.

The RWB should consider, in the alternative, recommending that the California Department of Water Resources conduct the necessary groundwater study because they have previously studied Scott Valley groundwater conditions, the Department has staff with the appropriate credentials for conducting such a study, and they enjoy a degree of trust with Scott Valley residents, having served their water resource study needs over the years.

There is already enough evidence to show that groundwater pumping is likely causing deleterious effects to both surface water quantity and quality (see Appendix A of this comments document). Department of Water Resources data indicate that the installation of wells has continued and suggest that postponing discussions and action on this critical issue is unwise. A prompt groundwater study carried out by qualified scientists will provide information on what needs to be done to remedy the problem.

If the final Scott TMDL continues to recommend a local lead role for the groundwater study, the Quartz Valley Indian Reservation should also be named as a specific party to the

study. Page 5-16 of the TMDL states that "The Regional Water Board requests that the County of Siskiyou, in cooperation with the Siskiyou Resource Conservation District (SRCD) and other appropriate stakeholders, conduct the above mentioned study." That statement should be revised to read "The Regional Water Board requests that the County of Siskiyou, in cooperation with the Quartz Valley Indian Reservation (QVIR), Siskiyou Resource Conservation District (SRCD), and other appropriate stakeholders, conduct the above mentioned study." It is important to note that Tribes are not stakeholders, pre se; they are sovereign nations with a unique status.

We recommend the re-insertion of the language that was included in the pre-draft TMDL, but removed from the public draft, recommending that the State Water Board and its Division of Water Rights "take the findings of the research into consideration and act accordingly to protect and restore the instream beneficial uses of the Scott River and its tributaries, with particular focus on those beneficial uses associated with the cold water fishery." We recognize that the RWB has the authority to make this request regardless of what language is included in, or excluded from, the TMDL and we would expect that as changes in groundwater management are found to be necessary to protect and restore the beneficial uses of the Scott River that the RWB would, as required by the Clean Water Act, make such a request.

5.1.1 Road and Sediment Waste Discharge Implementation Actions for Individual Responsible Parties: The final Scott TMDL should set quantitative limits on allowable road densities in each watershed (see comments in section 2.4.1, 2.4.3.2, and 2.4.3.5 above). If the RWB does not have adequate information on which to base such a limit, studies should be conducted to determine what an appropriate value would be. See Table 1 for a list of suggested targets for watershed condition with references on which they are based. Also, a requirement should be imposed on the USFS and private timber companies that roads that cannot be annually maintained must be fully decommissioned (see comments on section 2.2.2.3 above) similar to that included in the Redwood Creek TMDL (U.S. EPA, 1998b).

Multiple road crossings on Scott River tributaries failed in the January 1997 storm resulting in extensive channel scour and increase in stream temperatures (de la Fuente and Elder, 1998). The final Scott TMDL needs to set targets for stream crossings similar to Armentrout et al. (1999) and such standards should be enforced by RWB staff using their waste discharge authority during the timber harvest plan review process.

Roads data from Klamath National Forest show that some roads crossing lower Scott River tributaries have been decommissioned. Similar decommissioning is needed for roads on private lands. Roads crossing stream reaches that have a history of torrenting should have concrete fords, not culverts, similar to those installed by KNF after the 1997 storm (Kier Associates, 1999). The final TMDL needs to recognize sensitive headwater areas and the need to prevent road construction in areas shown to have a high risk of land-sliding through the use of the SHALSTAB model, unless a professional geologist makes a finding that there is no risk of failure.

5.1.8 Timber Implementation Actions for Private and Public Responsible Parties: The final Scott TMDL should set quantitative limits on the percentage of a watershed that can be harvested in a given time frame (Reeves et al., 1993). If the RWB does not have adequate

information upon which to base such a limit, studies should be conducted to determine what an appropriate value would be. For more information on this subject, see comments on section 2.4.3.5 above.

The lack of forest growth indicated by Landsat change scene and vegetation data (see discussions in Chapter 2 above) shows a clear need to restrict forest harvest in the rain on snow zone until stands previously disturbed are in a more mature condition to lessen the risk of rain on snow events. RWB staff need to limit canopy reduction on lands lying between 3,500 and 5,000 feet in elevation using its waste discharge requirement-setting authority during the timber harvest plan review process. Similarly, RWB staff should flag for geologic review any timber harvest on areas shown to be at a high risk for failure through SHALSTAB modeling (see Chapter 2 discussions).

5.1.9 Implementation Actions for the United States Forest Service

As recommended in section 2.4.3.5 above, the final Scott TMDL should set quantitative limits on the percentage of a watershed that can be harvested in a given time frame. The findings of de la Fuente and Elder (1998) indicate that the current BMPs applied on USFS lands have been insufficient to prevent cumulative watershed effects and increased restrictions on activity are needed. Also, maximum allowable road densities should be set as recommended in section 5.1.1 above.

Table 2. Recommended targets for watershed condition.

Parameter	**Upland Target Conditions**	**References**
Road Densities	<2.5 mi./sq. mi.	USFS (1996), NMFS (1995), Armentrout, (1998)
Road-Stream Crossings	<2 road crossings per mile of stream	Armentrout et al. (1998)
Timber Harvest	<25% of a watershed in 30 years	Reeves et al. (1993)
Unstable areas	No disturbance in SHALSTAB high risk zones w/o geologic review	Dietrich et al. (1998)

Chapter 6: Monitoring

There is enough information available to RWB staff to make specific recommendations for trend monitoring in the final Scott TMDL as required by Section 13242 of the California Water Code. The final Scott TMDL also needs to specifically state that all data used for monitoring and assessment under TMDL implementation should available as raw data, which is necessary for a transparent scientific process. Although time frames for recovery may be difficult to define exactly, the final Scott TMDL needs to establish an expected time line for recovery that can be amended through adaptive management during the implementation phase. The Scott TMDL must also specify that all data collected as part of TMDL monitoring should be added to an easily accessible electronic database.

In Stream Monitoring Methods and Locations: The draft Scott TMDL defines several targets for in stream conditions that are appropriate tools for discerning trends and abating water quality problems, but we recommend the addition of other cost-effective tools that have been widely employed in previous TMDLs or by the USFS. The Scott River basin is already data rich and continuing to collect data for trend monitoring of a similar type in the same or similar locations is both logical and practical. Table 3 shows recommended tools and locations for monitoring both sediment and water temperature. Additional details are include in discussions on section 2.4.2 above.

Table 3. Recommended TMDL Implementation Trend Monitoring Methods and Locations

Method	**Reference**	**Location**
Benthic Macroinvertebrates	Harrington and Born (1999)	Repeat at previously monitored locations every five years or after major storm event
Large Woody Debris	Schuett-Hames et al. (1999)	Coho salmon tributaries lower than fourth order
Embeddedness	CDFG (1998)	All stream sizes. Not necessary if more quantitative fine sediment data are collected.
Pool Distribution and Depth	US EPA (1998b)	Use habitat typing data or directly measure pool depths to gauge trends in all sizes of streams
Percent fines (<0.85 mm, 6.4 mm)	Scott TMDL	Same locations as Sommarstrom et al. (1989) but add tributary locations where fine sediments are a problem or to gauge trends after restoration
Cross Sections and Longitudinal Profiles	Madej (2001)	Lower mainstem Scott River
Volume of Sediment in Pools (V*)	Lisle and Hilton (1992) and Knopp (1993)	Continue monitoring at French Creek stations but also use in other streams of appropriate gradient and confinement with sediment problems to gauge trends in response to land management changes or restoration
Median Particle Size (D50)	Knopp (1993), Gallo (2002) and Reynolds (2001)	
Turbidity	Klein (2004)	Moffett Creek and mainstem Scott above and below
Water Temperature	Welsh et al. (2001)	Continue monitoring at previously sampled locations

Data Transparency: The RWB staff must require that all trend monitoring data related to TMDL implementation and abatement of water quality problems be supplied in raw form in order to maintain scientific validity (Collison et al., 2003). Although some Scott River stakeholders have held the position that data collected on private land is proprietary, RWB

staff can require data sharing as part of waste discharge monitoring related to timber harvest review, or other permitting actions.

Data Storage and Management: In order to facilitate participation of Tribes and the public in Scott TMDL implementation, it is desirable to have a central data repository. One such existing database is the Klamath Resource Information System or KRIS (see www.krisweb.com), which is now has been in use in the Klamath and Trinity River basins since 1998. KRIS is an optimal data management tool because its cloning function allows easy generation of new charts when new data are added. KRIS content can be shared via the Internet as attached files with anyone having a current version of KRIS installed on their computer. KRIS also captures reports and metadata, providing a means to share data in its full context, reducing the risk of the data be inappropriately used.

Time Frame for Recovery: Biological response to restoration actions may takes several life cycles, while physical stream habitat may respond more quickly (Spence et al., 1996). Both V* results and fine sediment measurements in French Creek indicate that road-related erosion prevention has resulted in improved water quality conditions. Consequently, trends in physical habitat should be checked within five years and if no response is detected within ten years, a change in management practices should implemented.

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Roads & Sediment Waste Discharges	• Parties Responsible for Roads and Sediment Waste Discharge Sites. • Regional Water Board.	• The Regional Water Board encourages parties responsible for roads and sediment waste discharge sites to take actions necessary to prevent, minimize, and control road-caused sediment waste discharges. Such actions may include the inventory, prioritization, control, monitoring, and adaptive management of sediment waste discharge sites and proper road inspection and maintenance. • The Regional Water Board's Executive Officer shall require parties responsible for roads, on an as-needed, site-specific basis, to develop and submit an Erosion Control Plan and a Monitoring Plan. An Erosion Control Plan shall describe, in detail, sediment waste discharge sites and how and when those sites are to be controlled. By [insert date that is 2 years from the date of U.S. EPA approval], criteria shall be developed for determining when an Erosion Control Plan shall be required, although nothing precludes the Executive Officer from requiring Erosion Control Plans prior to this date. • Should discharges or threatened discharges of sediment waste that could negatively affect the quality of waters of the State be identified in an Erosion Control Plan or by other means, dischargers shall be required to implement their Erosion Control Plan and monitor sediment waste discharge sites through appropriate permitting or enforcement actions	***• Road densities need to be reduced to no more than 2.5 mi. /sq. mi. per USFS (1996) and NMFS (1995) to reduce sediment and potential for damaging elevated peak flows. Priority for action needs to target coho salmon sub-basins or streams providing refugia.*** ***• Reduce road networks to those that can be annually maintained and make sure that decommissioned roads require no maintenance (U.S. EPA, 1998).*** ***• All major land owners should be required to participate in Erosion Control and Monitoring Plans.*** ***• Trend monitoring data need to be specified showing aquatic recovery companion with mitigation and restoration measures and additional abatement actions taken if targets are not met within a specific time period.*** ***• Prevent winter use of native surface logging roads due to discharges of fine sediment from truck traffic wearing down road beds (Collison et al., 2003).***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Roads	• California Department of Transportation (Caltrans). • Regional Water Board.	• Regional Water Board staff shall evaluate the effects of Caltrans' state-wide NPDES permit, storm water permit, and waste discharge requirements (collectively known as the Caltrans Storm Water Program) by [insert date that is 2 years from the date of U.S. EPA approval]. The evaluation shall determine the adequacy and effectiveness of the Caltrans Storm Water Program in preventing, reducing, and controlling sediment waste discharges and elevated water temperatures in the North Coast Region, including the Scott River watershed. If Regional Water Board staff find that the Caltrans Storm Water Program is not adequate and effective, Regional Water Board staff shall develop specific requirements, for State Water Board consideration, to be incorporated into the Caltrans Storm Water Program at the earliest opportunity, or the Regional Water Board shall take other appropriate permitting or enforcement actions.	***Proposed action sufficient.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Roads	• County of Siskiyou (County). • Regional Water Board.	• The Regional Water Board and the County shall work together to draft and finalize a Memorandum of Understanding (MOU) to address county roads in the Scott River watershed. The MOU shall be drafted and ready for consideration by the appropriate decision-making body(ies) of the County by [insert date that is 2 years from the date of U.S. EPA approval]. The MOU shall include the following contents: 1. A date for the initiation and completion of an inventory of all sediment waste discharge sites caused by county roads within the Scott River watershed, which can be done with assistance from the Five Counties Salmonid Conservation Program. 2. A date for the completion of a priority list of sediment waste discharge sites. 3. A date for the completion of a schedule for the repair and control of sediment waste discharge sites. 4. A date for the completion of a document describing the sediment control practices to be implemented by the County to repair and control sediment waste discharge sites, which can be done with assistance from the Five Counties Salmonid Conservation Program. 5. A description of the sediment control practices, maintenance practices, and other management measures to be implemented by the County to prevent future sediment waste discharges, which can be done with assistance from the Five Counties Salmonid Conservation Program. 6. A monitoring plan to ensure that the sediment control practices are implemented as proposed and effective at controlling discharges of sediment waste. A commitment by the County to complete the inventory, develop the priority list, develop and implement the schedule, develop and implement sediment control practices, implement the monitoring plan, and conduct adaptive management.	***Proposed action sufficient.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Grading	• County of Siskiyou (County). • Regional Water Board	. • The Regional Water Board encourages the County to develop a comprehensive ordinance addressing roads, land disturbance activities, and grading activities outside of subdivisions in the Scott River watershed by [insert date that is 1 year from the date of U.S. EPA approval]. The ordinance may be specific to the Scott River watershed or county-wide in scope.	***Proposed action sufficient.***
Dredge Mining	• Regional Water Board.	• Regional Water Board staff shall investigate the impact of suction dredge mining activities on sediment and temperature loads in the Scott River watershed by [insert date that is 3 years from the date of U.S. EPA approval]. If Regional Water Board staff find that dredge mining activities are discharging deleterious sediment waste and/or resulting in elevated water temperatures, staff shall propose, for Board consideration, the regulation of such discharges through appropriate permitting or enforcement actions.	***Proposed actions appropriate with the following addition:*** ***• If there is a substantial increase in mining activity (i.e. due to increase in price of gold), Regional Water Board staff will accelerate timeline for completion of study.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Temperature & Vegetation	• Parties Responsible for Vegetation that Shades Water Bodies. • Regional Water Board.	• The Regional Water Board encourages parties responsible for vegetation that provides shade to a water body in the Scott River watershed to preserve and restore such vegetation. This may include planting riparian trees, minimizing the removal of vegetation that provides shade to a water body, and minimizing activities that might suppress the growth of new or existing vegetation (e.g., allowing cattle to eat and trample riparian vegetation). • The Regional Water Board shall develop and take appropriate permitting and enforcement actions to address the human-caused removal and suppression of vegetation that provides shade to a water body in the Scott River watershed. The Regional Water Board's Executive Officer shall report to the Regional Water Board on the status of the preparation and development of appropriate permitting and enforcement actions by [insert date that is to be determined].	• The Regional Water Board shall develop and take appropriate permitting and enforcement actions to address the human-caused removal and suppression of vegetation Scott River watershed riparian zones to maintain shade, microclimate and large wood recruitment. ***As general guidance, with some exceptions, removal of riparian vegetation is prohibited.*** The Regional Water Board's Executive Officer shall report to the Regional Water Board on the status of the preparation and development of appropriate permitting and enforcement actions by [insert date that is to be determined]. ***• The Regional Water Board encourages the restoration of upland and valley floor riparian zones necessary to reduce sediment and temperature pollution.*** ***• The Regional Water Board specifically recommends the re-establishment of cottonwood gallery forest in valley floor riparian zones to provide better shade, channel definition, habitat complexity, and functions such as trapping sediment from flood waters and protecting valuable agricultural land.*** ***• The Regional Water Board recommends the use of conservation easements in riparian zones on agricultural land to allow riparian recovery while maintaining viability of the local agricultural economy.*** ***• The Regional Water Board recommends long term goals of rearrangement of rip rap in reaches of the Scott River where the channel is simplified and constricted with a secondary objective of providing the river with access to its flood plain to assist in replenishing groundwater.*** ***• The Regional Water Board will act to reduce ground water pumping and depletion where it is found to be limiting recruitment and survival or riparian trees.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Temperature & Vegetation	• Parties Responsible for Vegetation that Shades Water Bodies. • Regional Water Board.		Continued from previous page. ***• The Regional Water Board shall address the removal and suppression of vegetation that provides shade to a water body through the up-coming Stream and Wetland Protection Policy. The Policy will be a comprehensive, region-wide riparian policy that will address the importance of shade on instream water temperatures and will potentially propose riparian set-backs and buffer widths. The Policy will likely propose new rules and regulations, and will therefore take the form of an amendment to the Basin Plan. Regional Water Board staff are currently scheduled to develop this Policy by 2007, with funding available through a grant from the U.S. EPA.***
Water Use	• Water Users. • County of Siskiyou (County). ***• Quartz Valley Indian Reservation*** • Stakeholders. • Regional Water Board.	• The Regional Water Board encourages water users to develop and implement water conservation practices. • The Regional Water Board requests the County, in cooperation with other appropriate stakeholders, to study the connection between groundwater and surface water, the impacts of groundwater use on surface flow and beneficial uses, and the impacts of groundwater levels on the health of riparian vegetation in the Scott River watershed. The study should: (1) consider groundwater located both within and outside of the interconnected groundwater area delineated in the Scott River Adjudication,** (2) the amount of water transpired by trees and other vegetation, and (3), if deleterious impacts to beneficial uses are found, identify potential solutions including mitigation measures and changes to management plans. • Should the County determine that it and its stakeholders are able to commit to conducting the above study, the County, in cooperation with other stakeholders, shall develop a study plan by [insert date that is 1 year from the date of U.S. EPA approval]. The study plan shall include: (1) goals and	***• The Regional Water Board shall take action to secure necessary instream flows to protect water quality where water diversion is the clear cause of impairment, such as where cold water tributaries are dewatered.*** ***• The Regional Water Board shall require water users to develop and implement water conservation plans and practices over a ten year time frame, where action is needed to restore surface flows and water quality.*** • The Regional Water Board requests that the Department of Water Resources, in cooperation with ***the Quartz Valley Indian Reservation and*** appropriate stakeholders, study the connection between groundwater and surface water, the impacts of groundwater use on surface flow and beneficial uses, and the impacts of groundwater levels on the health of riparian vegetation in the Scott River watershed. The study should: (1) consider groundwater located both within and outside of the interconnected groundwater area delineated in the Scott River Adjudication,** (2) the amount of water transpired by trees and other vegetation, and (3), if deleterious impacts to beneficial uses are found, identify potential solutions including mitigation measures and changes to

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
		objectives; (2) data collection methods; (3) general locations of data collection sites; (4) data analysis methods; (5) quality control and quality assurance protocols; (6) responsible parties; (7) timelines and due dates for data collection, data analysis, and reporting; (8) financial resources to be used; and (9) provisions for adaptive change to the study plan and to the study based on additional study data and results, as they are available.	management plans. • Should the DWR determine that it and its stakeholders are able to commit to conducting the above study, the DWR, in cooperation with ***the Quartz Valley Indian Reservation and*** other stakeholders, shall develop a study plan by [insert date that is 1 year from the date of U.S. EPA approval]. The study plan shall include: (1) goals and objectives; (2) data collection methods; (3) general locations of data collection sites; (4) data analysis methods; (5) quality control and quality assurance protocols; (6) responsible parties; (7) timelines and due dates for data collection, data analysis, and reporting; (8) financial resources to be used; and (9) provisions for adaptive change to the study plan and to the study based on additional study data and results, as they are available.
Water Use	• Water Users. • County of Siskiyou (County). • ***Quartz Valley Indian Reservation*** • Stakeholders. • Regional Water Board.		***• The Regional Water Board requests that the State Water Board and its Division of Water Rights take the findings of the above groundwater study into consideration and act accordingly to protect and restore the instream beneficial uses of the Scott River and its tributaries, with particular focus on those beneficial uses associated with the cold water fishery.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Flood Control & Bank Stabilization	• Parties Responsible for Flood Control Structures or Dredge, Fill, and/or Bank Stabilization Activities. • Regional Water Board.	• The Regional Water Board encourages parties responsible for levees and other flood control structures to plant and restore stream banks on and around existing flood control structures. • The Regional Water Board shall rely on existing authorities and regulatory tools, such as the 401 Water Quality Certification program, to ensure that flood control and bank stabilization activities in the Scott River watershed are conducted in a manner that minimizes the removal or suppression of vegetation that provides shade to a water body and minimizes changes in channel morphology that could increase water temperatures.	• The Regional Water Board encourages parties responsible for levees and other flood control structures to plant and restore stream banks on and around existing flood control structures. • ***The*** Regional Water Board shall rely on existing authorities and regulatory tools, such as the 401 Water Quality Certification program, to ensure that flood control and bank stabilization activities in the Scott River watershed are conducted in a manner that minimizes the removal or suppression of vegetation that provides shade to a water body and minimizes changes in channel morphology that could increase water temperatures. ***As general guidance:*** ***- All bank stabilization projects conducted in the Scott River watershed will require a 401 permit.*** ***- All bank stabilization projects conducted in the Scott River watershed shall incorporate riparian plantings, and rock-only bank stabilization projects will not be allowed. Exceptions may be granted, but only occasionally with strong justification.*** ***• The Regional Water Board shall work with appropriate agencies and stakeholders to develop a protocol for what will occur after a large flood damages flood control structures and property. A goal of the plan will be to find cost-effective means to increase sinuosity of stream channels and re-establish the connection between streams and their floodplains.*** ***• The Regional Water Board will encourage and support landowners who choose to seek conservation easements to cease or reduce agricultural activities in areas near stream channels to facilitate riparian restoration and reduce flooding of agricultural land.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Timber Harvest	• Private & Public Parties Conducting Timber Harvest Activities. • Habitat Conservation Plan Holders. • Regional Water Board.	• The Regional Water Board shall use appropriate permitting and enforcement tools to regulate discharges from timber harvest activities in the Scott River watershed, including, but not limited to, cooperation with, and participation in, the California Department of Forestry and Fire Protection's timber harvest project approval process. • The Regional Water Board shall use, where applicable, general or specific waste discharge requirements and waivers of waste discharge requirements to regulate timber harvest activities on private and public lands in the Scott River watershed. • Timber harvest activities on private lands in the Scott River watershed are not eligible for Categorical Waiver C included in the Categorical Waiver of Waste Discharge Requirements for Discharges Related to Timber Harvest Activities on Non-Federal Lands in the North Coast Region (Order No. R1-2004-0016, as it may be amended or updated for time to time) simply through the adoption of this TMDL Action Plan. However, timber harvest activities on private lands in the Scott River watershed may be eligible for Categorical Waivers A, B, D, E, and F, as appropriate. • Where a Habitat Conservation Plan (HCP) is developed, Regional Water Board staff shall work with the HCP holder to develop, for Board consideration, ownership-wide waste discharge requirements for activities covered by the HCP, with any additional restrictions necessary to protect water quality and beneficial uses.	***Proposed actions appropriate with the following additions:*** ***• In considering WDRs, the Regional Water Board shall examine indices of cumulative effects risk (i.e. road densities, percent of watershed area harvested, and road stream crossing density) in watersheds with proposed timber harvests and compare them to prudent risk levels recommended in regional scientific literature.*** ***• The Regional Water Board recognizes that water quality and aquatic habitats in some tributaries may be in such a degraded state that significant watershed rest (time period with limited harvesting) and erosion control efforts (such as road upgrading and decommissioning) must occur before additional large-scale commercial harvest is allowed. In general, wet-weather hauling will not be permissible.*** ***• The Regional Water Board staff will consider the following through waste discharge authority as part of timber harvest review: limiting riparian harvests to allow large wood recruitment for coho and maintaining near stream microclimate; reducing activities on unstable lands, reducing road densities, near stream roads and crossings; and returning forest conditions in the rain-on-snow zone to levels that reduce the risk of increased peak discharge.***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
U.S. Forest Service & U.S. Bureau of Land Management	• U.S. Forest Service (USFS). • U.S. Bureau of Land Management (BLM). • Regional Water Board	• The Regional Water Board and federal land management agencies, including the USFS and the BLM, shall work together to draft and finalize a Memorandum of Understanding (MOU) that shall address sediment waste discharges, elevated water temperatures, and grazing activities within the Scott River watershed. The MOU shall be drafted and ready for consideration by the appropriate decision-making body(ies) by [insert date that is 2 years from the date of U.S. EPA approval]. The MOU shall include the following contents: Contents Related to Sediment Waste Discharges: 7. A date for the completion of an inventory of all sediment waste discharge sites and all roads on USFS/BLM land. 8. A date for the completion of a priority list. 9. A date for the completion of a schedule for the repair and control of sediment waste discharge sites. 10. A date for the completion of a document describing the sediment control practices to be implemented by the USFS/BLM to repair and control sediment waste discharge sites. 11. A description of sediment control practices, road maintenance practices, and other management measures to be implemented by the USFS/BLM to prevent future sediment waste discharges. 12. A monitoring plan to ensure that sediment control practices are implemented as proposed and are effective at controlling discharges of sediment waste. 13. A commitment by the USFS/BLM to complete the inventory, develop the priority list, develop and implement the schedule, develop and implement sediment control practices, implement the monitoring plan, and conduct adaptive management. Contents Related to Elevated Water Temperatures: 14. A commitment by the USFS/BLM to make permanent and implement the Riparian Reserve buffer width requirements. 15. A monitoring plan to ensure that the Riparian Reserve buffer widths are effective at reducing high water temperatures. 16. A commitment by the USFS/BLM to implement the Riparian Reserve monitoring plan and conduct adaptive management.	***• The Regional Water Board staff, through waste discharge authority in timber harvest review with the U.S. Forest Service, should consider a moratorium of any timber harvest in the Scott River basin that reduces canopy closure in the transient snow zone.*** ***• The Regional Water Board shall require that the USFS provide a study demonstrating forest regrowth and return to stand conditions (multi-tiered canopy) that lessen the risk of un-naturally high peak flows to prevent frequent flood damage to stream channels in the Scott River watershed.*** ***• The Regional Water Board staff shall consider withholding approval of timber harvests that substantially reduce the canopy in the lower Scott River watershed until the Redwood Sciences Laboratory study results on BMPs is released and it is demonstrated that USFS BMPs have protected water quality*** ***• The Regional Water Board will work cooperatively with the Klamath National Forest to reduce road networks within the Scott River to the level that can be actively maintained.*** ***• Roads decommissioned by the USFS to meet the above objective will have minimal erosion risk or maintenance requirements.*** ***• Prioritization of road decommissioning shall follow a hierarchy that protects watersheds with coho salmon or that provide salmonid refugia first (i.e. Elder et al., 2002)***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
U.S. Forest Service & U.S. Bureau of Land Management	•U.S. Forest Service (USFS). •U.S. Bureau of Land Management (BLM). •Regional Water Board.	Continued from previous page. Contents Related to Grazing Activities: 11. A date for the completion of a description of grazing management practices and riparian monitoring activities implemented in grazing allotments on USFS/BLM lands. 12. A commitment by the USFS/BLM and the Regional Water Board to determine if existing grazing management practices and monitoring activities are adequate and effective at preventing, reducing, and controlling sediment waste discharges and elevated water temperatures. 13. A commitment by the USFS/BLM to develop revised grazing management practices and monitoring activities, should existing measures be inadequate or ineffective, subject to the approval of the Regional Water Board's Executive Officer. 14. A commitment by the USFS/BLM to implement adequate and effective grazing management practices and monitoring activities and to conduct adaptive management.	

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Grazing	• Private Parties Conducting Grazing Activities. • Regional Water Board	• The Regional Water Board encourages the parties responsible for grazing activities to take necessary actions to prevent, minimize, and control sediment waste discharges and elevated water temperatures. • The Regional Water Board's Executive Officer shall require parties responsible for grazing activities on private lands in the Scott River watershed to develop, submit, and implement a Grazing and Riparian Management Plan and a Monitoring Plan on an as-needed, site-specific basis. A Grazing and Riparian Management Plan shall describe, in detail, (1) sediment waste discharges and sources of elevated water temperatures caused by livestock grazing, (2) how and when such sources are to be controlled and monitored, and (3) management practices that will prevent and reduce future sources. By [insert date that is 2 years from the date of U.S. EPA approval], criteria shall be developed for determining when a Grazing and Riparian Management Plan shall be required, although nothing precludes the Executive Officer from requiring Grazing and Riparian Management Plans prior to this date. • Should human activities that will likely result in sediment waste discharges and/or elevated water temperatures be proposed or identified, through a Grazing and Riparian Management Plan or by other means, the responsible party(ies) shall be required to implement their Grazing and Riparian Management Plans and monitor through appropriate permitting or enforcement actions	***Proposed actions appropriate***

Table 1. Proposed TMDL Implementation Actions and Recommended Alternative Actions

Topic	Responsible Parties	Action Proposed in Public Draft TMDL	Recommended Alternative Action
Siskiyou RCD & Scott River Watershed Council	• Siskiyou Resource Conservation District (SRCD). • Scott River Watershed Council (SRWC). • Regional Water Board.	• The Regional Water Board and staff shall increase efforts to work cooperatively with the SRCD and SRWC to provide technical support and information to landowners and stakeholders in the Scott River watershed and to coordinate educational and outreach efforts. • The Regional Water Board shall encourage the SRWC to (1) implement the strategic actions specified in the Strategic Action Plan and (2) assist landowners in developing and implementing management practices that are adequate and effective at preventing, minimizing, and controlling sediment waste discharges and elevated water temperatures.	***Proposed actions appropriate with the following addition:*** ***The Regional Water Board shall require that all water quality or trend monitoring studies conducted by the SRCD, SRWC or their consultants provide raw data, along with summary data and reports.***
Natural Resources Conservation Service	• Natural Resources Conservation Service (NRCS). • Regional Water Board	• The Regional Water Board shall increase efforts to work cooperatively with the NRCS to provide technical support and information to responsible parties and stakeholders in the Scott River watershed and to coordinate educational and outreach efforts.	***Proposed actions appropriate with the following addition:*** ***• The Regional Water Board will engage NRCS staff in discussions regarding response to flood damage to agricultural land and appropriate reach agreement on a plan of action.***
CA Dept. of Fish and Game	• CA Depart. of Fish & Game (CDFG). • Regional Water Board	• The Regional Water Board shall encourage the CDFG and aid, where appropriate, in the implementation of necessary tasks, actions, and recovery recommendations as specified in the Recovery Strategy for California Coho Salmon (CDFG 2004) in the Scott River watershed.	***Proposed actions appropriate with the following addition:*** ***• The Regional Water Board staff will work cooperatively with CDFG regarding coordination on shared authority such as stream bank and bed alteration that may affect water quality.*** ***• CDFG will be encouraged to provide Scott River fish trend monitoring data to Regional Water Board staff and coordinate on sediment studies in the Scott River canyon related to fall chinook salmon spawning success.***

* Although the Regional Water Board prefers to pursue the implementation actions listed in Table 4, the Regional Water Board shall take appropriate permitting and/or enforcement actions should any of the implementation actions fail to be implemented by the responsible party or should the implementation actions prove to be inadequate.
** Superior Court of Siskiyou County. 1980. Scott River Adjudication: Decree No. 30662.

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Appendices

Appendix A: Groundwater levels in Scott Valley 1953-2004

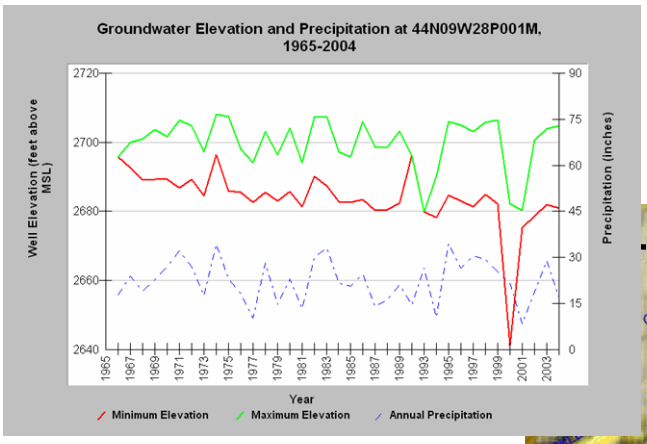
These figures and text were extracted from:
Quartz Valley Indian Community. 2005. Comments on Hypothesis Testing for Approach to Groundwater Studies, by Scott River Watershed Council – Water Committee. Quartz Valley Indian Community, Fort Jones, CA.

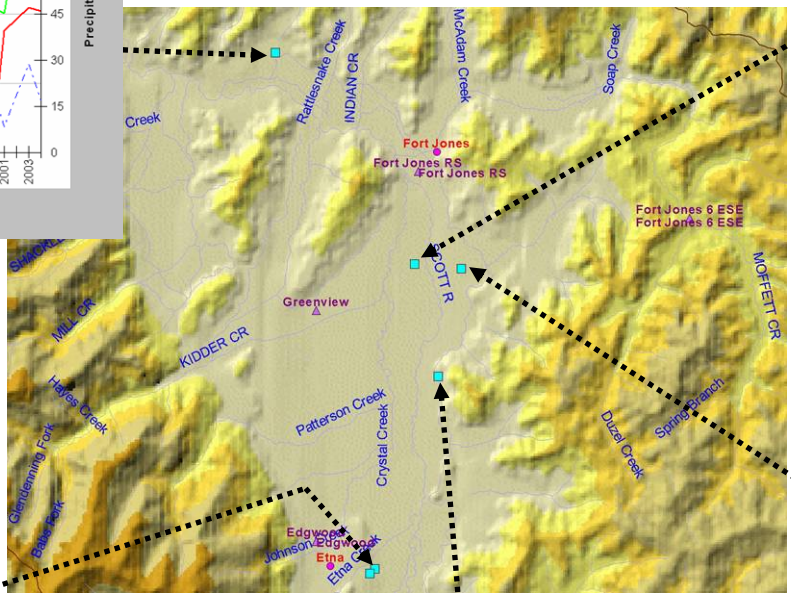
To obtain copies of the data on which these charts and maps are based, please contact Rebekah Sluss (EPA Director at QVIC) at rebekahqvir@yahoo.com or 530-468-5907.

Preliminary charting of annual minimum/maximum levels in California Department of Water Resources monitoring wells in the Scott Valley suggests that annual maximum levels have remained relatively constant over time (fluctuating with precipitation), but that annual minimum levels have declined since 1965 (though they fluctuate with precipitation). See maps and charts below for details.
[Cautionary note: when constructing charts, all measurements were used (data points were not excluded based on QAQC information)].

Each chart displays annual minimum and maximum groundwater levels at a California Department of Water Resources monitoring well. Also displayed on each chart is annual precipitation at Fort Jones (rain gage F20 3182 00). Groundwater elevations were typically measured once or twice per year, but have been measured more often in recent years.

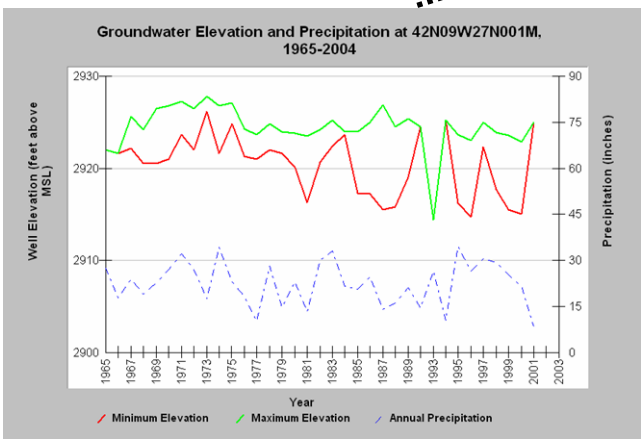
Scott Valley Groundwater Levels 1953-2004

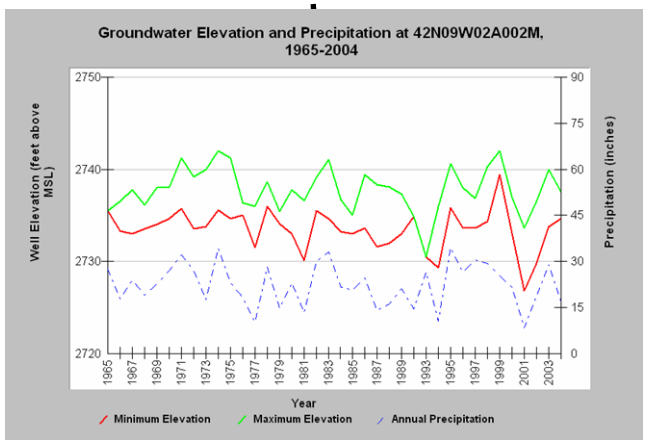


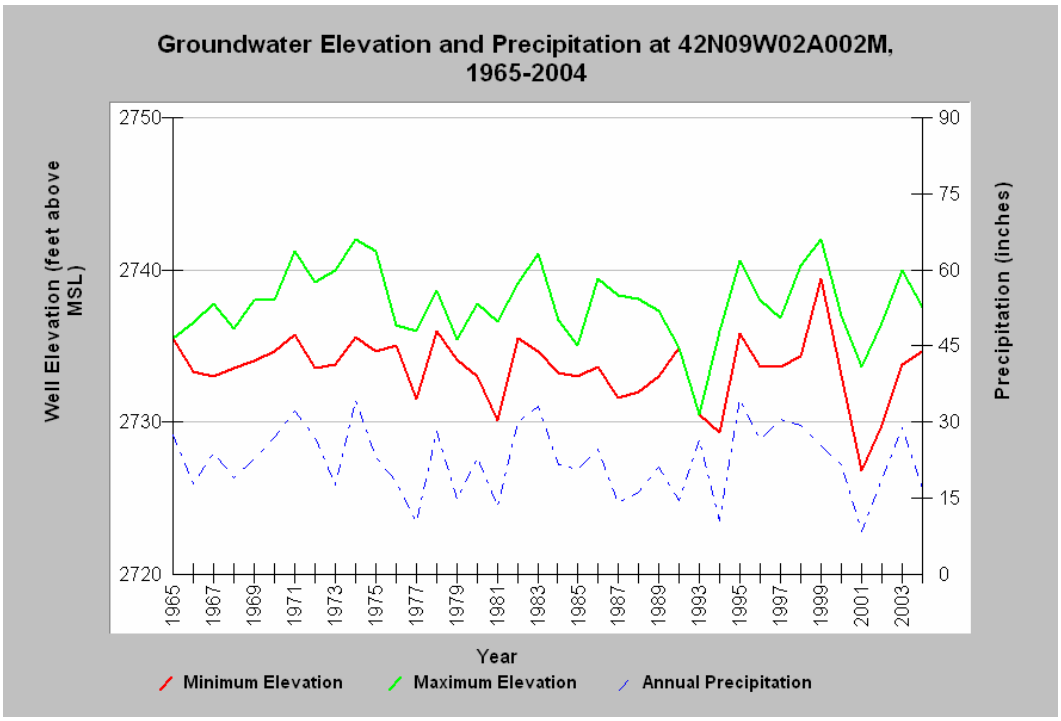


Groundwater data are from California Department of Water Resources Water Data Library - http://well.water.ca.gov/

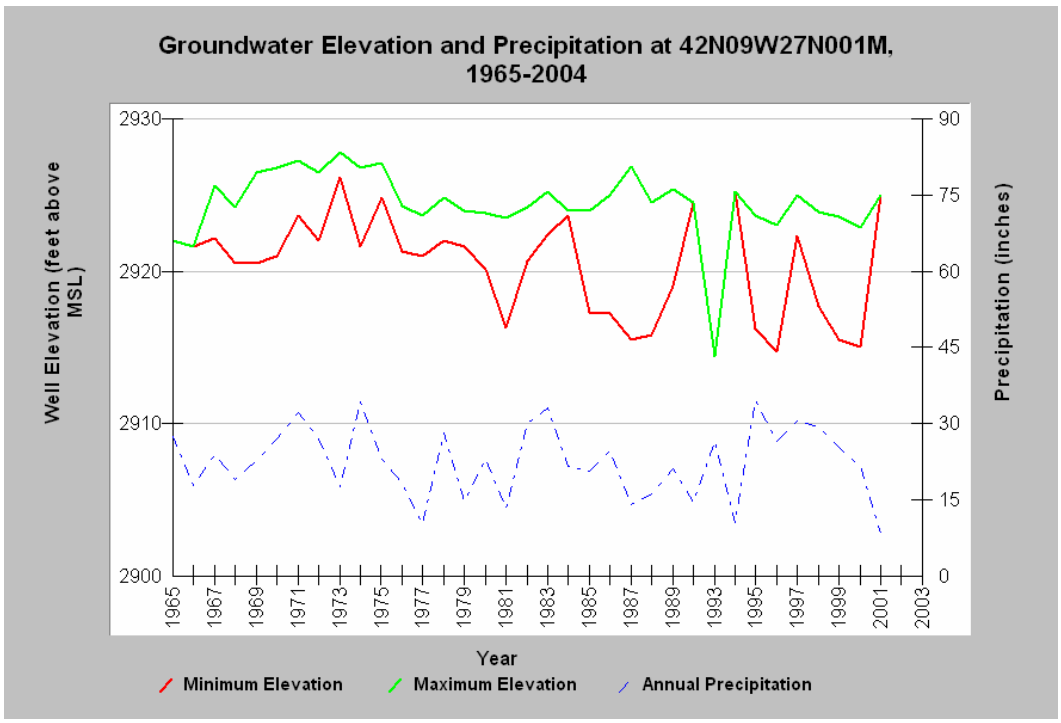
Precipitation data are from Fort Jones rain gage (F20 3182 00) California Data Exchange Center - http://cdec.water.ca.gov



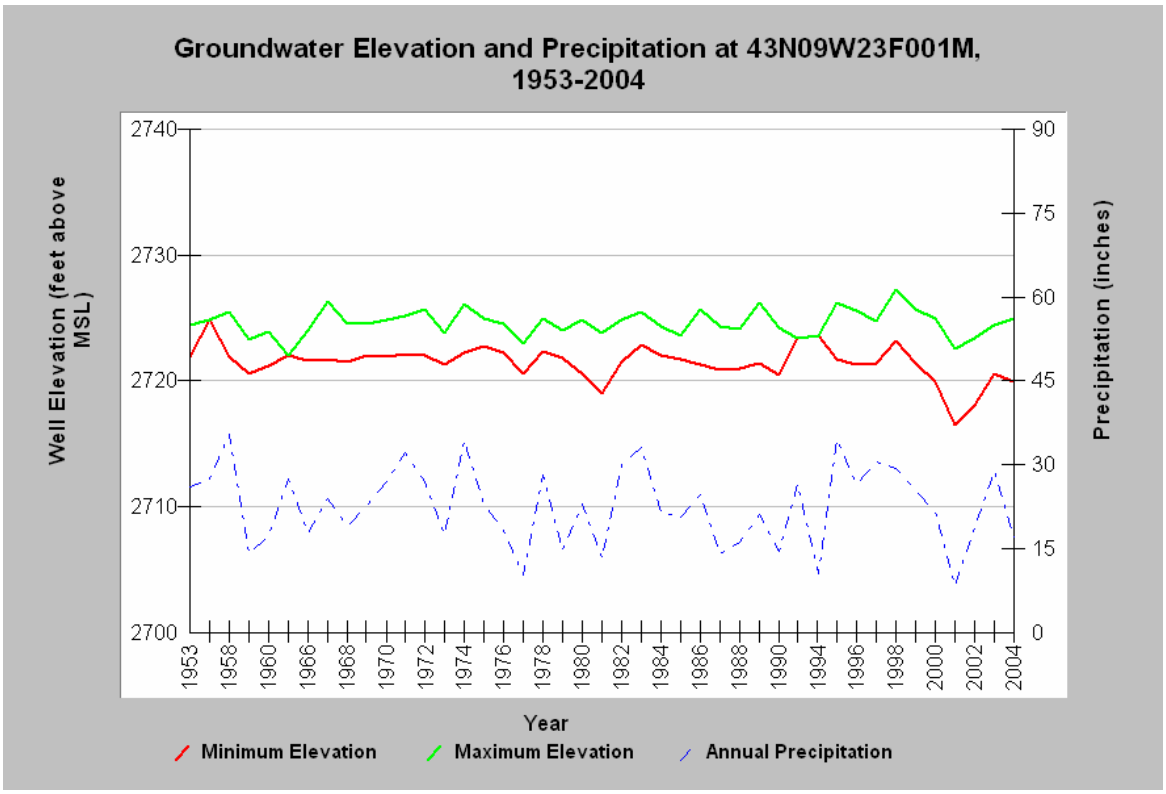




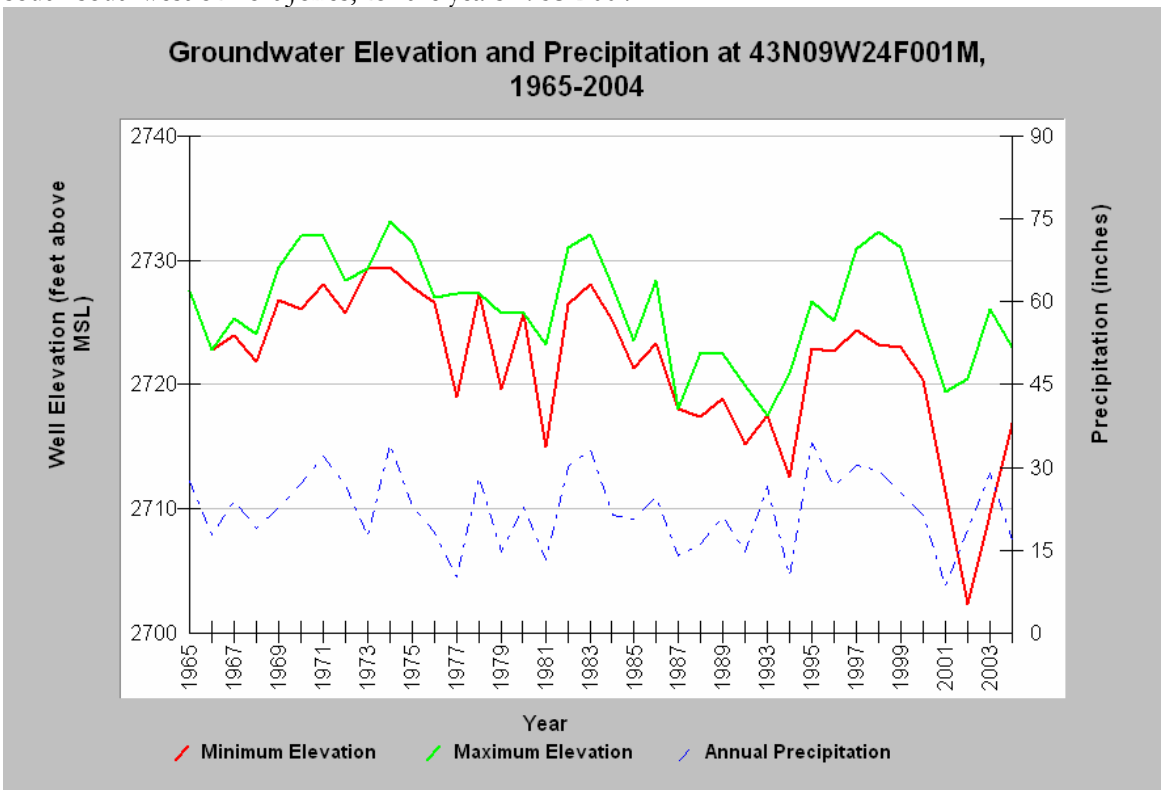
California Department of Water Resources well 42N09W02A002M, approximately 8 kilometers northwest of Fort Jones, for the years 1965-2004.



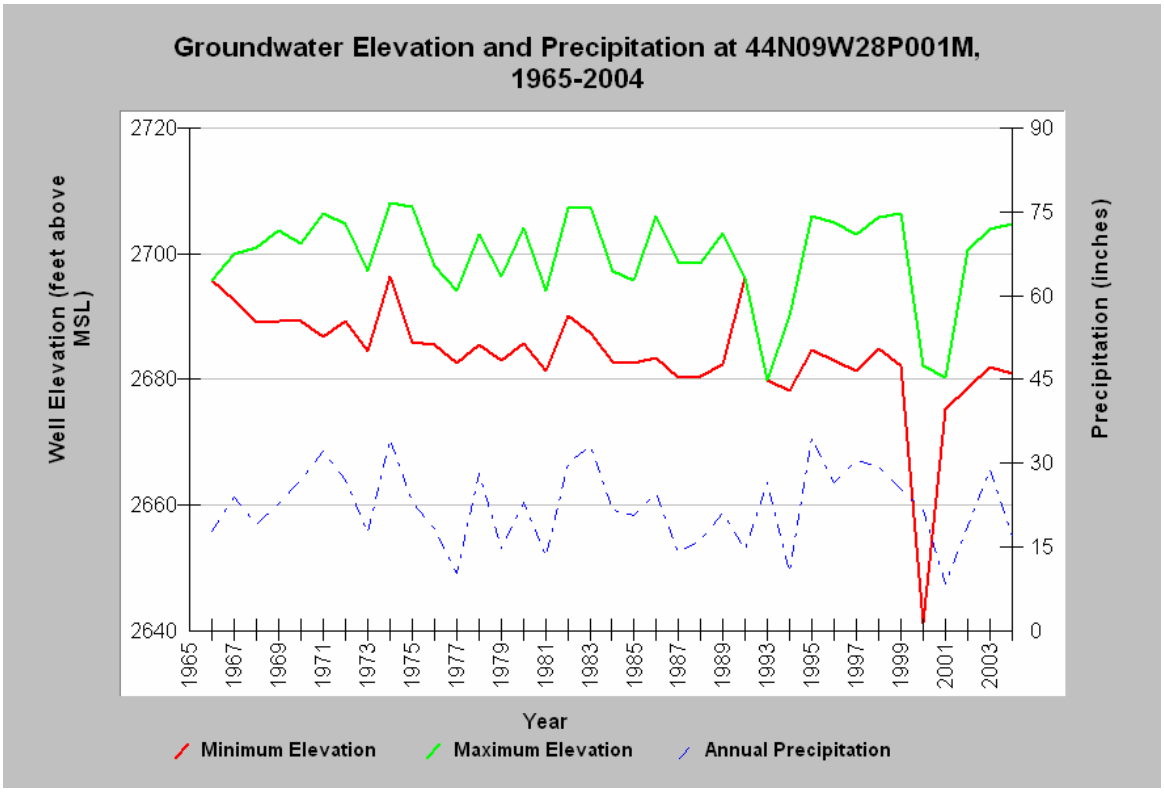
California Department of Water Resources well 42N09W27N001M, approximately 8 kilometers east of Etna, for the years 1994-2004.



California Department of Water Resources well 43N09W23F001M, approximately 5 kilometers south-southwest of Fort Jones, for the years 1953-2004.



California Department of Water Resources well 43N09W24F001M, approximately 5 kilometers south-southeast of Fort Jones, for the years 1965-2004.



California Department of Water Resources well 44N09W28P001M, approximately 8 kilometers northwest of Fort Jones, for the years 1965-2004.