COMMENT 1

October 15, 2007
Comments on the Groundwater Study Plan
Marcia H. Armstrong, Supervisor 5th District
Siskiyou County

I cannot support the plan as written. Primarily, it should be remembered that this is a voluntary, community-based study, This means that one must acquire permission from the landowner for any bore-hole, well, instrument or scientific field work that you wish to conduct. It should also be recalled that the rivers are non-navigable, requiring landowner permission to access, drill, etc. and study. The County cannot and will not force anyone to give their permission.

A huge component of the study will be community outreach and developing landowner support in order to acquire permission to do these invasive studies that you outline. A lot of this work is to develop participant trust that the results of the studies will not be used to target people in a punitive, regulatory manner. You might also be aware that you will probably not get cooperation on the level that your wells or bore-holes will be at the intervals you want or the river transects or measurements at the points you want. The plan should anticipate that and not be so rigid. Perhaps these could be written as desirable objectives and not tasks.

It also should be kept in mind that, although the TMDL is written for beneficial uses for cold water fisheries, there also is an equally valid beneficial use of agriculture. This use happens to be the one upon which our County and Scott Valley economy is based. Adequate water quantity is necessary for this economy to survive. Otherwise, we will see the unintended consequences of land conversions to ranchettes, which experience in the Shasta Valley has shown has doubled the number of wells. If groundwater managers (the landowners) are going to be able to have the information to make decisions, and if we are to craft workable alternatives, they are going to have to be able to understand the trade-offs of alternate use regimes. You should keep that in mind when designing your proposed study plan and make sure both sides of the trade off are shown.

It should be noted that the TMDL requires writing of the plan – not necessarily implementation. As it is community based, that would be contingent upon receptiveness by the community and potential participants.

Specific Comments

Page 6 line 227 – Do we need a time schedule? Implementation will be dependent on the time it takes to get willing participants and the ability to acquire funding.

Page 7 line 316 – Note that climate change and the effects on future water supply and energy needs for water management are some of the elements that will give proposals brownie points for funding under Prop. 84

Page 8 line 34 – “fluctuations have significantly changed since 1950.” Appears to contradict your statement on page 22 line 913-4 where you state “levels have remained fairly constant.”

Page 11 line 444 and 447 – Why are we modeling pre-historically? The rivers and landscape no longer have the capacity to perform in that manner. (Dredger tailings, climate, major land use changes, major changes in the rivers.)

Page 5 – line 223 – Please remove the statement regarding “Public Trust values.” That has political and involves questions on legal navigable status that the County does not wish to get into in this document.

Page 16 line 654-5 – Is it the intent to ignore the Marble Mountain segment – particularly Quartz Valley? That is what was done in the static level study and I think it is a mistake. These are major coho streams and important contributors to cold water.(Page 30 lines 1219-1227)

Page 23 lines 932-936- Please add Siskiyou County. Jim DePree has contributed a lot and we are paying for this year’s static well study.

Page 37- line 1536 - This should be updated to reflect that the Governor signed AB 1580 for local watermaster service on the Scott and Shasta http://leginfo.ca.gov/pub/07-08/bill/asm/ab_1551-1600/ab_1580_bill_20071010_chaptered.html

Page 37 line 1545 – 1551 As I understand it, the USFS is entitled to 200 sec. ft. of flow as a priority one user in that reach. There are 12 water users in their reach and 8 are priority ones. When the priority ones are not getting their water, they can shut off the lower priorities in their reach.

Page 38 line 1559-172 It is my understanding that this is a voluntary plan. The RCD has no enforcement authority.

Page 41 line 1686 – “proper management” is a values biased statement. Management practices should maximize beneficial uses – including agriculture, which is the vital economic use of this resource in the area.

Page 47 line 1921 – Installing 140 observation wells at a frequency of 1 per mile or per half mile. This is a nice objective, but should be couched in those terms. Achievement is largely dependent upon landowner cooperation and permission.

Page 48 line 1974 – Same as above in regard to landowner’s part in achieving objectives or tasks.

Page 49 – 1998-2004 in-line flowmeters may be a part of the measurements required under the ITP/ watermaster, otherwise, we have the participation limitation again.

Page 50 -2032-3 It should be kept in mind that selection may be based on choosing from those willing to participate, which may not necessarily be where you optimally would want them.

Page 50 lines 2074-2099 Dependent upon voluntary participation

Page 51 line 2110-2112 Would these affect drinking water wells? There are domestic users on these systems.

Page 52 lines 2146-2156 Dependent upon voluntary participation

Page 55 line 2264-2277 I will not support a plan that proposes well metering.

Page 57 line 2356-7 Dependent upon voluntary participation

Page 58 lines 2397-00 and 2408-10 Dependent upon voluntary participation

Page 59 line 2431 I will not support a plan that proposes well metering – period.

Page 61 line 2511 -2512 As I understand it, the TMDL was NOT based on per-historic parameters but on current altered capacity of the system. I don't see why we should illustrate conditions that will never again exist as some kind of baseline standard.
Page 61 lines 2513-1516 the goal of "sustaining a healthy economy and historic family farms by supporting agricultural land and water use."

Page 61 lines 2530-2540 and page 62 line 2571 scales of the study must be crafted to protect individual landowners from regulation, protect their privacy and property rights and encourage their participation.

Page 66 section beginning with line 2745. It should be stated that the purpose of this is not to enforce or require the landowners to use the BMPs developed. This is a voluntary program driven by incentives (market advantage, aesthetic and other values, grants etc. We could even develop a salmon-friendly niche market.) If these are not going to be voluntary and incentive based, then the County and the potential participants need to know so they can consider this when deciding whether or not to participate.

Page 69-70 costs should include outreach and education. Scale and reporting should consider protection of participants

The County has no funds to implement this and I do not foresee that county revenues and obligations would change in such a manner as to provide funds. It is mentioned that the County could apply for Prop 84 funds. I just returned from the IRWMP conference last week. This is what they said about Prop 84 funds. (You might want to consider this when crafting the plan for competitiveness.)

SB 1002 was the prop 84 appropriation bill for 07-08 and was for planning grants. It was vetoed by the Governor. So there is no appropriations bill for this session unless something comes through the Governor's water meetings. http://gov.ca.gov/pdf/press/SB%201002%20veto%20message.pdf

They want linkages between multiple areas in coordinated plans. They want to improve flood control, address environmental justice and climate change (mitigate greenhouse gas emissions and anticipate needs on a 20 year planning horizon.) Objectives must be measurable. Water management strategies have to consider the 25 strategies in the California Water Plan Update. They want to serve disadvantaged communities, help in salmon recovery further TMDLs. They want to consider the bigger picture. They want to meet statewide priorities, such as coho recovery.

Planning grants will require a 25% cost share (can be waived) and must have relevance to and be consistent with the North Coast RWMP.

Jennifer Jenkins said there are 6 things they want: (1) restore native salmonid habitat; (2) protect and enhance drinking water quality; (3) adequate water supply with minimum environmental impacts; (4) support statewide water initiatives; (5) Serve environmental justice; (6) have an inclusive framework for intra-regional cooperation. Statewide priorities are TMDLs; steelhead and coho recovery plans; Watershed management initiative chapters; basin plans (water quality control plan for the north coast; public health plans, and local coastal plans.)

COMMENT 2 (from Regina)

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Comments on the Scott River Groundwater Study Plan

The Klamath Riverkeeper summits the following comments on the Scott River Groundwater study plan. First we apologize for not turning these comments in during the six day comment period, however reviewing the plan and related documents in six days is impossible for most people and most Klamath River residents are not represented by Siskiyou County, which has a know bias against fisheries and regulation. The Klamath Riverkeeper believes there are many assumptions in this document that come directly from Siskiyou County and is not scientifically based. This is disappointing considering the great scientific expertise involved in the Klamath River.

Beyond the non-scientific assumptions present in this document, the Klamath Riverkeeper is disappointed that the study proposes to take up to ten years with no proposed mitigation or moratoriums on groundwater pumping in the interim. Much science exist that the groundwater pumping in the Scott River is directly responsible for many of the tributaries and the mainstem Scott in the Scott Valley going dry every year. This lack of water equals not only a temperature related issue, but threatens endangered and tribal trust species and the public trust as a whole. The importance of the Scott River to the whole Klamath River fishery can not be understated and by proposing business as usual while this study is occurring could put the salmon in the Scott River at great risk.

That said we are very glad that this study is being done and hope that it can use the best science possible and not be muddied by the politics of the Siskiyou County. At this time we wish to incorporate the comments of the Klamath Basin Tribal Water Quality Work group.

Below is a list of our main concerns with this plan, then comments delineated by line numbers.

- Study should consider whether groundwater extraction is violating downstream water rights.
- Study should identify a sustainable amount of groundwater pumping,
- Study should identify the areas which have interconnected ground water and recommend that this whole area is included in adjudications,
- Study should take into account flow needs for salmon in the river and how better groundwater planning and conservation can meet those needs,
- All assumptions in the study should have science behind it. Personal communications should not be taken as fact,
- Study should recommend a moratorium on new groundwater pumping and should recommend sustainable levels of pumping for existing wells,
- Study should take into account that this is a public trust issue that effects the whole state through the salmon fishing economy and not just local ranchers and farmers,
- Effects to riparian vegetation from groundwater pumping should be considered,
- All information gathered for this study and all information relied upon for this study should be made available to the public throughout the process to make sure all available information is used and science is sound,
- Water use and conservation recommendations should be included in this study.
- Study should consider historic groundwater levels as the baseline and not current depleted conditions.

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Below are our comments by line number

102. Ground water inflows are also a primary driver of stream temperatures in the Scott Valley.

123. Much evidence on the effects of ground water withdraws on temperature exist.
Include evidence.

193. This part should include and subterranean streams and rivers.
197. This part should include water efficiency.

This section should also include identifying violations of water rights and feasibility of existing water rights actually being enough to deal with supply, as in stream water rights for the Forest Service are never realized.

255. This part should include surface feed sprinkler irrigation and should look at the different methods of use, such as water saving techniques used by other drought prone areas, such as watering in the morning and night, using higher value, less water intensive crops, ext.

261. This part should include whether water table elevations were historically high enough for planting, and if the deplete water table in these areas are from ground water pumping.

267. Ground water in the Scott Valley is connected to surface water and often really subterranean creeks and river. This is a public trust assess and cannot only be made available to landowners.

277. Tribes and other stakeholder should be included. This process needs to be transparent and not another futile study where only in Valley farmers are included in planning and updates.

298-312 Effects of unregulated ground water diversions and lack of oversight on water withdraw and water rights should be included.

320 Due to the effects of climate change all hypothesis should air on the side of caution.

326. Livestock and private use should also be considered.

335. Because this study could take up to 10 years this assertion should be enough information to declare a moratorium on new wells, water rights and increased pumping until the study is done. Assurance that existing water rights are being followed and not overdrawn\ and that non-water right holders are not using ground water should be key to this process.

361-368 This is why a moratorium on groundwater pumping, oversight on water rights, and estimating use is needed for the life of this study.

369. This claim needs to be supported in document and the amount of drawdown that does affect the river needs to be added.

376. This claim needs to be supported and timing that water savings do affect flow should be disclosed. General unsupported statements on water efficiency should only be used if scientifically

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defensible.

395. No mention of the effects of the loss of natural channel variability and repeated in stream bulldozer use is included in this section

398. This section is confusing and should be explained better.

413. Natural vs. man-made drawdown should be discussed.

421. Use of dangerous and often illegal chemicals in these ditches that the impact to groundwater should be studied.

426. This part should include how groundwater is affected by these activities.

434. This sentence should include historic and current as morphology has been greatly affected by humans.

446. The presence of salmon, due to their life history answers this question.

452. Options to deal with this issue should be explored along with cumulative effects.

756. How irrigation affects these streams conditions is unknown and should be further studied.

945. Long term monitoring data should be made available to the public.

1046. Health of ground water should not be assumed in a groundwater study.

1052. Ground water should be sampled as part of this study to make sure agriculture and septic imputes are not causing similar problems as were found in these samples.

1088. Meters should be used at wells

1105. This study should aim to make sure that a uniformed way of studying groundwater is used and assumptions should be avoided.

1306. Effects of fire suppression and fire fighting not discussed.

1316. Effects of logging on Decomposed granitic soils and major road failures not discussed by important in this area. This is a major input of sediment and is responsible for riparian vegetation being destroyed in many areas.

1363. I have read reports of irrigation use efficiency being much worst. This statement should be backed by science and data

1415. Use of this type of experiment as a management tool should be evaluated.

1432. Irrigation efficiency methods for systems outside the individual farm should also be

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consider. For instance using irrigation line rather then open ditches could save a lot of water.

1465. Irrigated agriculture uses way more water then natural vegetation therefore this statement should be backed by data and science.

1475. If water use outside the Adjudication zone is affecting flows, then this study should recommend that these areas be managed through water rights.

1504. Groundwater should be managed under state law if this study finds it connected to surface flows.

1521. If adjudicated is not available, this report should recommend the re-opening of the adjudication.

1529. This statement is obviously not being taken into consideration and this study should document where this is being ignored in relation to groundwater.

1542. Whether the use of a unified water-master is needed should be addressed in this study.

1553. The extent of which the groundwater diversions are affecting the Forest Services water rights and Section 5937 of the Fish and Game code should be analyzed.

1686. Needs as far as flow for salmon should be identified by the Department of Fish and Game and this study should show how groundwater pumping and interconnection relates to meeting these base flows.

1769. The way that stream modifications (bulldozing, seasonal dams, ext) effect groundwater inflow and outflow should be analyzed along with diversions

1818. It is important to calculate how ground water diversions are affecting these numbers and to estimate what the difference would be without any wells.

1833. What is this estimate based on? It seems low.

Note on section: What evidence exists to show that the Westside of the Valley is the only area contributing to groundwater inflow.

1920. Plan should include plans for the closing of observation wells, so they are not utilized or abandon after the study is complete.

2003. For the purpose of gathering good date flow meters and gauges should be continuous, not a one time measurement, as watering needs may change from day to day.

2058. Due to the fact that it is believed that a greater area then the area near the stream is affected by ground water pumping and a wide area around the stream are affected by groundwater pumping through the valley, a larger area should be studied.

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2120. Tracers need to be proven salmon and drinking water safe.

2273. Land owners with adjudicated water rights must prove they are not taking more then there right and therefore are responsible to meter. The Department of Water Rights and Cal Fish and Game should be involved and should encourage not cooperating well owners to be involved as it is against the law for people to violate water rights.

2292. Due to the proven hydraulic connection between groundwater and the river flows groundwater diverters should also be required to meter their diversions by Fish and Game.

2421. Water use is decided by water rights, which should be monitored. In places with no water master water use must be monitored buy water rights holders. There is no question that water rights are being violated in some degree in the Scott Valley and water right holders should be documenting use.

2556. Water management scenarios should focus on water efficiency and savings and include metering of all diversions.

2746. Tribes and non-profits should be involved with defining BMP's. Siskiyou County and the Siskiyou County RCD have a well know bias against regulation and good management of resources. Due to their anti-tribal and anti conservation attitude many agencies have let them define studies and legal processes to get their cooperation. This is unethical and illegal as the County represents only a minority of the people whom depend on the Scott River and often hurts rather then helps efforts such as this study. The only reason there has not been slurry of lawsuits relating to this fact is that the community really wants to see things such as the Scott River Groundwater study and Scott River TMDL get done so on the ground changes can occur. However the lack of participation by anyone the county does not like, including tribes, has only hurt the processes in place and had lead to decisions and planning that is not balanced or fully informed. This process cannot follow this same pattern.

2752. Quality of water, not just amount, should be considered while creating BMP's

2793. Attempts to gather data from all water rights holders and groundwater pumper's needs to be attempted to clarify information.

2872. The Scott River salmon do not have 20 years to wait for action. Information should be reviewed and presented to water managers every year or two and recommendations should be made, and management changed at these times.

Thank you for the opputunity to comment.

COMMENT 3

from the desk of Felice Pace

28 Maple Road Klamath, Ca. 95548 707-482-0354 unofelice@gmail.com

TO: Tam Doduc, Chair, SWRCB
John Corbett, Chair, NCWQCB
RE: **Comment on Scott Valley Groundwater Study Plan "Penultimate Draft" 10/9/07**
CC: Interested Parties

Dear Ms. Doduc and Mr. Corbett:

These comments are directed to you because the above referenced Study Plan does not conform to the urgent need for a directed study to provide reasonable assurance that actions designed to address the impairments of the Scott River are backed up by good information.

Instead what we have is a long-term study which – although it is 100% funded by the SWRCB - has been directed by other entities (most notably Siskiyou County) to meet their own needs and to provide a level of scientific underpinning and assurance that have not been applied to other restoration projects in this Valley most of which have clearly benefited landowners but many of which have been of questionable benefit – or in some cases even harmful to - water quality, fisheries and wildlife[1]. This raises serious questions about whether Siskiyou County and the Siskiyou RCD are good faith partners in efforts to address impairments to the Scott River.

It is important to consider this Study Plan within the context of the current situation in the Scott River. This fall flows declined to less than 10 cfs while full irrigation – at least half of it from the 228 unregulated irrigation wells in the County proceeded fully. Chinook are now not able to make it to the prime spawning grounds in and above Scott Valley even in average water years. In drought years Coho are delayed in Scott Canyon (lower 10% of the watershed). This amounts to a serious threat of extirpation/extinction and – unless significant action is taken soon to address the situation – is likely to result in a petition to list Scott Chinook under the state ESA.

Under these circumstances the goal of the Study Plan can not be complete confidence or complete knowledge (which is not what science can deliver in any case) but rather producing information and professional judgment within a reasonable time period (max of 1 year) that will allow actions to be formulated with substantial but not complete confidence.

Specific Comments on the Draft SP:

1. A two phased study plan should be developed.

While the comprehensive nature of the SP is appreciated, given the urgency of the situation – and the fact that the funding has been supplied for more limited purposes – the SP should be redrafted into two stages:

Phase 1 should focus on providing good quality information as soon as possible including:

a. Evaluating current information (including FWS monitoring wells, Mack/USGS, DWR/1975, and USFWS in press) and old maps that show the location of springs on the

[1] This assertion is well documented and I would be happy to provide specifics to NCWQCB and SWRCB upon request.

Westside in the alluvial fans) to determine what can be reasonably concluded (and with what level of confidence) about the impact of groundwater pumping on spring accretion, and the impact of groundwater pumping on flows in the mainstem.

b. Targeted investigations to fill data gaps and sufficient to provide 75% probability determination re impacts of groundwater pumping on springs, accretion and flows.

c. Recommendations re interim prudent measures to prevent additional impacts of groundwater pumping on springs, accretion and flows.

There should be a deadline set for delivering Phase 1 equal to 1 year from approval of study plan by NCWQCB/EPA.

Phase 2: The more ambitious "Cadillac" study presented in the draft Study Plan should be reworked into a second phase on a longer time frame.

2. It is critical that the Study Plan and the study itself be perceived by all stakeholders as unbiased. The current Study Plan does not appear to be unbiased.

The Land Grant universities in general and the UC Extension in particular have well documented biases that are the result of history. Whether or not the individuals involved in this study plan exhibit such a bias is irrelevant since we are dealing with perception. But it is essential that all stakeholders have confidence that the study will be designed and conducted without bias. For this reason the following approaches are strongly recommended.

a. This and subsequent study plans should be peer reviewed by independent professionals not associated with UC Extension and specifically chosen by NCWQCB and EPA respectively in consultation with QVIR and Siskiyou County.

b. Individuals with a personal interest in maintaining the status quo on groundwater pumping should not be advisors to this study. For example, one of the advisors has a family business (nursery) that was developed less than 10 years ago and which pumps extensively from within 300 feet of the Scott River. This individual should not be an advisor or employed in the study. The same holds for any individual who has an irrigation pump that is not adjudicated as part of surface flow as well as others who have a personal financial interest in the outcome.

3. The County and RCD are applying a different standard for information to justify restoration projects associated with the TMDL groundwater issues than they have ever applied before to any other restoration project. If this standard of information surety were applied to all restoration projects in the Valley, the RCD would be out of the restoration business. This divergence indicates a county/RCD bias which calls into question whether they are a good faith collaborator with the NCWQCB.

It is recommended that substantially the same standard of information surety be applied to information to inform restoration actions associated with groundwater and flows as is applied to the $20-$30 million in restoration projects which have been implemented by the RCD. It should be noted that those expenditures include grants from the SWRCB and NCWQCB under 319 j and other programs that have not required the sort of comprehensive long-term surety which is being applied in this case.

Sincerely,

Via e-mail
Felice Pace

COMMENT 4 (QVIR and Kier Associates)

Quartz Valley Indian Reservation
13601 Quartz Valley Road
Fort Jones, CA 96032
ph: 530-468-5907 fax: 530-468-5908

November 20, 2007

Ground Water Study Team
UC Cooperative Extension Groundwater Hydrology Program
University of California
Davis, CA 95616

Dear Study Team,

The Quartz Valley Indian Reservation is located in the Scott River watershed and the community of Quartz Valley is very concerned about the Scott River watershed health as it relates to salmon and steelhead recovery. Surface and groundwater extraction represent significant limiting factors for the recovery of these species. Salmon have been relied upon for sustenance of our community and downstream Tribes for thousands of years.

We would like to protest the exclusion of our Tribe from your draft study plan development to date. We are stakeholders in the Scott valley and should be given the same respect and participation that the other stakeholders were given. Your draft specifically states that the North Coast Regional Water Quality Control Board envisioned the Quartz Valley Indian Community working cooperatively on the groundwater plan and we look forward to an explanation as to why this has not yet taken place. We expect you to rectify this in the future.

We look forward to working with you.

Sincerely,

Harold Bennett, Tribal Chairman
Quartz Valley Indian Reservation

CC: Bryan McFadin, Robert Klamt, Luis Rameirez NCRWQCB
Susan Corum, Karuk Tribe Natural resources Dept.
Kevin McKernan, Yurok Tribe Environmental Dept.
Ken Norton, Hoopa Tribal EPA
Phil Smith, Resighini Rancheria EPA

INTRODUCTION

Kier Associates has reviewed the *Draft Scott Valley Community Groundwater Plan (Draft Plan)* (Harter and Hines, *In review*) on behalf of the Klamath Basin Tribal Water Quality Work Group (Work Group), an alliance of water quality research and environmental protection departments of five federally recognized lower Klamath Basin Tribes. The Work Group was formed following the devastating September 2002 Klamath River adult salmon kill to work proactively on water quality recovery by supplying sound and timely science products and interpretations to government agencies to assist in programs and processes of possible assistance to the river. The Work Group views Clean Water Act compliance as a means to ensure the future of salmon and the continuance of a tradition of fishing and fish conservation by the Tribes.

Before addressing the content of the *Draft Plan*, a note on process is necessary. The report notes that it is the explicit wish of the North Coast Regional Water Quality Control Board (NCRWQCB) that the Quartz Valley Indian Community (QVIC) be recognized as a cooperator in this ground water study. QVIC has not been consulted by the developers of the *Draft Plan* despite their Reservation being squarely within the Scott Valley.

SUMMARY OF COMMENTS

Overall, the *Draft Scott Valley Community Groundwater Plan* presents some useful information and ideas. It fails, however, to draw sufficiently on available information. And it fails to recognize the extent of stream habitat impairment that has occurred, and that continues to occur in the Scott River watershed.

To provide background regarding Scott River water and fisheries issues, we recommend that the groundwater study authors review comments (Kier Associates, 2005; QVIC 2006a, 2006b, 2006c) that the Work Group provided the State during development of the *Scott River Sediment and Temperature TMDL* (NCRWQCB, 2006), the genesis of the groundwater *Draft Plan* and the California Department of Fish and Game's (CDFG) Incidental Take Permit (ITP) process (CDFG, 2006). Additionally, TMDL comments by PCFFA et al. (2006) also provide important information. The most relevant of these documents are included here as Appendices (A-C).

The groundwater study plan calls for a major monitoring, research and modeling effort that would, were it ever implemented, produce long-term, high-quality information useful in environmental decision-making in the Scott River watershed.

We are concerned, however, that the ambitious measured called for in the *Draft Plan* will not provide enough useful information in the near-term. The restoration of water quantity and water quality in the Scott River is an urgent matter. The *Draft Plan* is recommending studies the cost of which will be quite high at precisely the moment that the State's fiscal condition is rapidly worsening.

The study plan needs to be improved by providing a better understanding of its phasing, the basis for prioritizing its steps, and the probable cost of its steps.

The *Draft Plan* fails to make clear just how rapidly the Scott River watershed groundwater and surface water situation has worsened since the major expansion in groundwater pumping began in the mid-1970s. Scott River instream flows have shriveled in the past decade. Instead of making clear the severity of the problem the Draft Study resorts to platitudes like "It will be more cost effective to discover and prevent problems before they occur in review" (p. 1).

A review of available information, provided in our comments below, clearly shows that there is a crisis in water quality and quantity in the Scott River Valley. Populations of coho salmon and fall Chinook salmon are at critically low levels. What is needed is an adaptive management program in which immediate measures are taken to decrease groundwater pumping and surface diversions, with studies to document how instream water quantity and quality respond to such measures.

We recognize that the groundwater study plan is by its nature only a study plan, and that its authors are not in the position to command reformation of Scott River water resource management; however, the point we raise above about the need to recognize the present severe degree of impairment and the need for urgent action are, in fact, relevant to the shaping of the goals and methods of the proposed study.

STUDY PLAN SHOULD PROVIDE MORE DETAIL ON PHASES AND PROBABLE COSTS

As noted in our summary above, the study plans calls for a massive monitoring, research and modeling effort. There are no assurances, whatsoever, that funding for an effort of the proposed scale will ever materialize.

It is prudent, therefore, to provide a clear and concise list of study phases and priorities. It is understandably difficult and painful to whittle a master plan down to a smaller list of core elements, but this must be done. The cost estimate listed for Phase 1 alone is $2.5 million, a very large sum. Phase 1 currently has multiple sub-components, but the priority ranking and specific utility of each is not clear. We recommend that Phase 1 be split into smaller pieces, listed in order of priority, and a justification be provided as to exactly what would be learned from each piece, and why one piece should take priority over another.

STUDY PLAN SHOULD BEGIN BY EVUALUATING EXISTING DATA

Before launching into a multi-million-dollar data collection effort and development of a state-of-the-art model, it would first be prudent to analyze existing data to determine what is already known about historic changes to the surface and ground hydrology of the Scott River watershed. What we are suggesting here is different than the construction of a computer model that simulates surface water/groundwater interactions (Phase 1a of the study plan); it is more simple analyses, as follows:

1. Looking at trends in low-flow conditions in the Scott River flows. For instance:

- Has there been a change in the number of days per year with flow <20 cfs (and <40 cfs) at the Fort Jones USGS gage since data collection began in 1942?
- Has there been a change in the minimum monthly flows at the Fort Jones USGS gage since data collection began in 1942?

2. What are the long-term trends in the number of wells in the Scott Valley, including their pumping capacity, and how does the timing (on a scale of years/decades) of well installation compare with any changes in streamflow over time?

3. What do 1972 and 1973 data collected by the State Water Resources Control Board (SWRCB, 1974) show about the magnitude and locations of groundwater accretions to various reaches of the river? How do those data compare with similar data collected in 2003 for the *Scott River TMDL* and, again in 2006-2007?

4. What is the pumping capacity of Scott Valley wells?

Answering the questions above is neither difficult nor expensive, yet would yield valuable information and should be part of any sober effort to determine how groundwater hydrology and groundwater extraction may influence Scott River stream flows.

We request, therefore, that such analyses be conducted by the groundwater study team as a priority.

EVIDENCE OF DEGRADED AQUATIC HABITAT CONDITIONS IN THE SCOTT RIVER WATERSHED AND THE ROLE OF GROUNDWATER

Effects of groundwater pumping on riparian vegetation

While the *Draft Plan* cites the need to "evaluate effects of groundwater on the health of riparian vegetation," it ignores the known riparian degradation of Moffett Creek attributable to groundwater extraction (Kier Associates, 1999). Figure 1 shows lower Moffett Creek and its lack of riparian trees. This stream once harbored coho salmon, steelhead and Chinook salmon but has now been reduced to a degraded steelhead-only stream. An appropriate goal for a groundwater study would be to test what actions are needed to restore surface flow to Moffett Creek and to revive its riparian zone.

Large sums are proposed for studies in the *Draft Plan* but there is little mention of incentives for land owners to modify cropping patterns, sell easements or install water conservation equipment in the near term.

Figure 1. Moffett Creek in August 1997 after the January 1997 storm and subsequent bulldozing. Note the lack of riparian trees due to the drop in the groundwater table (Kier Associates, 1999). Photo from KRIS Version 3.0.

Effects of tributary diversions

The *Draft Plan* states that "Diversions of surface water lead to relatively small temperature impacts in the mainstem Scott River, but have the potential to affect temperatures in smaller tributaries, where the volume of water diverted is large relative to the total flow." In fact, the mainstem Scott River not only experiences significant temperature problems because of flow depletion (Figure 2 and 3), it also loses surface flow altogether in some reaches due to agricultural water withdrawals (Figure 4). Temperature impacts don't get much more dramatic that that!

Major salmon and steelhead-bearing tributaries also have more than temperature problems, losing summer and fall surface flow due to diversions (e.g. Shackleford Creek, Kidder Creek, and Etna Creek). All stream reaches that are currently de-watered were formerly good-quality salmon rearing areas. QVIC (2006b, 2006c) has pointed out repeatedly that this dewatering is illegal under CDFG Code 5937.

In aggregate, water withdrawal in tributaries of the Scott River severely depletes mainstem flows and causes problems related to transit time, water temperature and water quality. A good example of this is the lower mainstem Scott River in the canyon below Kelsey Creek on U.S. Forest Service lands (Figure 5). Slow transit time through this exposed, parabolic reach of the Scott River warms the stream significantly and degrades its capacity for salmon (see Anadromous Fish).

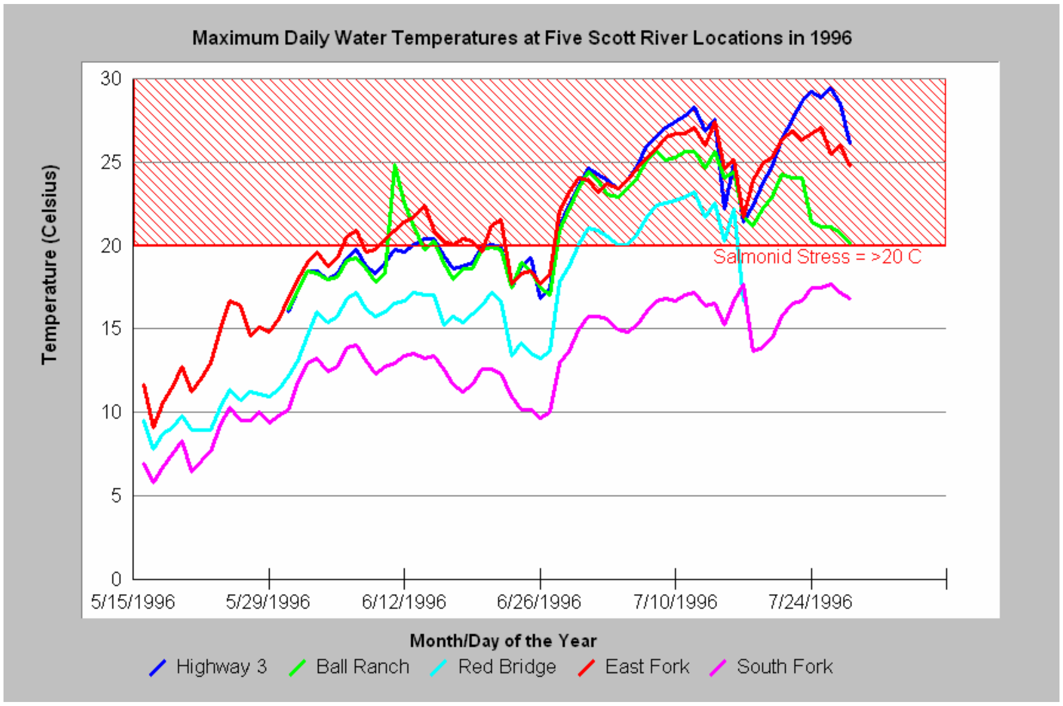

Figure 2. Water temperature at various Scott River mainstem locations in 1996. Flow depletion slows streamflow transit time and increases thermal loading. Chart from KRIS V 3.0 and data from the Siskiyou Resource Conservation District.

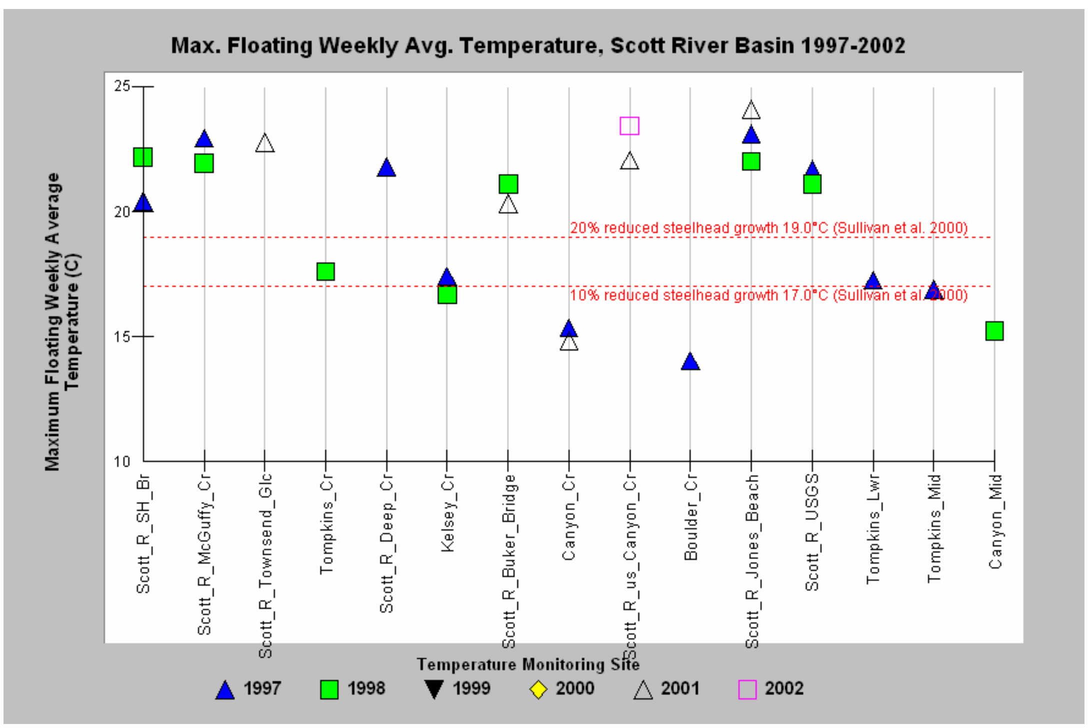

Figure 3. Maximum floating weekly average water temperature (MWAT) for several mainstem Scott River and tributary locations shows that lower Scott River water quality is stressful for salmonids and provides only marginal rearing habitat. Data from the Karuk Tribe and USFS.

Figure 4. Mainstem Scott River lacking surface flow in late summer 2002 between Fort Jones and Etna. Photo by Michael Hentz from KRIS V 3.0.

Figure 5. Photo of lower Scott River canyon shows very low flow and open exposure to sun in parabolic gorge that promotes warming. Michael Hentz photo from KRIS V 3.0.

Trends in Scott River groundwater extraction

The *Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program* (Kier Associates, 1991) noted that ground water pumping in the Scott River valley depleted surface flows because of the interconnection between surface- and groundwater. This fact was also clearly noted in the *Scott River Adjudication* (CSWRCB, 1980) and in earlier work by the U.S. Geologic Survey (Mack, 1958).

The California Department of Water Resources (CDWR) unpublished well log data (Eaves, personal communication) indicate that the installation of irrigation wells continues in the Scott River Valley (Figure 6). The greatest number of wells installed in the Valley occurred in the 1971-1980 period. After a slump in installations between 1981 and 1990 the number of new wells increased once more during the 1990's and continues to the present. Not all well installations are reported. CDWR estimates their record may be 30-50% low. Data from 2005-2007 have not been recorded and data from 2001-2004 are provisional.

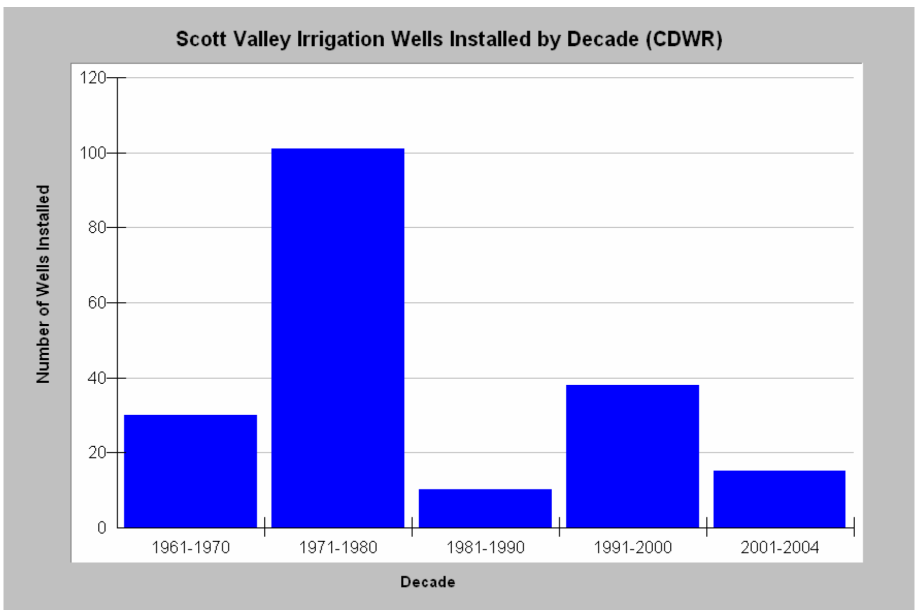

Figure 6. The number of new irrigation wells recorded by the California Department of Water Resources by decade 1961-2004 (Eaves, personal communication). Figurre from PCFFA et al (2006).

Although the number of pump installations may have diminished over time, the installation of just a few large capacity pumps can drive groundwater levels downward (USGS, 2005).

The U.C. Davis team needs to assemble a current inventory of all wells, including the pumping capacity of each.

Trends in Scott River streamflow

The *Draft Plan* describes trends in Scott River flow for only a very limited period. Figure 6 shows the 2007 Scott River summer and fall flows with reference lines showing the flows required flows to meet SWRCB (1980) adjudicated levels. This chart shows flows as low as 5 cubic feet per second (cfs), or less than one sixth of those required by adjudication.

Prior to 1977, Scott River flows *never* dropped below 20 cfs (Figure 7). Despite assertions(by Drake et al. 2000) that flow depletion is a product of climate change, the number of days in which Scott River flows have dropped below 20 cfs have increased steadily in recent years, even when precipitation has been moderate to high (Figure 8).

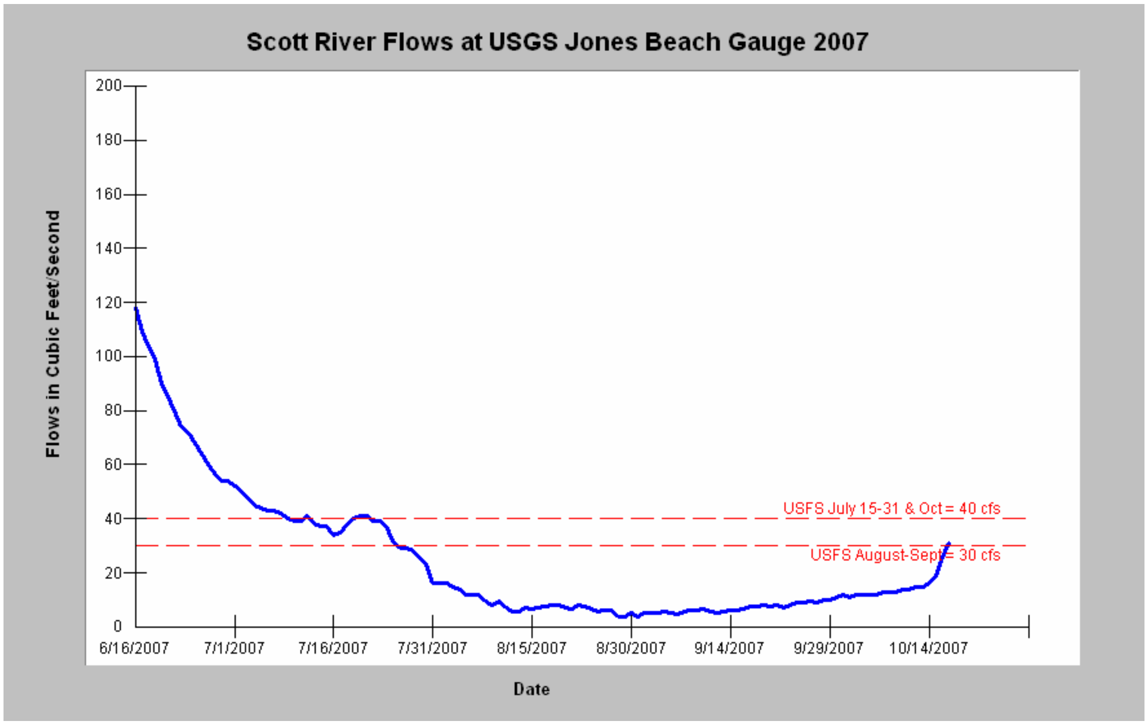

Figure 7. USGS flow gage results for 2007 show major lapses in meeting SWRCB (1980) adjudicated flow levels. These low flows cause stream warming and create significant risks for the survival of juvenile salmonids in the lower Scott River.

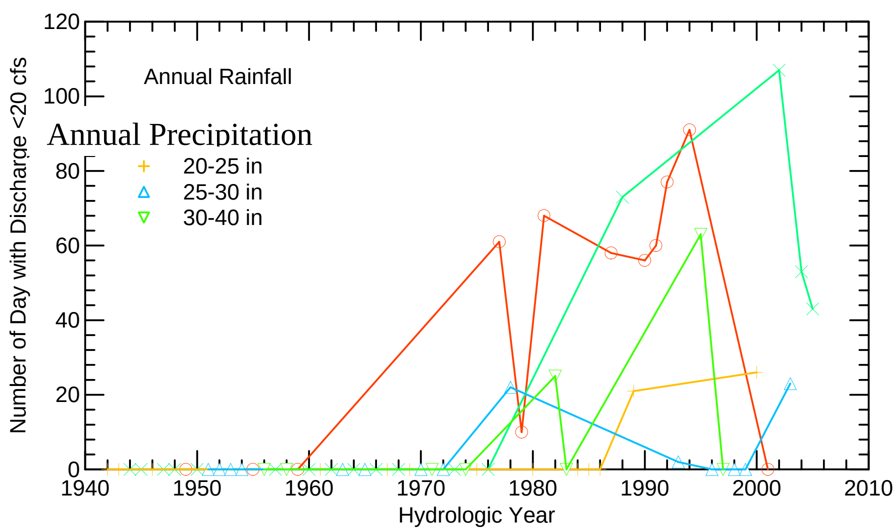

Figure 8. This chart shows the number of days that the Scott River fell below 20 cfs at the USGS gauge below Ft Jones, with years with similar annual precipitation grouped together. Note that there were 60 days of flows less than 20 cfs even in a recent wet year (1998/30-40 inches of rain). Figure from PCFFA et al. (2006).

The status of salmon and the effects of low stream flows on the risk of their extinction

There are clear signs that if immediate action is not taken to restore Scott River flows that Pacific salmon stocks in the basin will be lost (Rieman et al., 1993). When flows in the Scott River gorge on U.S. Forest Service lands are not met, habitat that once served as critical refugia becomes marginal or unusable for juvenile salmonids. As low flows extend into the fall they block adult fall Chinook salmon migrations further into the basin.

The *Draft Plan* fails to note that Scott River fall Chinook salmon populations have fallen to critically low levels in recent years (Figure 9), heralding an elevated risk of extinction (Kier Associates, 1991; Gilpin and Soule, 1990). QVIC (2006c) has pointed out that only one of three year classes of coho salmon has been robust, a sign that that this population is at risk of extinction (Rieman et al., 1993). Summer steelhead and spring Chinook salmon that formerly returned to the Scott River have been extirpated or nearly so (Kier Associates, 1991).

Fall Chinook salmon that are unable to ascend into the Scott River Valley are trapped in the lowest six reaches of the river (approximately 25 miles, see Figure 10), where bedload movement and shifting sands makes successful spawning problematic (Kier Associates, 1999). The final ground water study should also acknowledge that there is currently a positive ocean productivity cycle that coincides with a wet on-land cycle (Hare et al., 1999).

These long-term weather cycles are likely to switch to less productive ocean conditions and a dry on-land climatic condition sometime between 2015 and 2025 (Collison et al., 2003). If flow conditions in the Scott River have not been remedied by then, Scott River Chinook salmon and coho salmon will most likely go extinct.

This should create a sense of urgency to remedy groundwater overdraft, not just study it.

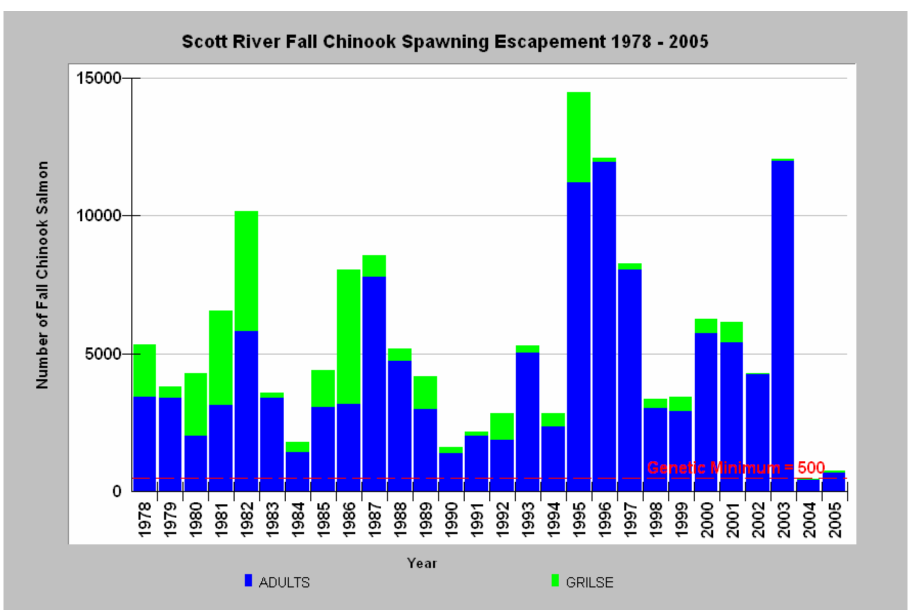

Figure 9. Scott River fall Chinook escapement, where both 2004 and 2005 are the lowest years on record, bringing the resource to the lower limit of viability (Gilpin and Soule, 1991). Data from CDFG.

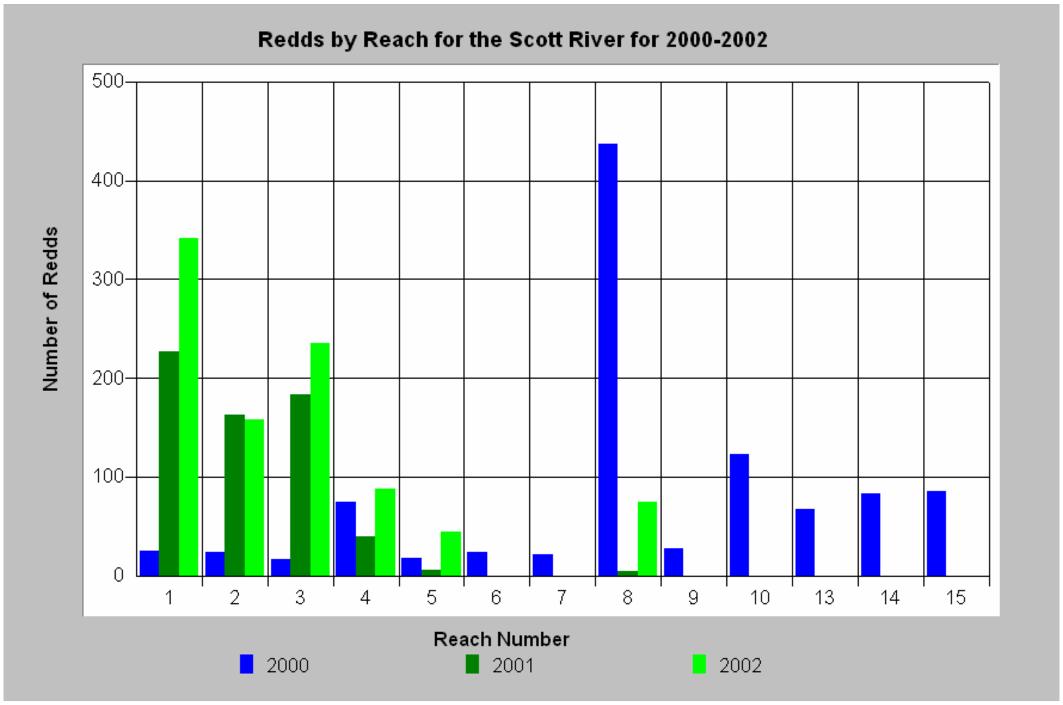

Figure 10. Fall Chinook salmon spawned, for the most part, in the lowest five reaches of the Scott River in 2001 and 2002, because flows were insufficient to pass fish upstream. Data from CDFG.

Review of historic Scott Valley groundwater data

The presentation and discussions of historic Scott Valley groundwater data on pages 22-23 of the *Draft Plan* is incomplete and needs to be improved. Data for only three of the five long-term monitoring wells are shown in Figure 3-3. This should be revised to include data from all five wells. The short y-axis of the graph and the one low outlier make the graph difficult to interpret.

Detailed graphs of each of the five wells are contained in QVIC (2006a), included here as Appendix A. An examination of these data show that annual maximum levels have remained relatively constant over time (fluctuating with precipitation), but that annual minimum levels have declined since 1965 (though they, too, fluctuate with precipitation).

For example, at well 42N09W27N001M, water surface elevation never dropped below 2920 feet prior to 1980, but now drops well below that consistently even in years with relatively high precipitation (Figure 11).

The groundwater study needs to be revised to explain these declining minimum annual levels, or alternatively, provide some discussion why these data are not useful.

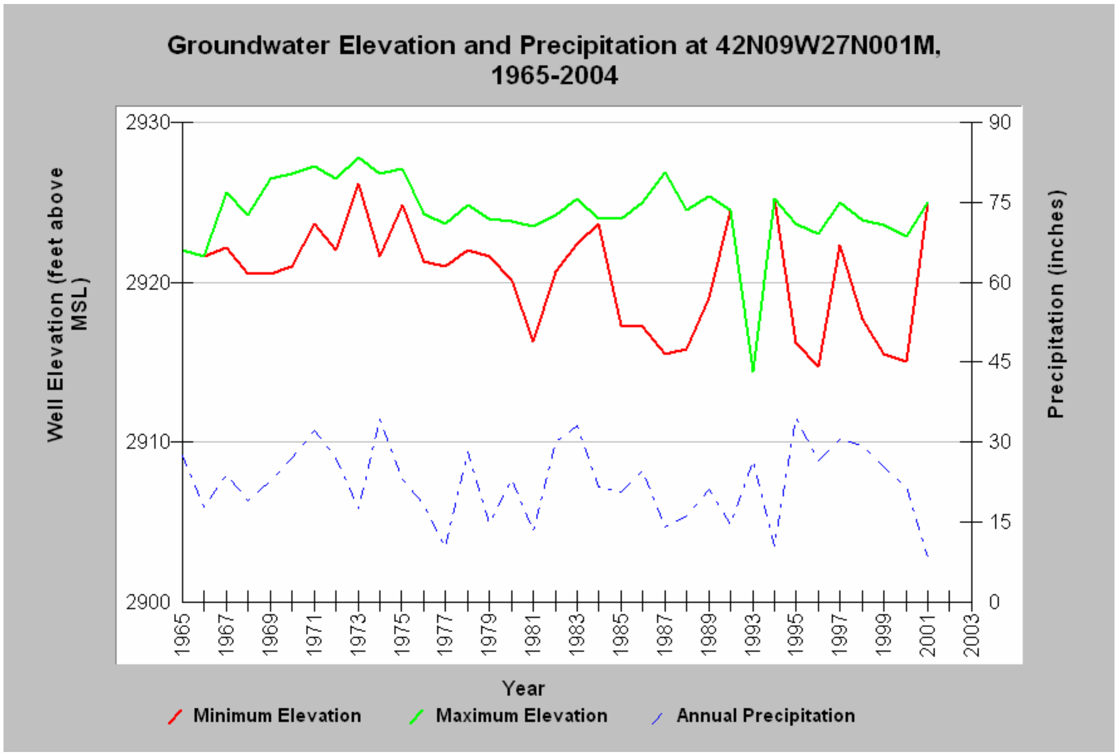

Figure 11. California Department of Water Resources well 42N09W27N001M, which is approximately 8 kilometers east of Etna, for the years 1965-2001. Figure from Kier Associates (2005).

Effect of groundwater accretion on mainstem water temperatures

The *Draft Plan's* statement that "While the TMDL temperature source analysis found that changes in groundwater accretion and surface water flow can have a deleterious effect on stream temperatures and the beneficial uses associated with the cold water fishery…" (Page 3, lines 118-121) should be improved by the inclusion of some details regarding the *Scott River TMDL* model results (NCRWQCB, 2006), and should note that the TMDL model also found there would be major benefits to increasing groundwater accretions. For example, a doubling of groundwater accretions was predicted to decrease temperatures by 5-10˚ C (Figure 12).

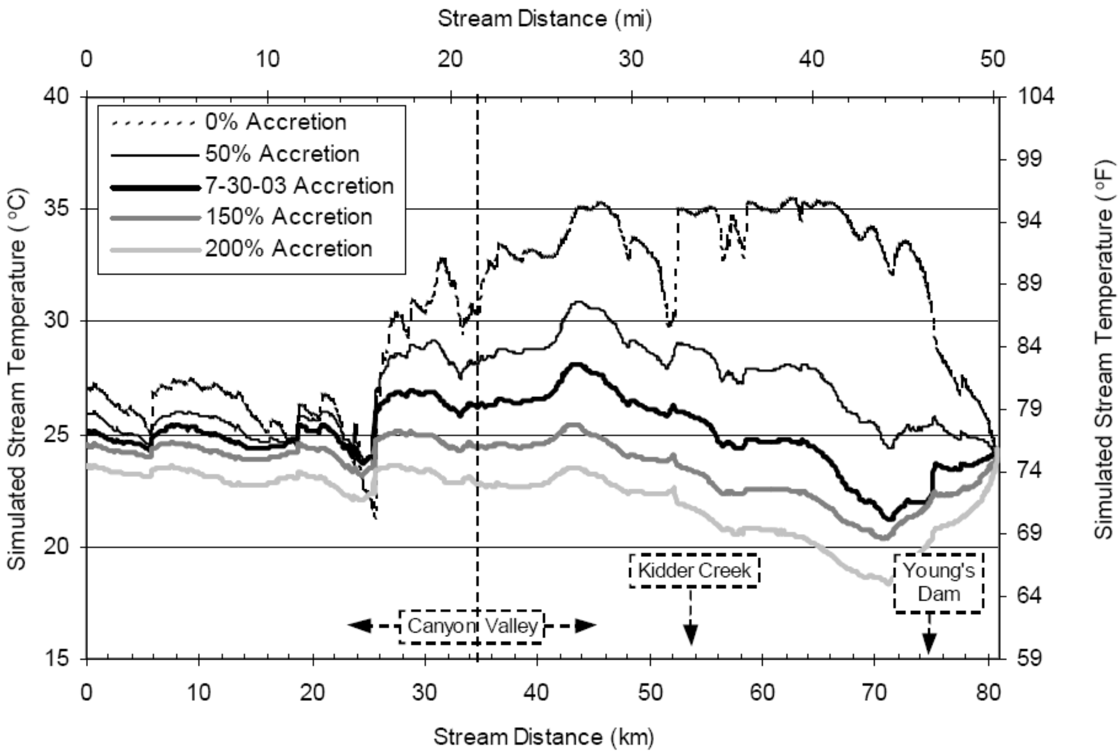

Figure 12. Longitudinal profiles of temperature modeling results that quantify the effects of groundwater accretion, Scott River mainstem; 3:00 PM, July 30, 2003. Adapted from Figure 4.13 of Scott River TMDL Staff Report.

DATA CONFIDENTIALITY ISSUES

The *Draft Plan* suggests the expectations that the "Scott Valley Community" has for the groundwater study: "Future groundwater studies would include confidentiality of water table data collected on private land." (p. 6).

It is our position that all data and models used in the groundwater study should be publicly accessible. Transparency is essential to the scientific process and models that do not clearly state their assumptions, which fail to share the mathematical formulas upon which relationships are determined, and which fail to provide the raw data used for modeling are not valid (Collision et al., 2003). If data are confidential, then there is no way to verify analyses and models, and therefore the results cannot be reliable nor effectively used in the public arena.

The groundwater study plan should state that <u>all data used in the study will be publicly shared</u>.

ADDITIONAL AVAILABLE DATA SOURCES

The list of available data sources in section 7.3 (page 72) fails to mention either the U.S. Forest Service and Karuk Tribe combined temperature database, which includes 15 sites in the Scott River watershed. This dataset is available online as part of the Klamath Resource Information System (KRIS). The data are accessible online by simply following the links at the bottom of the web page http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/md_cst30.htm and a map of sites is available at: http://www.krisweb.com/krisklamathtrinity/krisdb/webbuilder/sc_m3.htm

REFERENCES

California Department of Fish and Game. 2006. Notice of Preparation of a Draft Environmental Impact Report for Scott River Watershed-wide Coho Salmon Incidental Take Permitting Program. CDFG, Region 1, Redding, CA. 73 p.

California State Water Resources Control Board (SWRCB). 1974, Report on Water Supply and Use of Water, Scott River Stream System, Scott River Adjudication, Div. Of Water Rights. Sacramento, CA.

California State Water Resources Control Board (SWRCB). 1980. Scott River Adjudication Decree No. 30662, Superior Court for Siskiyou County. Scott River stream system within California in County of Siskiyou. Sacramento, 152p.

Collison, A., W. Emmingham, F. Everest, W. Hanneberg, R. Martston, D. Tarboton, R. Twiss. 2003. Phase II Report: Independent Scientific Review Panel on Sediment Impairment and Effects on Beneficial Uses of the Elk River and Stitz, Bear, Jordan and Freshwater Creeks. Independent Science Review Panel performed analysis on retainer to the North Coast Regional water Quality Control Board, Santa Rosa, CA.

Drake, Daniel., Tate, Kenneth., Carlson, Harry. 2000. Analysis shows climate-caused decreases in Scott River Fall Flows. California Agriculture, Vol 54 n6, pp46-49.

Gilpin, M.E. and M.E. Soule. 1990. Minimum Viable Populations: Processes of Species Extinction. In: M. Soule (ed) Conservation Biology: The Science of Scarcity and Diversity University of Michigan Press. pp 19-36.

Hare, S. R.; Mantua, N. J.; Francis, R. C. 1999. Inverse production regimes: Alaska and the west coast Pacific salmon. Fisheries, Vol. 24 (1): 6-14.

Harter, T. and R. Hines. 2007. Draft Scott Valley Community Groundwater Plan. Groundwater Cooperative Extension Program University of California, Davis. 85 p.

Kier Associates. 1991. Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program. U.S. Fish and Wildlife Service, Klamath River Fishery Resource Office. Yreka, CA. 403 pp.

Kier Associates. 1999. Mid-term evaluation of the Klamath River Basin Fisheries Restoration Program. Sausalito, CA . Prepared for the Klamath River Basin Fisheries Task Force. 303 pp.

Kier Associates. 2005. Hypothesis Testing for Approach to Groundwater Studies, by Scott River Watershed Council – Water Committee. Memo to Quartz Valley Indian Reservation for meeting preparation. March 10, 2005. Kier Assoc., Sausalito, CA. 6p.

North Coast Regional Water Quality Control Board. 2006. Action Plan for the Scott River Watershed Sediment and Temperature Total Maximum Daily Loads. NCRWQCB, Santa Rosa, CA. 472 p.

Quartz Valley Indian Community. 2005. Comments on the Final Draft Scott River Total Maximum Daily Load (TMDL). Letter to the North Coast Regional Water Quality Control Board. Quartz Valley Indian Reservation, Ft. Jones, CA. 64 p. http://www.klamathwaterquality.com/QVIC_Scott_TMDL_11_05.pdf

Quartz Valley Indian Community. 2006b. Comments on Draft Scott River Watershed TMDL Implementation Work Plan and North Coast Basin Plan Amendment. Quartz Valley Indian Reservation, Ft. Jones, CA. 7 p. http://www.klamathwaterquality.com/QVIC_Scott_TMDL_Work_Plan_9_06.pdf

Quartz Valley Indian Community. 2006c. Scoping Comments Concerning the Proposed California Department of Fish & Game Draft Environmental Report for the Proposed Scott River Watershed-Wide Permitting Program for the Incidental Take of Coho Salmon. Prepared by Kier Associates on behalf of the Klamath Basin Water Quality Work Group. 23 p.

Pacific Coast Federation of Fishermen's Associations (PCFFA), Institute for Fisheries Resources, Coast Action Group, Northcoast Environmental Center (NEC), Environmental Protection and Information Center (EPIC), Mendocino Group of the Redwood Chapter of the Sierra Club, and Sierra Club of California. 2006. Letter to State Water Resources Control Board regarding Joint Comments on the Proposed Action Plan for the Scott River Watershed Sediment and Temperature TMDL. June 12, 2006. 31 pp. http://www.klamathwaterquality.com/ScottTMDLJointLtr06-12-06.pdf

Rieman, B., D. Lee, J. McIntyre, K. Overton, and R. Thurow. 1993. Consideration of extinction risks for salmonids. As FHR Currents # 14. U.S. Department of Agriculture, Forest Service, Region 5 . Eureka, CA. 12 pp.

U.S. Geologic Survey. 2005. Assessment of the Klamath Project Pilot Water Bank: A Review from a Hydrologic Perspective. Performed under contract to U.S. BOR, Klamath Falls, OR by the USGS, Portland, OR. 98 p. Available online at: <http://www.usbr.gov/mp/kbao/docs/Final_USGS_Assessment_of_Water_Bank.pdf>

APPENDICES

To provide important background information, we are attaching the following relevant documents as appendices:

A. QVIC's (2006b) comments on the Scott River TMDL implementation work plan.

B. QVIC's (2005) comments regarding the draft Scott River TMDL. In particular, see the appendix in which reviews historic Scott Valley groundwater data.

C. Conservation groups' (PCFFA et al. 2006) comments on the Scott River TMDL.

COMMENT 4 - Appendix A

6/7/06 Bd Mtg: Scott River-
Item__ Deadline 5/10/06

Quartz Valley Indian Reservation
13601 Quartz Valley Road
Fort Jones, CA 96032
phone: 530-468-5907 fax: 530-468-5908

May 10th, 2006

Song Her, Clerk to the Board
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

RE: Comment Letter - Sediment and Temperature TMDL in the Scott River Watershed

Dear Song Her,

Quartz Valley Indian Community (QVIC) of the Quartz Valley Indian Reservation (QVIR) thanks you for the opportunity to comment on *The Action Plan for the Scott River Watershed Sediment and Temperature Total Maximum Daily Loads (TMDL)* amendments to the North Coast Regional Water Quality Control Board *Basin Plan* on how to improve the implementation plan and specific recommendations on flow options that the State Water Board might take in the watershed.

Quartz Valley Indian Reservation is located in Scott Valley on a major tributary, Shackleford Creek, to the Scott River. 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.

We appreciate the efforts of your staff in the creation of this document and the development of the Scott TMDL. Please find below the attached official comments of the Quartz Valley Indian Community.

Sincerely,

Harold Bennett, Vice-Chairman Quartz Valley Indian Reservation

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

Streamflow Issues

The *Scott TMDL Amendment* to the *Basin Plan* depends upon voluntary action to increase streamflows to levels needed to support beneficial uses: "The Regional Water Board encourages water users to develop and implement water conservation practices." This contradicts the recognition in the amendment narrative that: "Diversions of surface water... have the potential to affect temperatures in smaller tributaries where the volume of water diverted is relatively large compared to the total stream flow."

We have previously noted that surface water diversion in Shackleford Creek, for example, is directly causing the stream to warm and dry before reaching the Scott River, resulting in a total loss of the creek's juvenile and adult salmon and steelhead carrying capacity. This observation was based on thermal infrared radar (TIR) data collected for the Scott River TMDL (Watershed Sciences, 2003). This is a clear case of streamflow diversions linked to water quality and its ability to support beneficial uses.

Previous comments by the Quartz Valley Indian Reservation cite legal precedents that authorize and, arguably, require water quality authorities to take steps to improve streamflow when reduced streamflow is the obvious driver of water pollution.

The inability of the Scott River's reduced streamflow to support beneficial uses is a clear issue in the Scott River canyon. The *Scott River Adjudication Decree* (SWRCB, 1980) mandated minimum flows (Table 1) to support aquatic ecosystem function: "These amounts are necessary to provide minimum subsistence-level fishery conditions including spawning, egg incubation, rearing, downstream migration, and summer survival of anadromous fish, and can be experienced only in critically dry years without resulting in depletion of the fishery resource."

Table 1. Absolute minimum instream flows to be provided U.S. Forest Service lands in the Scott River canyon as set out in the 1980 *Scott River Adjudication.*

Months	Minimum Flow in CFS
November - March	200
April - June	150
June 16 - June 30	100
July 1 - July 15	60
July 16 - July 31	40
August - September	30
October	40

That the mandated streamflow levels in Table 1 are <u>not</u> being met argues that the SWRCB should be pursuing enforcement actions, rather than relying upon volunteer actions as proposed in the Scott TMDL.

The SWRCB should develop and adopt a program of supervision of the California Department of Fish and Game's (CDFG) program of issuing stream diversion permits under

Fish and Game Code Section 1600 et seq. Such permits should be granted only in cases where sufficient streamflow will be left in the stream to support beneficial uses.

CDFG's permits cannot, by law, be granted for a period of more than five years. SWRCB oversight of CDFG permit renewal should require that a determination be made that the renewal of such diversion permits will not interfere with the attainment of other beneficial uses of water.

It is within the SWRCB's authority and responsibility to provide oversight and additional necessary control of CDFG's issuance of streamflow diversion permits in the Scott River basin.

The inability of the Scott River to attain the minimum streamflows adjudicated to the Scott River canyon is due in significant part to an increase over the past 30 years of well drilling and pumping for irrigated agriculture directly from the aquifers that support the Scott River's surface flow system. The QVIC presented well log data collected by the California Department of Water Resources (DWR) that clearly demonstrates that groundwater recharge has diminished over time as the number of wells in the Scott River valley has increased.

The *Scott River TMDL Amendment* designates Siskiyou County as the entity to investigate streamflow/groundwater interactions. This is an inappropriate delegation of responsibility by the State on two counts: the County has no demonstrated competency in the conduct of such groundwater investigations, and the County's investigators may be partial to the local landowner water users.

SWRCB staff or SWRCB designees (for example, DWR) should retain responsibility to the impartial and timely completion of the Scott River valley groundwater use/surface water relationships investigation. If the data support the conclusion that groundwater pumping is dewatering the Scott River, the SWRCB should expedite actions to reduce such pumping. And, in the interim, SWRCB should restrain development of further wells in the Scott River valley floor.

Finally, if it is determined that groundwater is interconnected with the surface flow of the Scott River, the SWRCB should inform the Siskiyou County Superior Court of the need for timely review and appropriate revision of the Scott River Adjudication.

QVIIC has noted in previous comments that cumulative watershed effects related to logging are increasing sediment loads, which cause the streambed to widen and, in the worst cases, the loss of surface flows altogether during low flow periods. The SWRCB should set prudent risk limits for disturbance in the Scott River watershed by logging and road building and prohibit or severely restrict these activities on unstable areas like decomposed granitic soils and landslide zones.

Timelines

All comments on the *Scott River TMDL* provided by QVIC to the SWRCB have emphasized that the Pacific Decadal Oscillation (PDO) cycle greatly influences both the productivity of ocean conditions and the wet-dry cycles onshore that effect Pacific salmon populations. We are currently in a good ocean and wet onshore cycle. These conditions are likely to reverse, however, some time between 2015 and 2025 (Collison et al, 2003). The 40 year timeline for recovery of the Scott River is, therefore, unacceptable to the Quartz Valley Indian Community because salmon species may be lost if conditions are not improved sooner.

Fall Chinook salmon adult spawning returns to the Scott River in 2004 and 2005 were the lowest on record (467 and 756) and are dangerously close to the minimum population size needed for maintaining long term genetic viability of this stock (Figure 1). Higgins et al. (1992) discussed the risk of extinction of northwestern California Pacific salmon stocks and discussed minimum viable population sizes:

> "When a stock declines to fewer than 500 individuals, it may face a risk of loss of genetic diversity which could hinder its ability to cope with future environmental changes (Nelson and Soule 1986). A random event such as a drought or variation in sex ratios may lead to extinction if a stock is at an extremely low level (Gilpin and Soule 1990). The National Marine Fisheries Service (NMFS, 1987) acknowledged that, while 200 adults might be sufficient to maintain genetic diversity in a hatchery population, the actual number of Sacramento River winter run Chinook needed to maintain genetic diversity in the wild would be 400- 1100."

Immediate action is needed to prevent stock loss, not the longer, step-wise process contemplated in the *Scott River TMDL Amendment to the Basin Plan.*

While its provisions for road plans and plans for controlling erosion from roads is within a reasonable timeframe, the *Scott River TMDL Amendment* states that such plans will be required only on a site-specific basis. This means that only roads involved in new timber harvest activities or which have major histories of failure that are called to the attention of the NCRWQCB staff are likely to become the subject of erosion control plans.

Major problems can also result from the legacy of abandoned roads and skid roads that are not likely being examined by staff in the course of timber harvest review, but which can cause significant problems. As mentioned above, the SWRCB should consider limiting the road density in Scott River sub-basins to prudent risk levels.

The timeline suggested in the Temperature and Vegetation section of Table 4 is inappropriate, particularly since it requires only that "The Regional Water Board's Executive Officer report to the Regional Water Board on the status of the preparation and development of appropriate permitting and enforcement actions."

Landowners have removed large riparian cottonwood areas and immediate action should be taken to restrain further riparian forest removal. Kier Associates (1999) pointed out that "flood control" activities following the January 1997 storm had a disastrous adverse impact on riparian vegetation.

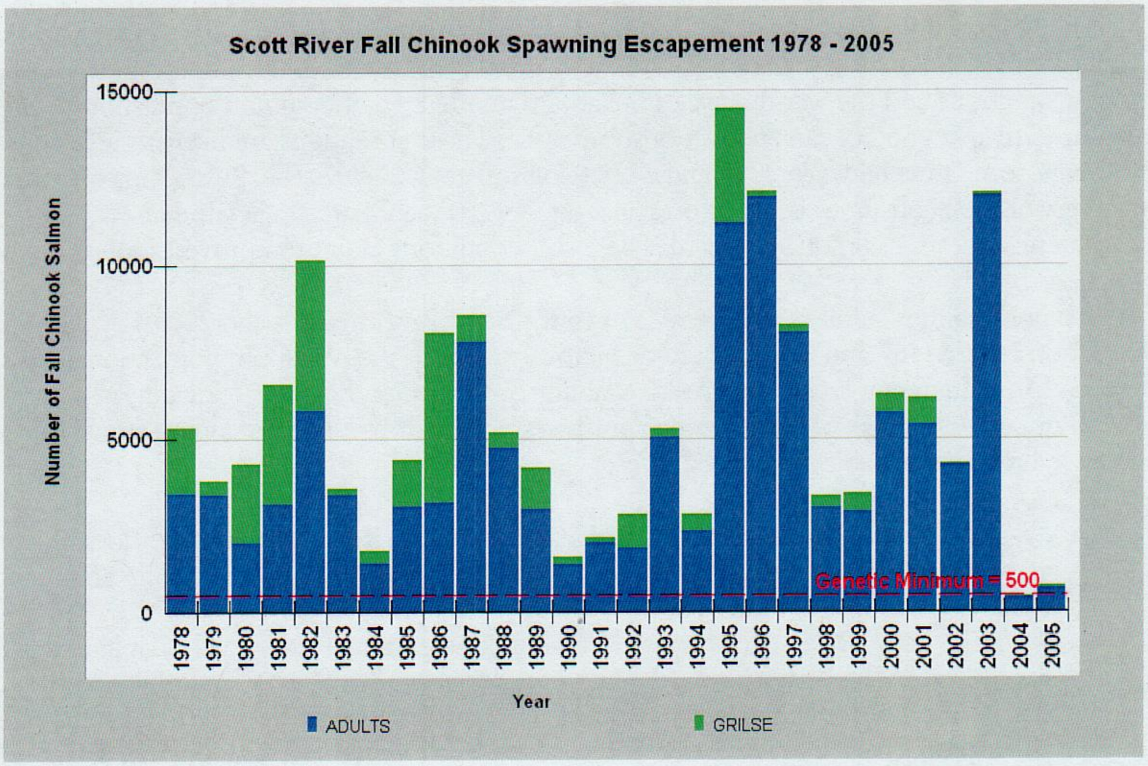

Figure 1. Scott River fall Chinook salmon returns showing a minimum viable population size reference from Gilpin and Soule (1990).

Previous comments on the Scott TMDL by the QVIC pointed out that timber harvest in riparian zones along coho bearing streams has been active in recent years. The riparian zones in historic coho streams are already heavily depleted, causing high stream temperatures and diminishing necessary large woody debris recruitment. Juvenile coho salmon remain in fresh water for at least a year and require cold water and pools scoured by large wood. Scott River coho populations are at very low levels and immediate action is needed to stop any further harvest of large trees within the riparian zone of streams where coho juveniles rear.

References

California State Water Resources Control Board. 1980. Scott River Adjudication Decree No. 30662, Superior Court for Siskiyou County. Scott River stream system within California in County of Siskiyou. Sacramento, CA. 152p.

Collison, A., W. Emmingham, F. Everest, W. Hanneberg, R. Martston, D. Tarboton, R. Twiss. 2003. Phase II Report: Independent Scientific Review Panel on Sediment Impairment and Effects on Beneficial Uses of the Elk River and Stitz, Bear, Jordan and Freshwater Creeks. Independent Science Review Panel performed analysis on retainer to the North Coast Regional water Quality Control Board, Santa Rosa, CA.

Gilpin, M.E. and M.E. Soule. 1990. Minimum Viable Populations: Processes of Species Extinction. In: M. Soule (ed) Conservation Biology: The Science of Scarcity and Diversity University of Michigan Press. pp 19-36.

Higgins, P.T., S. Dobush, and D. Fuller. 1992. Factors in Northern California Threatening Stocks with Extinction. Humboldt Chapter of American Fisheries Society. Arcata, CA. 25p.

Kier Associates. 1999. Mid-term evaluation of the Klamath River Basin Fisheries Restoration Program. Sausalito, CA. Prepared for the Klamath River Basin Fisheries Task Force. 303 pp.

Kier Associates. 2005a. Review comments on NCRWQCB's draft South Fork Scott River Watershed Pilot Study for the Total Maximum Daily Load for Sediment. Prepared for the Klamath Basin Tribal Water Quality Work Group. March 12, 2005. Kier Assoc., Sausalito, CA. 3 p.

Kier Associates. 2005b. Hypothesis Testing for Approach to Groundwater Studies, by Scott River Watershed Council – Water Committee. Memo to Quartz Valley Indian Reservation for meeting preparation. March 10, 2005. Kier Assoc., Sausalito, CA. 6p.

Kier Associates. 2005c. Review of the pre-draft Scott River Watershed TMDL. Performed under contract to the Quartz Valley Indian Reservation on behalf of the Klamath Basin Water Quality Work Group. August 9, 2005. Kier Associates, Sausalito, CA. 31 p.

Kier Associates. 2005d. Lower West Side Scott Shallow Landslide Hazard Maps. Performed under contract to the Quartz Valley Indian Reservation by Dr. Jan Derksen of Kier Associates on behalf of the Klamath Basin Water Quality Work Group. September 18, 2005. Kier Assoc., Sausalito, CA. 11 p.

Kier Associates. 2005e. Review of the Action Plan for the Scott River Watershed Sediment and Temperature Total Maximum Daily Loads. Performed under contract to the Quartz Valley Indian Reservation on behalf of the Klamath Basin Water Quality Work Group. October 25, 2005. Kier Associates, Sausalito, CA. 31 p.

National Marine Fisheries Service. 1987. Endangered and threatened species, winter run Chinook salmon. Federal Register 52: 604 I-6048.

Nelson, K. and M. Soule. 1987. Genetic Conservation of Exploited Fishes. In: N. Ryman and F.Utter (eds). Population Genetics and Fisheries Management University of Washington Press. Seattle, WA.

Watershed Sciences. 2003. Aerial Surveys using Thermal Infrared and Color Videography Scott River and Shasta River Sub-Basins. Performed under contract to the NCRWQCB and U.C. Davis by Watershed Sciences LLC, Corvallis, OR.

The Pacific Coast Federation of Fishermen's Associations (PCFFA), Institute for Fisheries Resources, Coast Action Group, Northcoast Environmental Center (NEC), Environmental Protection and Information Center (EPIC), Mendocino Group of the Redwood Chapter of the Sierra Club, and the Sierra Club of California

Chair Tam Doduc and Members of the Board
C/o Selica Potter, Acting Clerk of the Board
State Water Resources Control Board – Executive Office
1001 "I" Street, 24th Floor
Sacramento, CA 95814

12 June 2006
Via Email and Mail

Re: Joint Comments on the Proposed Action Plan for the Scott River Watershed Sediment and Temperature TMDL

Dear Board Members:

The Board's decision to adopt an Action Plan (Plan) for the Scott River Watershed Sediment and Temperature TMDL offers a tremendous opportunity. When it enacted the Porter-Cologne Water Quality Control Act, the Legislature assigned the State Board jurisdiction over both water quality and water *quantity* for the agency to take each into account when determining what pollutants may go in and what water may come out of a watershed. To date, the State Board's divisional structure and the sharp separation between the water quality and water rights divisions' proceedings and staffing has resulted in the regulatory distancing of water quality and water quantity issues for most of the State's rivers. Although the State's involvement in water quality certifications provided by the federal Clean Water Act, for example in dam licensing proceedings, have bridged the gap on occasion, those few occasions are very project specific, subject to the scheduling licensing proceedings, and include water quality issues only as a secondary issues. The TMDL proceedings currently underway around the state provide a much more integrated and timely opportunity for the State Board to realize Porter-Cologne's goals of integrating its water quality *and* water quantity management and assuring water quality standards and beneficial uses are attained as soon as possible for hundreds of degraded rivers and streams throughout the State.

Although many of the technical TMDLs produced for the North Coast region have identified sufficiently the sediment and temperature problems confronting rivers and creeks throughout that region, with the exception of the Garcia River, the Regional Board has failed to adopt any implementation plans specific to any of the other listed waterbodies. The Regional Board's failure appears to be a combination of lack of political will to confront the facts presented in these watersheds and, in regard to temperature issues, a lack of authority to directly address flows.

The Scott River Action Plan could be a model of how to integrate its water quality *and* water quantity responsibilities in a manner that reflects the natural connection between a river's flow volumes and the quality of that water rather than allow the Board's divisional structure to serve as a roadblock to effective implementation of needed regulatory requirements.

c/o The Klamath Basin Coalition, PO Box 1375, Eugene, OR 97440
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Web Page: www.klamathbasin.info

Unfortunately, the proposed Plan does not contain sufficient enforceable actions to protect public trust and beneficial water uses, including fisheries protections, in the Scott River. In light of the ongoing collapse of Klamath River salmon resources, and ample evidence that particularly for state and federally ESA-listed coho salmon these issues are particularly important in the Scott River, the Plan needs measurable and definite actions that the State can apply to reduce controllable temperature and sediment pollutants. Temperature pollution in particular needs to be reduced to achieve applicable water quality standards, and thus restore protected beneficial uses.

The most egregious and indefensible omission in the current proposed Implementation Plan (the "Plan") is the failure to recognize the nexus between increasing water use (surface and groundwater) and declining instream flows that have led to temperature impairment throughout the Scott River watershed.

Reduced surface flows and elevated water temperatures are significant factors in the decline of the Scott River's anadromous salmonid fisheries, particularly state and federally protected coho salmon (see ATTACHMENT A). The Plan should confront the problem of temperature impairment and address the need for adequate instream flows for the Scott River and its tributaries to enable the recovery of at-risk anadromous salmonids.

Diminished flows in the Scott River are clearly linked not only to temperature impairment but also to the concentration of chemical pollutants, low dissolved oxygen (DO) levels, and high nutrient levels. The almost completely unenforceable <u>voluntary</u> actions proposed in the Plan are not consistent with the State and Basin Plan's Anti-degradation Policy which applies to all waters of the state, including ground water; specifically it is the State's responsibility to regulate land use activities that may reasonably be controlled, such as surface diversions, ground water pumping, grading, clearing riparian habitat, and grazing, which singly or cumulatively influence the quality of waters of the State.

<u>General TMDL Comments:</u>

The Regional Water Board needs to develop/adopt a Temperature TMDL Implementation Policy similar to its Sediment TMDL Implementation Policy that identifies what actions the Board will take to control activities that elevate water temperature, resulting in non-attainment of water quality standards.

The State Water Resources Control Board (SWRCB), in addition to its Regional Boards, are also charged by the federal Clean Water Act and California Porter-Cologne Act to control waste discharges and ensure attainment of water quality standards.

Porter-Cologne does not allow mere voluntarism (which by its very nature is uncertain and unreliable as well as unenforceable) as the means for the Boards to address discharges of pollution to the State's waters. Porter-Cologne provides <u>three primary tools</u> to the SWRCB and RWQCBs to control any waste discharges to waters of the State, including the Scott River, and assure attainment of water quality standards. These three tools are: 1) waste discharge requirements, 2) conditional waivers of waste discharge requirements, or 3) discharge prohibitions.

In addition to these three fundamental regulatory tools, Porter-Cologne allows for additional layers of activity to supplement the regulatory scheme, including funding provisions, voluntary actions, guidance authority, etc. However, in no case do any of these additional authorities supplant the three options the Board must turn to when pollution is being discharged. Every discharger of the state, large or small, good or bad, simple or complex, must report its waste discharge to the applicable Regional Board. The Regional Board then must take one of the three required actions. The choice of action and the appropriate regulatory conditions to be included can then take into account the severity (or lack thereof) of any reported discharge. But, as a matter of law, one of these three basic tools must be used wherever a discharge is occurring.

The three fundamental regulatory tools described above are recognized by the State Board's existing Nonpoint Source Policy. The tools available to the Boards are no different when developing a TMDL implementation plan. Every TMDL implementation plan must employ the three categories for every pollutant source identified by the TMDL. Every TMDL implementation plan must be consistent with the State Board's Nonpoint Source Policy.

Similarly, the Legislature delegated to the State Board the authority to regulate water diversions, including the regulation of bypass flows and enforcement of diversion limitations via water rights licenses. Given the State Board's authority over all activities affecting water quality and quantity in any given waterbody, it would be antithetical to the goals of Porter-Cologne not to integrate these two components of ecosystem health into proceedings purporting to address impairments to that health right now.

However, where an implementation plan attempts to justify holding any of these three mandated water quality tools (WDRs, Conditional Waivers or Prohibitions) or the State Board's water quantity tools at bay, based on mere speculations of the efficacy of future voluntary efforts or future potential challenges of any water right proceedings, this turns "implementation" into hesitation. Instead of eliminating pollution problems, such a plan simply institutionalizes them.

Comments on the Action Plan for the Scott River Watershed Sediment and Temperature TMDL

The Plan identifies several implementation actions that the Regional Board believes will achieve sediment and temperature TMDL, and thus meet minimum water quality standards. However, it will take higher standards than just meeting the minimum to actually recover the Scott River's beneficial uses such as those that support its anadromous salmonid resources. The Scott River has been classified as impaired now for nine to fourteen years; the Plan expects another forty years to attain water quality standards, yet no quantifiable goals nor targets have been identified in the Plan for instream flows, temperature, or sediment. Some beneficial uses that support recovery of state and federally listed anadromous salmonid populations (RARE) simply cannot wait until 2046. Entire generations of citizens will be denied their right to enjoy the Scott River's un-impaired beneficial uses: (REC-1, REC-2, COMM, COLD, RARE, MIGR, and SPWN).

Additionally, at least 13 three-year lifecycles of coho salmon will pass between now and 2046, with ESA-listed coho continuing at risk of extinction throughout that period. Threatened salmon runs may well go extinct long before those 40-year goals are ever attained. More aggressive achievement goals are more than warranted, they are required by law. Adoption of a Plan that fails to attain water quality standards until 2046 violates federal and state Endangered Species Act prohibitions on "take" of protected species such as listed salmonids and the degradation of designated critical habitat.

The Plan fails to adequately address the issue of excessive consumption of water, thus its adoption will merely legitimize all the existing uses that currently degrade instream habitat and minimum flow needs of salmonids, and are detrimental to the recovery of these species. Likewise the Plan fails to require pro-active and enforceable measures to protect and restore federally designated critical riparian and aquatic habitats, including by excluding grazing in these critical habitats.

The proposed Plan will be an amendment to the Basin Plan; therefore, it must meet requirements of water quality control plan statutes, particularly Section 13242 of the CA Water Code. In order for the Plan to achieve both narrative and numeric water quality objectives, it must at a minimum include: (1) a description of what actions will implemented; (2) when those actions will be implemented, and; (3) how compliance with the objectives will determined. The proposed Plan relies excessively on actions that are by their very nature entirely unenforceable because they are entirely voluntary implementation actions delegated to entities other than to the Board, which is inconsistent with State water law. Encouraging voluntary actions is commendable, but they do not supplant the Boards' obligations to issue either WDRs, conditional waivers (where appropriate) or prohibitions, and cannot be effective unless there are definitive standards and goals to be met.

Comments on the Plan's Proposed Actions to Achieve Temperature TMDL

The Plan's temperature source analysis identifies three controllable anthropogenic activities that adversely affect water temperature: stream shade, stream flow, and stream channel geometry or morphology. Yet, the Plan provides no facts to support its unsupported finding that reductions in stream flow have only a small temperature impact and that reduction of shade is the primary cause of increased water temperatures in the Scott River. There is in fact considerable scientific evidence and monitoring data that shows that reductions in flows throughout the Scott River have had a far greater impact on water temperatures than the Plan acknowledges (see ATTACHMENT A).

The Plan also does not address the severity of direct or indirect impacts of anthropogenic changes to stream morphology on water temperature. These impacts too can be severe.

The Plan's implementation actions, to protect or restore effective shade to achieve temperature TMDLs, reference the State's Nonpoint Source Policy (NPS) to develop and take appropriate permitting and enforcement actions to address human-caused removal and suppression of vegetation that provides shade to a water body. The NPS Policy relies on the three regulatory tools provided by Porter-Cologne – WDRs, conditional waivers of WDRs, or prohibitions - to regulate all current and proposed nonpoint sources of stormwater pollution. The Plan should declare that all current and future nonpoint sources of pollution, regardless of the affected acreage, will be required to secure WDR permits, conditional waivers, and/or be subject to a Basin Plan prohibition, or be subject to its enforcement actions via cease and desist or cleanup and abatement orders. These are the only legal options available under California water law. In contrast to the proposed Plan, the word "voluntary" is not in the lexicon of the NPS, and the Plan and SWRCB should be in conformance with this NPS Policy.

The Plan's focus on the relationship of shade to water temperature completely ignores the excessive diversion of surface flows and pumping of groundwater. Both activities are controllable. The connection between flow and temperature is well established and is in no way controversial. The State has long failed to adequately regulate surface water diversions and bypass flows in the Scott River pursuant to its own Water and Fish & Game Codes, allowing conditions in the river to deteriorate; these laws must now be aggressively enforced if this deterioration is to be reversed. Adequate flow standards for each life-cycle of salmonids are needed throughout the Scott River Basin (for example to ensure spawning flows in areas where spawning occurs). The Board should have the Division of Water Rights study the impacts of surface water diversions on water temperature, fisheries, aquatic life and riparian vegetation in the Scott River Watershed, and establish adequate flow needs, particularly during critical low flow periods. This is a state responsibility: it cannot be delegated to the County, which is ill equipped to make such an analysis.

An analysis of the best available scientific information will lead to the finding that flows and temperature in the Scott River have been severely compromised by surface diversions and an increasing number of groundwater pumping projects for irrigation. It is highly likely that the sustainable draw levels of the local aquifers have been exceeded. The Board should request that the County declare a moratorium on new well drilling and well deepening in the Scott Valley bottoms pending further studies to ascertain if this is the case. Again, these studies are the responsibility of the State – the County has neither the expertise, funding, nor the inclination to conduct such studies.

The Board should also request that the County, through its General Plan and Zoning Ordinance, better regulate agricultural uses and the density of wells by land use/zoning districts to protect instream flows and thus water temperature. The rate of decline in flows in the Scott River at the USGS gauge below Scott Valley has accelerated during the period of record 1950-2000. The decline in flows corresponds closely to an increase in the number of irrigation wells and increased consumptive irrigation water use throughout this same period.

In other words, the Scott River is being incrementally dewatered through excessive and unregulated groundwater pumping. The Board should have the Division of Water Rights study the impacts of ground water use on water temperature, fisheries, aquatic life and riparian vegetation in the Scott River watershed, and establish adequate minimum instream flows throughout the watershed.

The Board should also re-examine all existing water rights for stream diversions for adherence to the terms regarding bypass conditions and compliance with Statements of Use, and correct any non-compliance, particularly diversions in excess of license conditions. Both monitoring and enforcement have been lax in the Scott River watershed for some time, and water permit violations are very common. The Scott River Adjudication must be enforced, particularly quantity and period of diversion (for example it states that irrigation is to end about October 15th yet in practice it does not).

The Board should review the record for compliance with the terms of the Adjudication for diversion and bypass requirements, and take appropriate enforcement actions in cases of non-compliance or usage in excess of license conditions. Surveys of other similar watersheds have disclosed more un-permitted diversions than permitted diversions. The continued decline of summer flows since the adjudication indicates that same pattern exists on the Scott. The watershed should be surveyed for un-permitted diversions or impoundments and enforcement actions taken to correct illegal diversions. Landowners who are in compliance should not be penalized by allowing those who are not to continue illegal uses. The Board should also reopen adjudication and reallocate water rights, as necessary, to achieve water quality standards and restore beneficial uses, including instream minimum flow protections for ESA-protected salmonids, in the Scott River Watershed.

Ultimately, the Plan has no goal, for it does not provide a measurable water temperature TMDL standard that it will use to determine the effectiveness of its implementation measures even in 40 years. The Plan must not only have a goal but it must require that the Scott River watershed have an adequate number of stream gages to continually monitor discharge, temperature, turbidity, and verify whether instream flow and temperature goals are being achieved.

Enforcement of violations of the Plan cannot be limited as proposed to enforceable restrictions contained in new water quality certifications or WDR permits, but must require certifications and WDRs or appropriate conditional waivers for existing uses that are contributing to the impairment of two water quality attributes: temperature and sediment. Enforcement of the Plan must parallel the Endangered Species Acts prohibition on “take” of listed species, since many pre-existing land uses clearly impair the Scott River. Achieving TMDL Action Plan objectives or attaining water quality standards for temperature and sediment is not possible if existing activities that degrade water quality simply are allowed to continue.

Comments on Other Proposed Actions

The Plan identifies twenty implementation actions. Unfortunately, few contain regulatory or physical recommendations that the Board can implement to achieve sediment or temperature TMDLs, and more importantly, reach minimum thresholds for water quality standards, which mean achieving beneficial uses or Basin Plan objectives. The majority of the implementation actions simply encourage others to take actions or to engage in planning exercises or management agreements such as MOUs. Thus these many voluntary actions sought in the Plan are unenforceable, and therefore inconsistent with Cal. Water Code Section 13242, as these examples demonstrate:

- Roads: The Plan’s implementation action for roads at the County level is restricted to merely encouraging the County to address their roads issues but does not address problems with the far more numerous private roads. The Board should inform the County that their General Plan and Zoning Ordinance are not in compliance with the proposed Plan or the Basin Plan, and require that the County develop and adopt by a date certain a comprehensive grading ordinance for roads, including land disturbances activities inclusive of clearing vegetation, and grading. The Board should set a date to issue county-wide WDRs or federal NPDES permits to the county and private roads. Many of the discharges associated with these roads are through point source discharges. For example, Caltrans roads currently are regulated through a NPDES permit. The road WDRs/permits should set forth necessary road construction and maintenance conditions, including other land disturbances activities inclusive of clearing vegetation, and grading and taking into account cumulative impacts of road sin the watershed.

- Dredging: The implementation action for dredging is one of the few that the Board itself will implement if necessary; DFG already regulates such activities.

- Water Use: If no study as proposed is undertaken then there is no implementation action addressing the most significant and controllable adverse impact to water quality: water use.

- Flood Control & Bank Stabilization: The over-reliance on WQC via a federal nexus with the Army Corps of Engineers to control water quality impacts from flood control or bank stabilization activities will fail to prevent the removal or suppression of stream-side vegetation, which is an activity that is rarely subjected to federal regulatory oversight. In fact, clearing vegetation is often mandated in federally funded/constructed flood control projects, in which case riparian vegetation is not protected. These activities should be addressed in appropriate WDRs or conditional waivers. The Plan should set forth a timeline for developing such WDRs or waivers.

- Grazing: The Plan's action for grazing again relies on simply encouraging others to act, yet the Plan should require that cattle be excluded from riparian areas, and that degraded riparian corridors be restored along the tributaries and mainstem of the Scott River. The Plan needs a more definitive description of desired near-stream conditions with a description of specific actions that can achieve these conditions within finite time periods. The Plan should require that the County adopt a stream management ordinance to regulate all land uses within a specified stream management zone, and that all such uses regardless of the acreage affected be required to secure WDRs or conditional waiver).

- Federal Agencies: The Plan proposes no actions to develop an MOU to coordinate regulation of activities with NOAA Fisheries to protect designated critical habitat pursuant to the federal Endangered Species Act nor essential fish habitat pursuant to the Magnuson-Stevens Fishery Management Act.

- CDFG: Lastly, the Plan should develop an MOU with DFG to inventory the Scott River and its tributaries to locate existing water diversions, determine bypass flow needs, assess whether present rates of diversion create low flow barriers to migration of anadromous salmonids, and to implement/apply the Coho Recovery Strategy Guidelines in the Scott River watershed. The Coho Recovery Strategy Guidelines and measures were developed with considerably Scott River watershed stakeholder input and approval, and should be incorporated into and/or coordinated with actions in the Plan.

<u>Conclusion</u>

The Clean Water Act charges the State with ensuring that necessary actions are taken to meet water quality standards and restore beneficial uses in the Scott River Watershed. Both the federal and state ESA listings of Scott River coho salmon also require similar actions, as does the CESA Coho Recovery Strategy long since adopted by the Fish and Game Commission.

In the 1983 Mono Lake case, the federal court stated that the Public Trust Doctrine requires the state to exercise continual supervision whenever feasible to protect the public's right to use and enjoy the State's waters and their associated resources. The Plan as proposed will cause significant adverse impacts to the distribution and abundance of state and federally protected anadromous salmonids in the Scott River watershed. This is a resource that many in-river Tribal communities, and many coast fishing ports, depend upon for their sustenance and livelihoods.

Further, the Plan as currently proposed will significantly reduce the probability of recovery of these already seriously depressed salmonid species because it fails to provide or protect adequate instream flows, improve elevated water temperatures, or restore/protect riparian corridors.

Lastly, the public's ability to enjoy the waters of the Scott River for recreation are significantly threatened by health risks associated with toxic algae blooms now proliferating throughout the Klamath River in waters with elevated temperatures. Deteriorating water quality in the Scott River, much of it triggered by decreasing instream flows, can only encourage the growth of these toxic algae species, posing a serious health risk to members of the general public.

In short, the Board must request an Action Plan where the State establishes adequate flows and regulates controllable consumptive water uses, and land disturbance activities that impair water quality if it wants to restore beneficial uses which are Public Trust uses in the Scott River.

Please make these comments part of the public record in this proceeding, and we hope they will be helpful to Staff as they prepare their recommendations.

Sincerely,

Glen H. Spain, J.D., for the Pacific Coast Federation
of Fishermen's Associations and the Institute
for Fisheries Resources, and the organizations below:

Coast Action Group
By Alan Levine, Executive Director

Northcoast Environmental Center (NEC)
By Tim McKay, Executive Director

Environmental Protection and Information Center (EPIC)
By Larry Evans, Executive Director

Mendocino Group of the Redwood Chapter of the Sierra Club
By David Myers, Water Committee Chair

The Sierra Club of California
By Paul Mason, Legislative Representative

Enclosed: Attachment A: Scott TMDL Related Data, Photos and
Maps Regarding Flow and Temperature Problems

ScottTMDLJointLtr06-12-06.doc

Attachment A

Scott TMDL Related Data, Photos and Maps Regarding Flow and Temperature Problems

Below are summary charts, photos and map images that provide support for arguments regarding the impact of diminished flows in the Scott River basin as follows:

1. Flows have been progressively decreased by ground water extraction;
2. Flows have declined to far below those required by the Scott River Adjudication and now often cause stream reaches and tributaries to go dry;
3. Low flow exacerbates water temperature problems, and;
4. Flow and temperature problems combine with sediment to severely limit productivity of salmon and steelhead populations.

Scott River salmon and steelhead stocks are at high risk of extinction and evidence is presented herein to demonstrate the need for immediate action to prevent loss of locally adapted salmonid populations. This is only a sampling of such supporting data, which is voluminous, but of which only this small portion could be included herein.

Data are from the California Department of Fish and Game, California Department of Water Resources, U.S. Geologic Survey, Siskiyou Resource Conservation District, U.S. Forest Service, North Coast Regional Water Quality Control Board and private contractors. These data along with photos and maps were often extracted from the Klamath Resource Information System Version 3.0, which is also available on-line at www.krisweb.com.

Ground Water Pumping and Lack of Sufficient Scott River Flows

The *Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program* (Kier Assoc., 1991) noted that ground water pumping in the Scott River valley depleted surface flows because of interconnections between surface and ground water. This fact was also clearly noted in the *Scott River Adjudication* (CSWRCB, 1980) and by earlier work by the U.S. Geologic Survey (Mack, 1958).

California Department of Water Resources (CDWR) unpublished well log data (Eaves, personal communication) indicate that installation of irrigation wells continues in the Scott River Valley (Figure 1). Data show that the highest number of wells installed occurred from 1971-1980. After a decrease in installations between 1981 and 1990, well construction resurged during the 1990's and continues to the present. Not all well installations are reported and CDWR estimates their records may be 30-50% low as a result. Data from 2005 and 2006 have not been recorded and data from 2001-2004 is provisional.

Long term flow records show a substantial decrease in surface flows at the USGS flow gauge at Fort Jones after the number of ground water pumps began to increase in the 1970's. Figure 2 shows the number of days by water year that flows in the Scott River fell below 20 cubic feet per second. The pattern in the data shows that before ground water pumps were installed river flows rarely fell to this level, but that now there are sometimes more than 100 days/year with average flows less than 20 cfs. Probably the most telling pattern is the high number of days with extremely low flows even in years with moderate rainfall. Rainfall data by which water years are grouped are based on the California Data Exchange Center gauge in Fort Jones.

Kier Associates (1991) pointed out that the *Scott River Adjudication* allotted instream water rights to the U.S. Forest Service as a riparian owner for its lands downstream of the valley

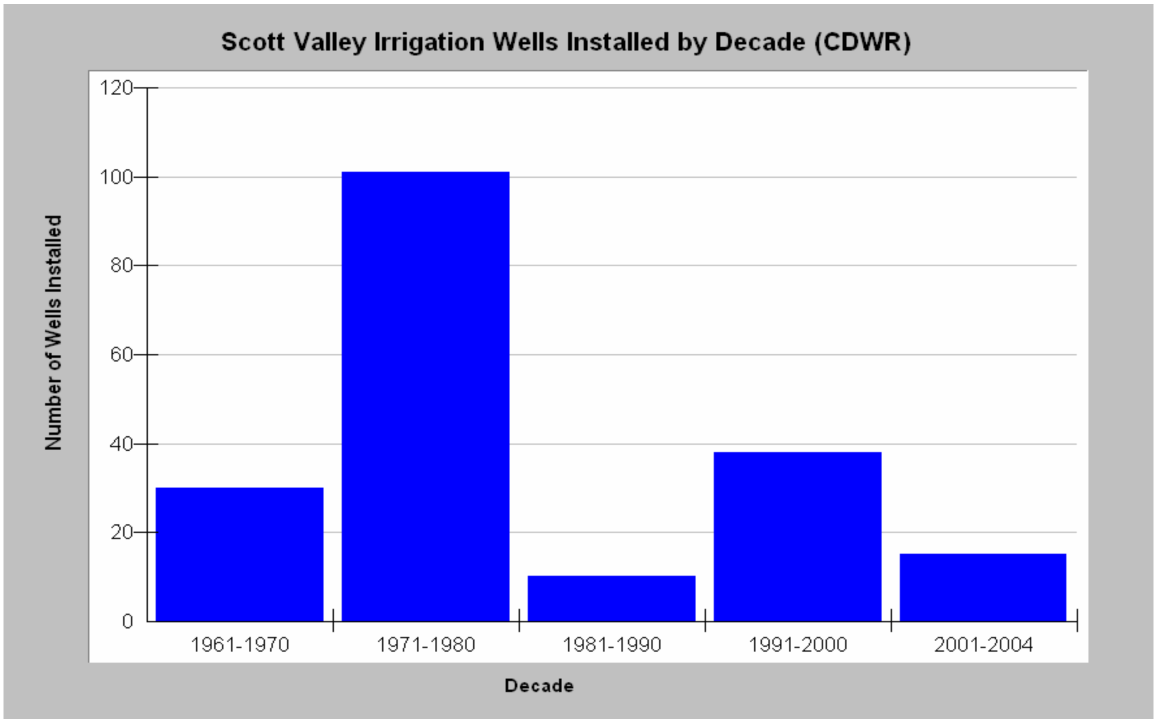

Figure 1. This chart shows the number of irrigation wells recorded by the California Department of Water Resources (Eaves, personal communication).

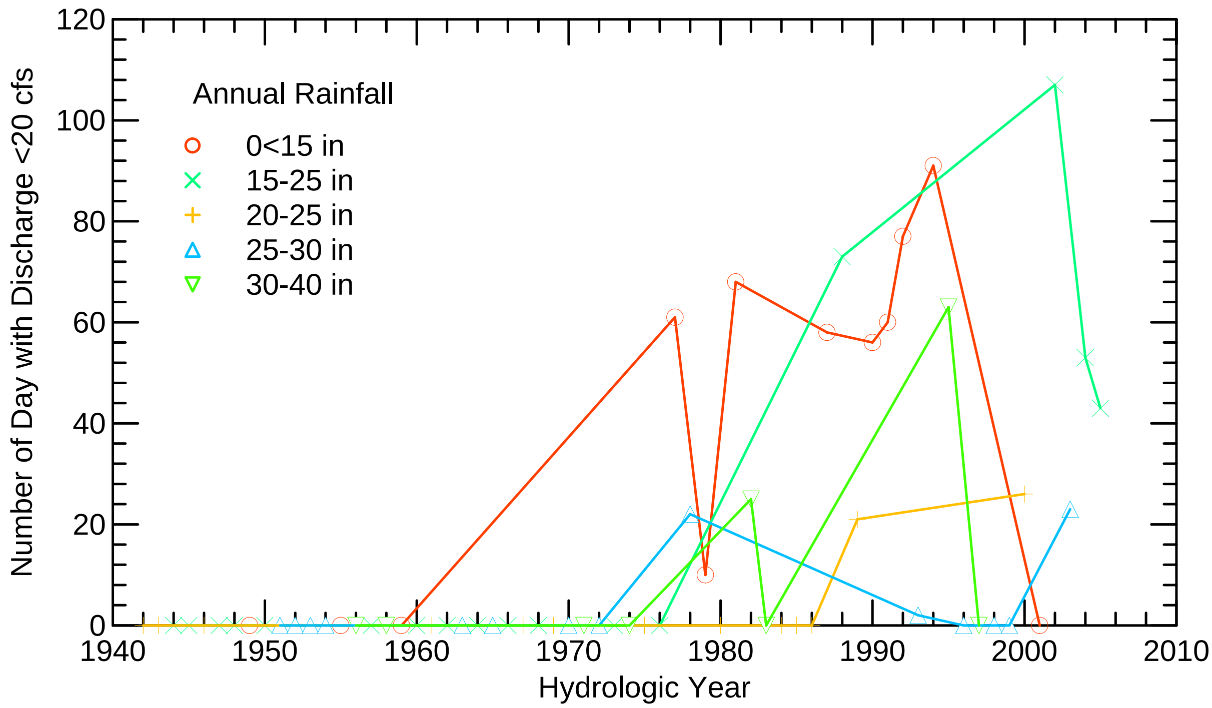

Figure 2. USGS flow gauge data are the basis for this chart showing the number of days/yr. with flows less than 20 cfs at Jones Beach in the lower Scott River. Annual rainfall from Ft. Jones CDEC gauge allows identification of associated rainfall in various years.

(CSWRCB, 1980) as shown in Table 1. "These amounts are necessary to provide minimum subsistence-level fishery conditions including spawning, egg incubation, rearing, downstream migration, and summer survival of anadromous fish, and can be experienced only in critically dry years without resulting in depletion of the fishery resource."

Table 1. Scott River Adjudication instream flow allotment for U.S. Forest Service needs for instream flow in Scott River canyon (CSWRCD, 1980 as cited in Kier Assoc., 1991).

Period	**Flow Requirement in Cubic Feet per Second**
November – March	200 cfs
April - June 15	150 cfs
June 16 - June 30	100 cfs
July 1 - July 15	60 cfs
July 16 - July 31	40 cfs
August - September	30 cfs
October	40 cfs

Flow records from summer periods in 2002 and 2004 are charted against low flow allotments for the U.S. Forest Service in the *Scott River Adjudication* in Figure 3 and Figure 4, respectively. These data show that the requirements of the adjudication are not being met, thus greatly decreasing carrying capacity for salmonids in the Scott River canyon and jeopardizing their future existence. This important habitat area has until recently served as a refugia for juvenile salmonids during summer when many reaches of the Scott River in Scott Valley and tributaries lack surface flow (see De-Watering section). Low flow conditions exacerbate water temperature problems throughout the lower Scott River (see Temperature section).

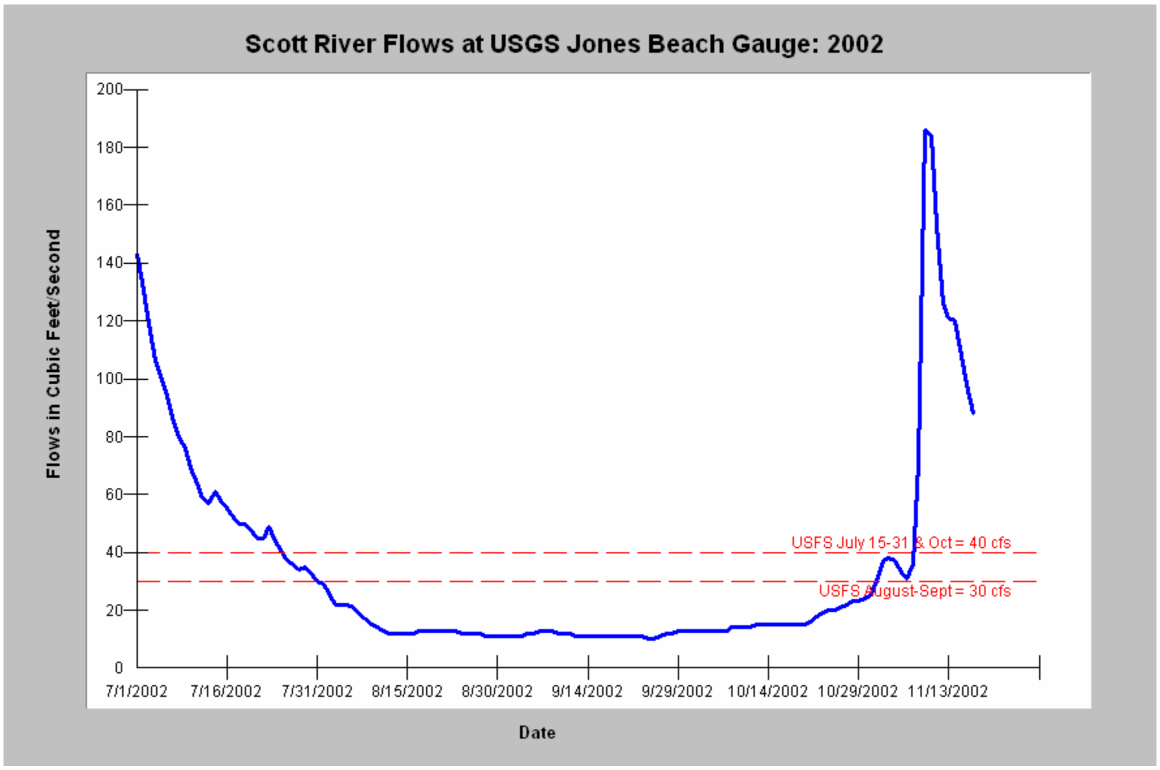

Figure 3. Jones Beach USGS flow gauge data from the irrigation season of 2002 show that flows failed to meet adjudicated levels for the USFS and flows needed for fish migration, spawning and rearing in August, September and October.

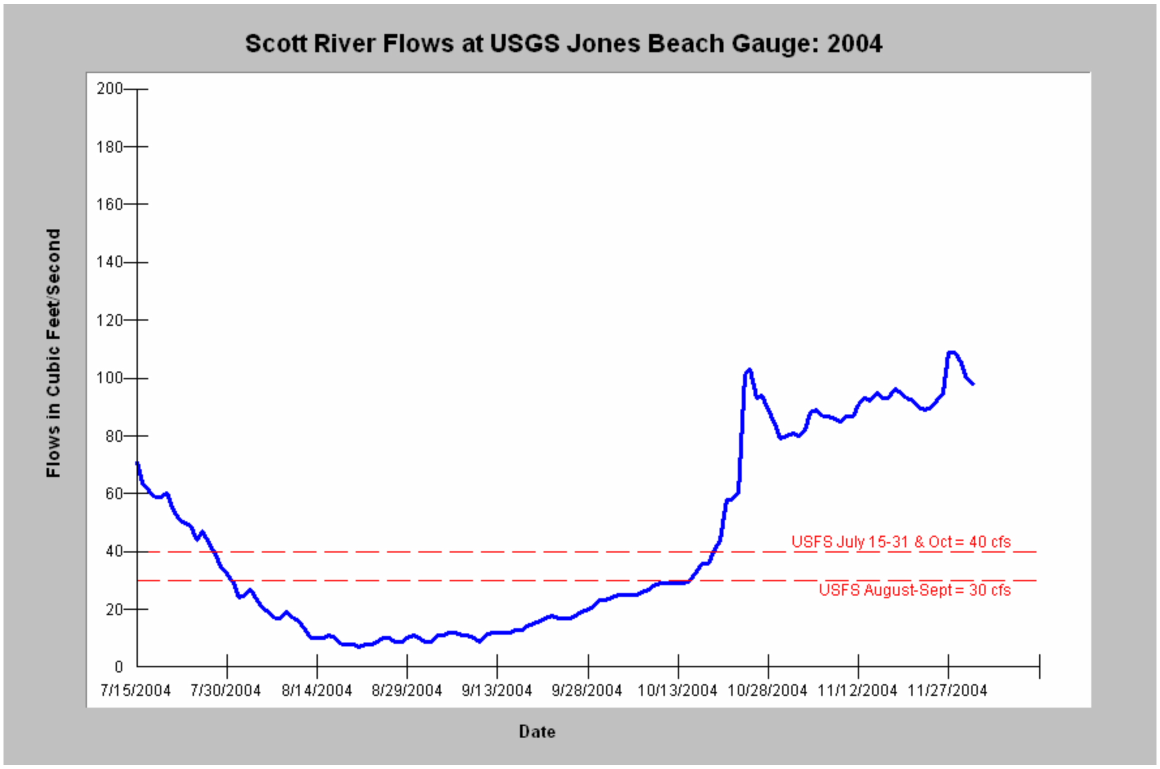

Figure 4. Jones Beach USGS flow gauge data from the summer and fall of 2004 show that flows failed to meet adjudicates levels for the USFS and flows needed for fish migration, spawning and rearing in August, September and the first half of October.

CDWR well data show a pattern of decline of minimum ground water levels over the last several decades as a greater number irrigation wells were installed. Figures 5 and 6 show the annual minimum and maximum measurements at a 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, annual minimum levels have declined since 1965, although they fluctuate with precipitation. Decreased ground water levels are likely linked to reduced cold water inflows into the Scott River.

De-Watering of Mainstem Scott River Reaches and Major Tributaries

While flows are often too low in the canyon of the Scott River, surface flows are sometimes completely lacking in mainstem reaches in Scott Valley and in tributaries that harbor salmon and steelhead. Photographic evidence from the KRIS project documents the loss of summer surface flow in numerous stream reaches, completely negating their ability to support cold water fisheries and other beneficial uses.

Mainstem Scott River reaches often go dry in irrigation season, such as the reach near the airport shown in Figure 7 in a photo taken by Michael Hentz in summer 2002. A photo from the same year near Fort Jones shows very little water in the Scott River channel below Highway 3. The photo also shows a stream bed with extremely fine average particle size distribution, an indication of recent sediment contributions and aggradation. Massive aggradation of some stream beds in the Scott River contributes to decreased available surface flow or complete loss of flow in some cases.

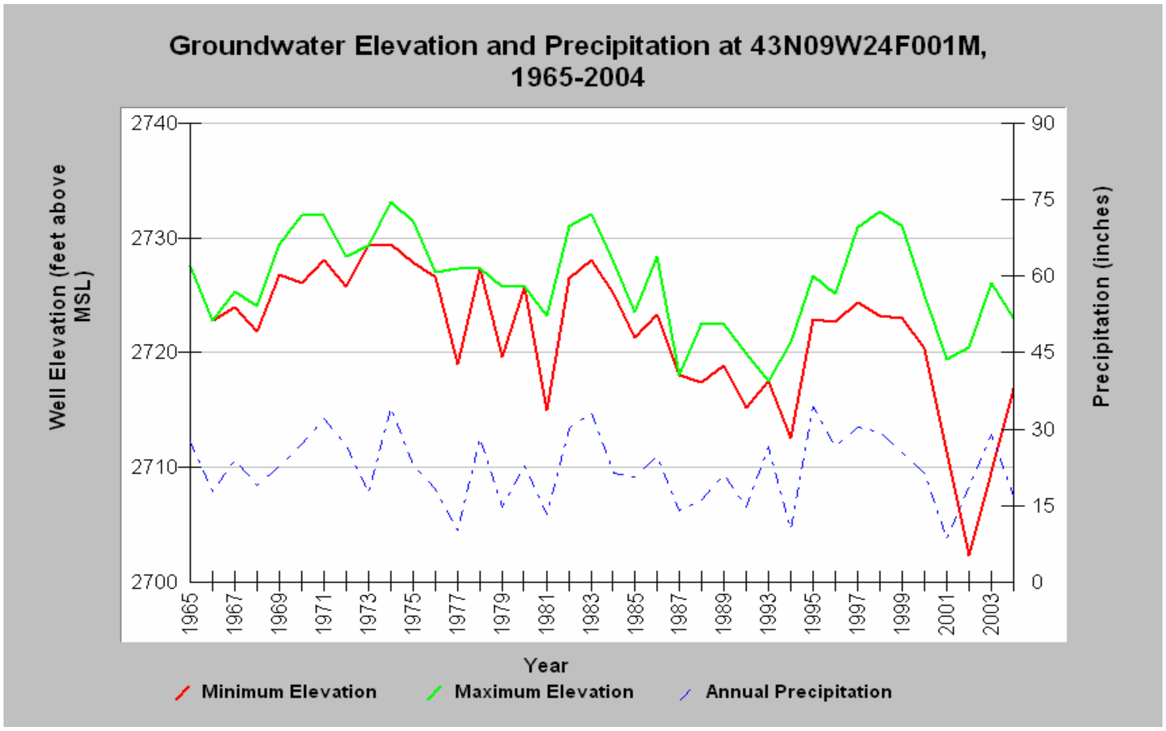

Figure 5. Department of Water Resources well 43N09W24F001M, approximately 5 kilometers south-southeast of Fort Jones, for the years 1965-2004.

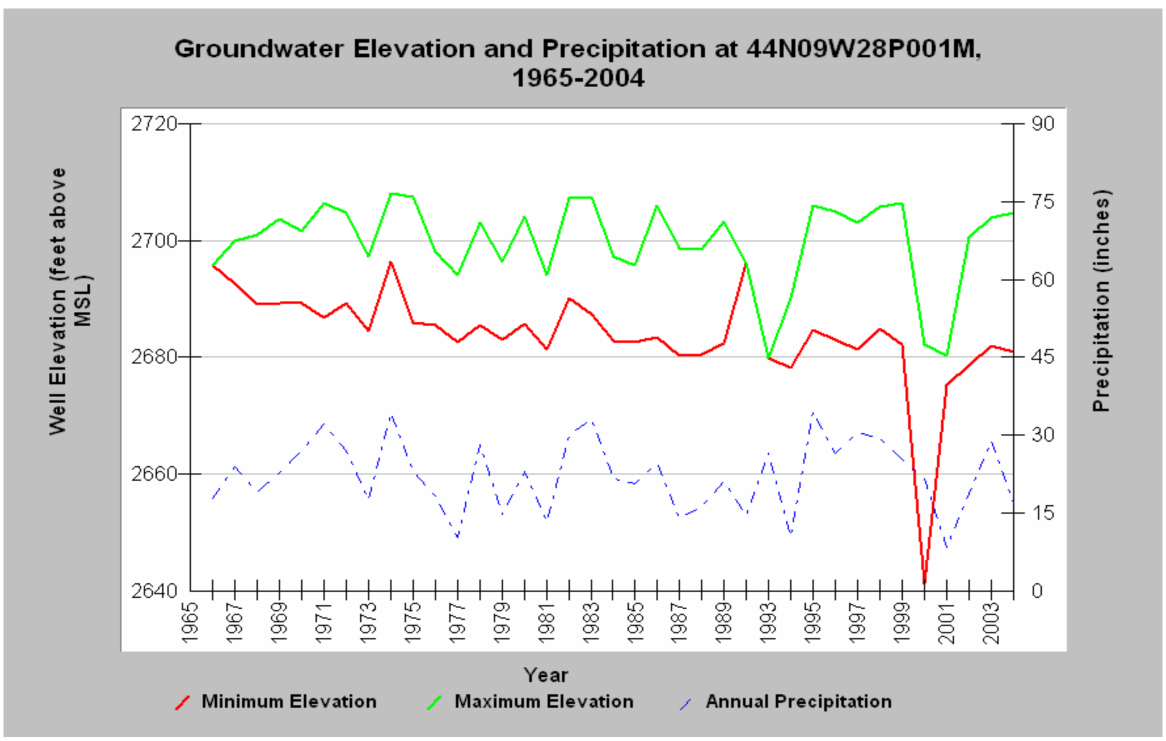

Figure 6. California Department of Water Resources well 44N09W28P001M, approximately 8 kilometers northwest of Fort Jones, for the years 1965-2004.

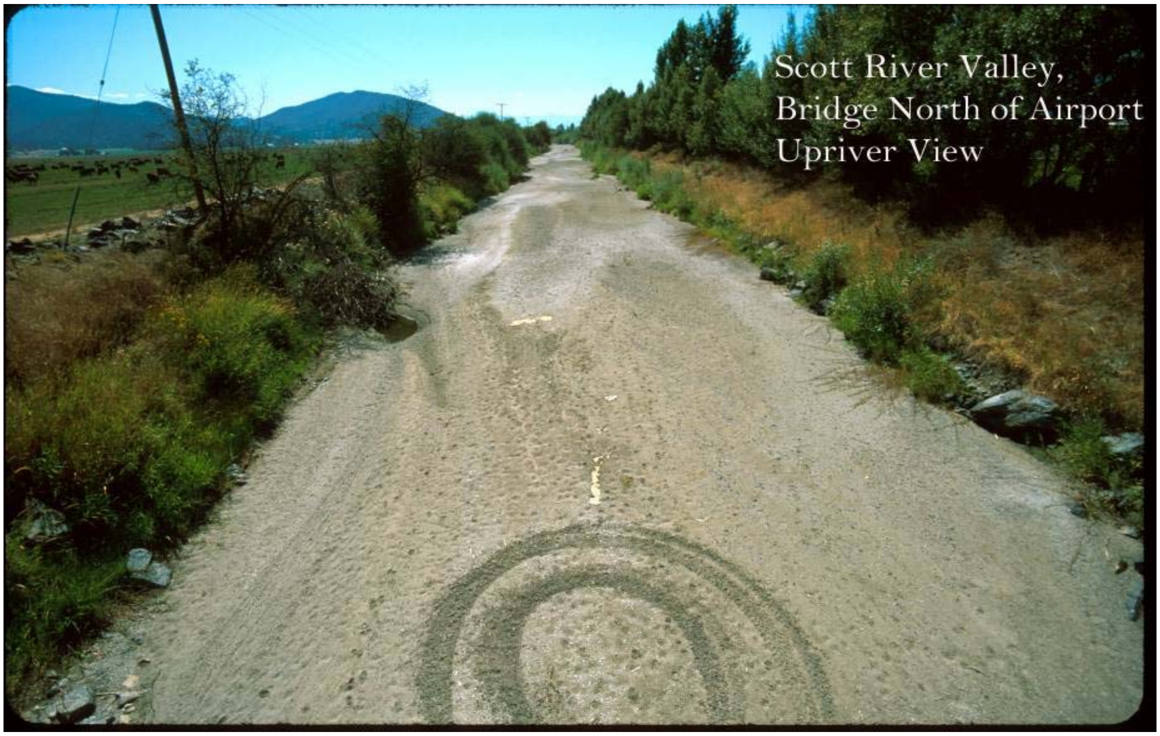

Figure 7. This photo shows the dry bed of the Scott River in a reach near the airport looking upstream. Photo from KRIS taken by Michael Hentz. 2002.

Figure 8. Scott River at Fort Jones Bridge looking downstream. Note streambed is comprised of mostly sand. Photo from KRIS taken by Michael Hentz. 2002.

Many tributaries of the Scott River that are known to harbor steelhead and coho salmon (see Fish section below) are routinely de-watered as a result of water extraction for irrigation. Figure 9 shows Moffett Creek where a combination of surface water extraction and ground water extraction combines to cause a loss of surface flow (Kier Associates, 1999).

Figure 9. Moffett Creek in August 1997 after the January 1997 Storm and subsequent excavation. Note lack of riparian trees due to drop in ground water levels (Kier Associates, 1999). Photo from KRIS Version 3.0.

Other major salmon and steelhead bearing tributaries that now typically lose surface flow due to diversion are Shackleford Creek (Figure 10 and 11), Kidder Creek (Figure 12) and Etna Creek (Figure 13). All stream reaches that are currently de-watered were formerly excellent salmonid rearing areas. The National Academy of Sciences (2003) makes it clear that "dewatering of tributaries eliminates potential rearing habitat for coho and causes loss of connectivity and reduction of base flow in the main stem."

Low Flow Adds to Water Temperature and Water Quality Problems

The National Academy of Sciences (2003) makes a clear case that flow depletion is at the root of temperature problems in the Scott River. As flows drop, transit time for water increases, allowing an opportunity for stream warming. Figure 14 shows maximum daily water temperatures at several mainstem Scott River locations during 1996. The South Fork has the coolest temperatures because it flows from U.S. Forest Service lands and has few diversions. The East Fork is much warmer by comparison and has a substantial number of diversions. The Scott River warms as it flows downstream, with temperatures well over stressful (McCullough, 1999) and sometimes over lethal (Sullivan et al, 2001) levels.

A thermal infrared radar (TIR) image of Shackleford Creek (Figure 15) was taken by Watershed Associates (2003) as part of the Scott River TMDL study process, and shows dramatic effects of flow depletion on water temperature. Shackleford Creek is cool enough for juvenile salmonid

Figure 10. Shackleford Creek looking downstream at a bridge over a middle reach showing complete loss of flow due to diversion. Photo from KRIS V 3.0 taken by Michael Hentz.

Figure 11. This photo shows the dry creek bed of Shackleford Creek at its convergence with the Scott River in August 1997. Photo from KRIS Version 3.0.

Figure 12. Photo shows Kidder Creek looking upstream off the Highway #3 Bridge in Greenview. Photo from KRIS V 3.0 by Michael Hentz. 2002.

Figure 13. Photo shows Etna Creek looking downstream off the Highway 3 Bridge. Photo from KRIS V 3.0 by Michael Hentz. 2002.

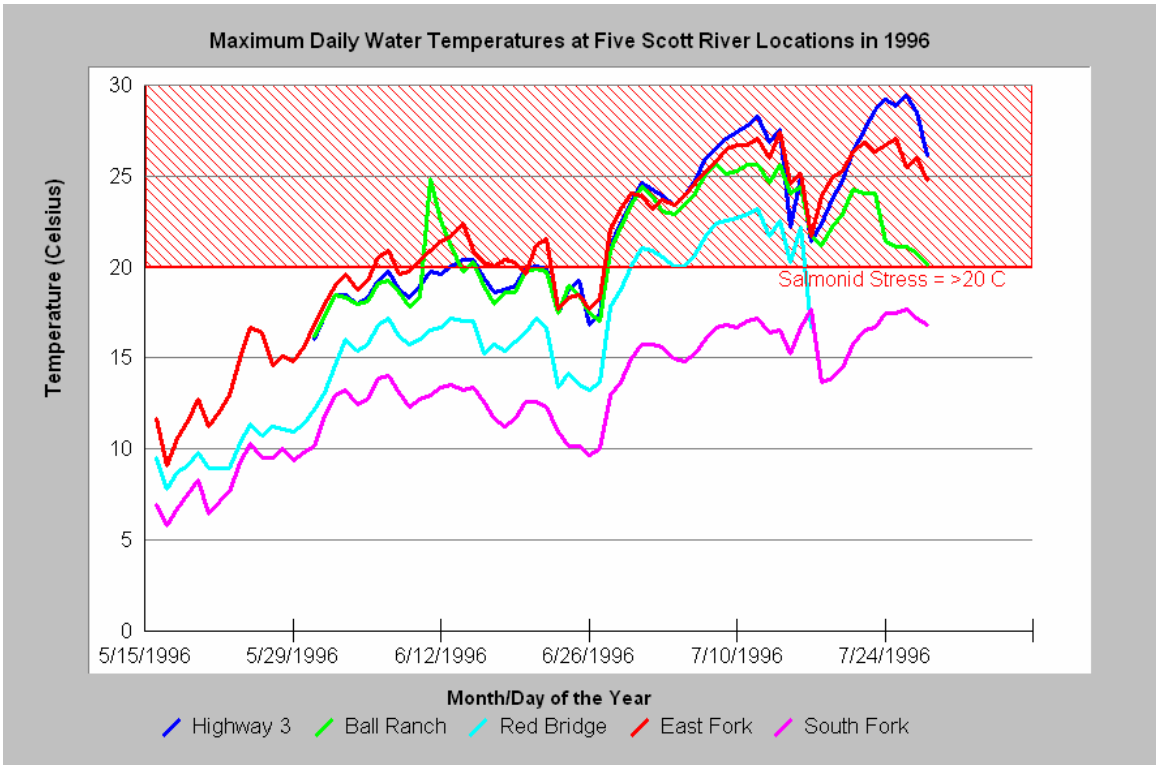

Figure 14. Water temperature at various Scott River mainstem locations in 1996. Chart from KRIS V 3.0 and data from the Siskiyou Resource Conservation District.

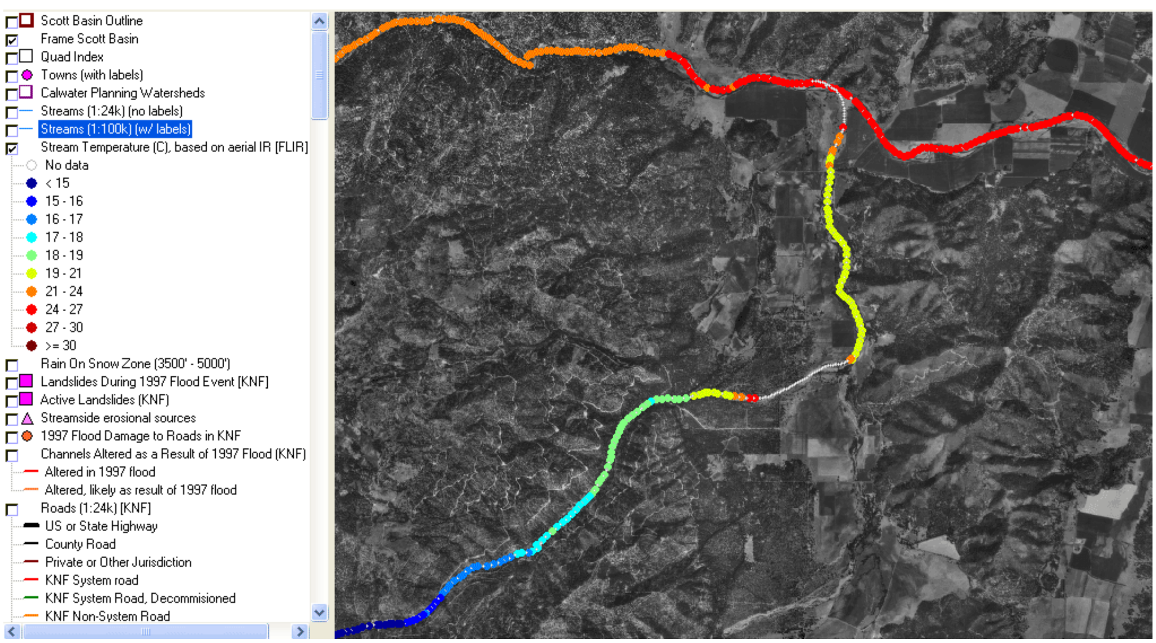

Figure 15. This map shows summary data of Scott River Thermal Infrared Radar (TIR) surveys for Shackleford Creek. Note that water temperature warms in a downstream direction as flow is depleted. Reaches with no temperature coded color (i.e., gray) are dry. Data from Watershed Sciences (2003).

rearing above points of diversion, then warms rapidly as its flow is depleted. Flow resumes below the major tributary Mill Creek, warms again as flow is further reduced by irrigation until surface flows are again entirely lost, just upstream of the convergence with the Scott River.

Although the Scott River is not yet listed as "water quality limited" for nutrients, dissolved oxygen (DO) or pH, these problems may arise if flows drop low enough to cause stagnation. Figure 16 shows a reach of the Scott River with much depleted flows due to irrigation. The algae blooms seen forming here can cause a diurnal increase in pH associated with high rates of photosynthesis and very low nocturnal dissolved oxygen (DO) levels as algae respires.

Figure 16. Photo shows the mainstem Scott River looking downstream with significant signs of algae blooms evident. Algae growth may alter water chemistry. Photo from KRIS V 3.0 by Michael Hentz.

Sediment and Increased Peak Flows Cause Channel Scour and Lead to Stream Warming

Kier Associates (2005) point out that changes in sediment yield and watershed hydrology related to logging and road building in the Scott River basin can also contribute to water temperature problems. The January 1997, flood damage report by the Klamath National Forest (de la Fuente and Elder, 1998) indicated that debris torrents caused 437 miles of stream channel scour, which in turn made these streams more subject to warming. Landslides were most frequently triggered by road failures, but were also well above background occurrence levels in recently logged or burned areas. Water temperature data from the Karuk Tribe and Klamath National Forest show that some tributaries of the lower Scott River increased in water temperature as a result of debris torrents associated with the January 1997 storm (Figure 17). Canyon Creek and Boulder Creek

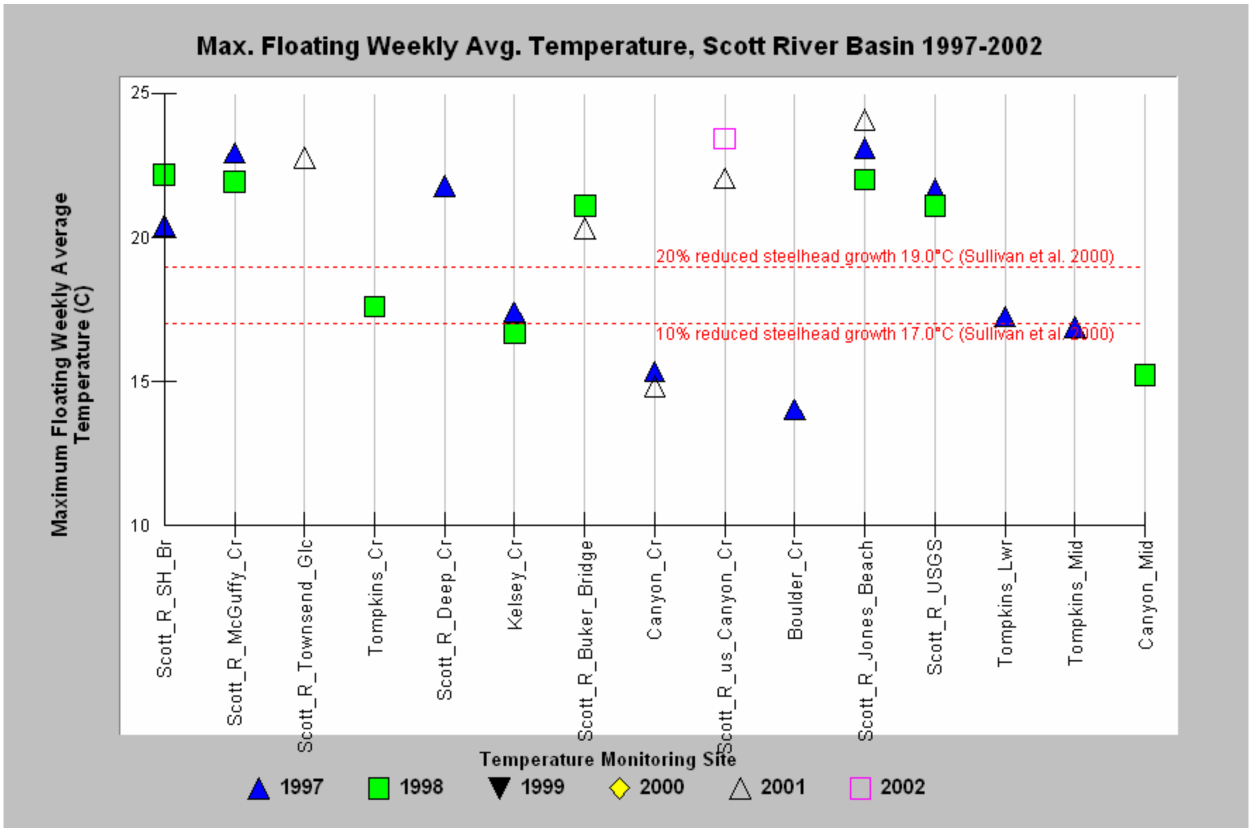

Figure 17. Maximum floating weekly average water temperature (MWAT) for several mainstem Scott River and tributary locations. Data from the Karuk Tribe and USFS.

did not experience debris torrenting and thus still maintain water temperature sufficiently cool to support coho salmon. Welsh et al. (2001) found that coho were present in streams that did not attain a maximum floating weekly average water temperature (MWAT) of greater than 16.8 C. Figure 17 shows reference lines from Sullivan et al. (2001) that indicate suppressed growth in steelhead juveniles at temperatures higher than 17 C.

Kelsey Creek and Tompkins Gulch both had major channel alterations as a result of the January 1997 storm which likewise triggered stream warming. Figure 17 indicates that neither of these streams was sufficiently cool to support coho juveniles after 1997. The Klamath National Forest flood study (de la Fuente and Elder, 1997) noted that the stream damage was high given the fairly low recurrence interval of the storm event, which was judged to be a 14-35 year event. Extensive logging, road building and fires all combine to elevate flood risk (Figure 18) and resulting increased flows and sediment yield caused major channel adjustments (Figure 19).

The lower reach of McGuffy Gulch, a tributary of the lower Scott River, serves as an example of what type of damage debris torrents can cause. Damage to this stream went well beyond loss of channel depth and increased channel width (Figure 20). The channel was buried so deeply that it lost surface flow. Kier Associates (2005) point out that channel scour can also occur due to increased peak flows related to rain-on-snow events (Berris and Harr, 1987; Coffin and Harr, 1991). Jones and Grant (1996) describe how road cuts intercepting ground water pathways can shunt water into road ditches, thus increasing peak flows and cutting off ground water recharge downhill, in turn resulting in decreased summer base flows.

Figure 18. Patch clear cuts, areas burned by forest fires, plantations and road networks in upper Kelsey Creek set the stage for flood damage and 70% channel scour by the January 1, 1997 storm. Photo by Patrick Higgins from KRIS V 3.0.

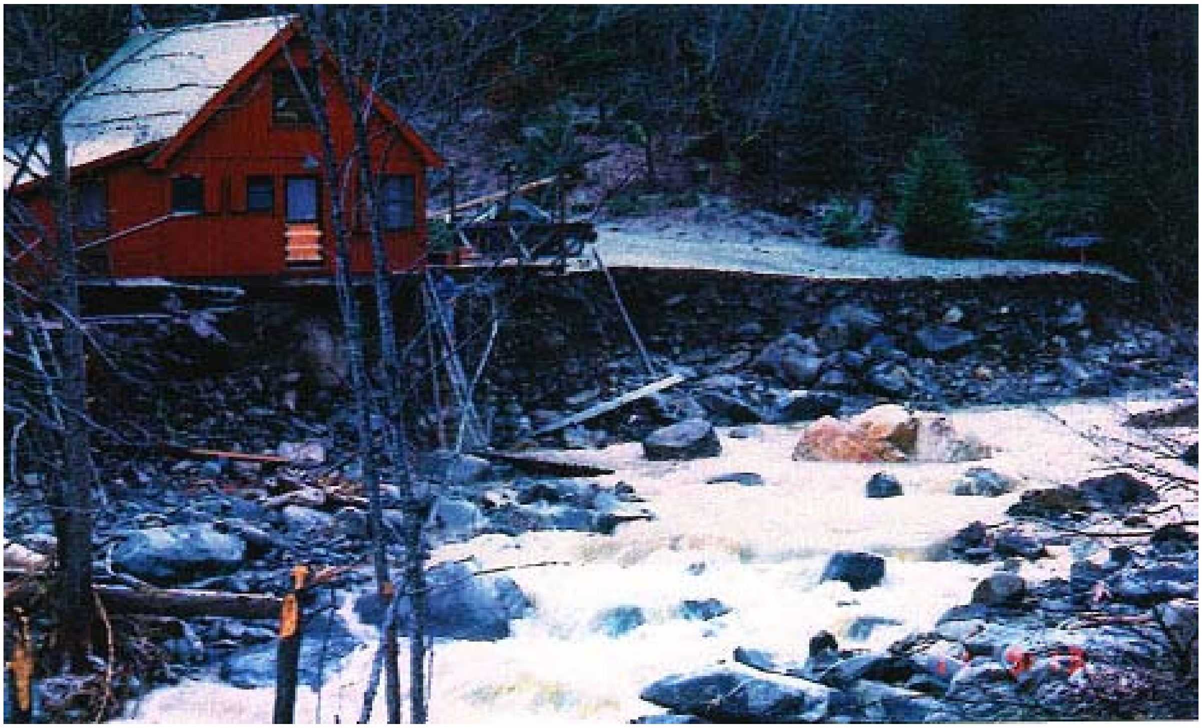

Figure 19. Kelsey Creek, just upstream of its mouth in early 1997, with snapped alder trees, large rubble and bank erosion near the house indicative of recent debris torrent damage. KRIS V 3.0.

Figure 20. Photo shows McGuffy Creek, a lower the Scott River tributary, just upstream of the Scott River Road. From KRIS V 3.0 by Michael Hentz. 2002.

Fish Population Status, Trends and Need for Immediate Action

The low gradient of the mainstem Scott River and its major tributaries made it ideal habitat for summer and winter steelhead, spring and fall chinook and coho salmon. Long term declines in these populations have been well documented (Kier Associates, 1991; CH2Mhill, 1985). Scott River spring chinook and summer steelhead populations are at remnant levels and are only sighted infrequently in surveys.

The low flows coming out of the lower Scott River Valley today not only reduce carrying capacity for juvenile salmonids but would also prevent any successful attempts by summer steelhead or spring chinook adults to hold over during summer. The Scott TMDL needs to recognize also that spring chinook and summer steelhead recovery may be attainable, due to metapopulation function (Rieman et al., 1993), if cold water refugia are restored in the lower Scott River, sediment diminished and water flows improved.

The Scott River TMDL should also specifically target recovery of coho salmon, which are recognized as “threatened” under both the federal and California Endangered Species Acts. The distribution of coho spawning is known (Figure 21), yet the TMDL does not specifically focus protection or restoration on reaches or tributaries that presently harbor ESA-listed coho as “best science” restoration efforts must (Bradbury et al., 1996).

Scott River adult coho returns are now only robust in one out of three year-classes, which is an indicator that the population is trending towards extinction (Rieman et al., 1993; NMFS, 2001; CDFG, 2003). Table 2 shows downstream migrant trapping results from CDFG indicating that coho juveniles are only abundant in one of three years following high spawner years.

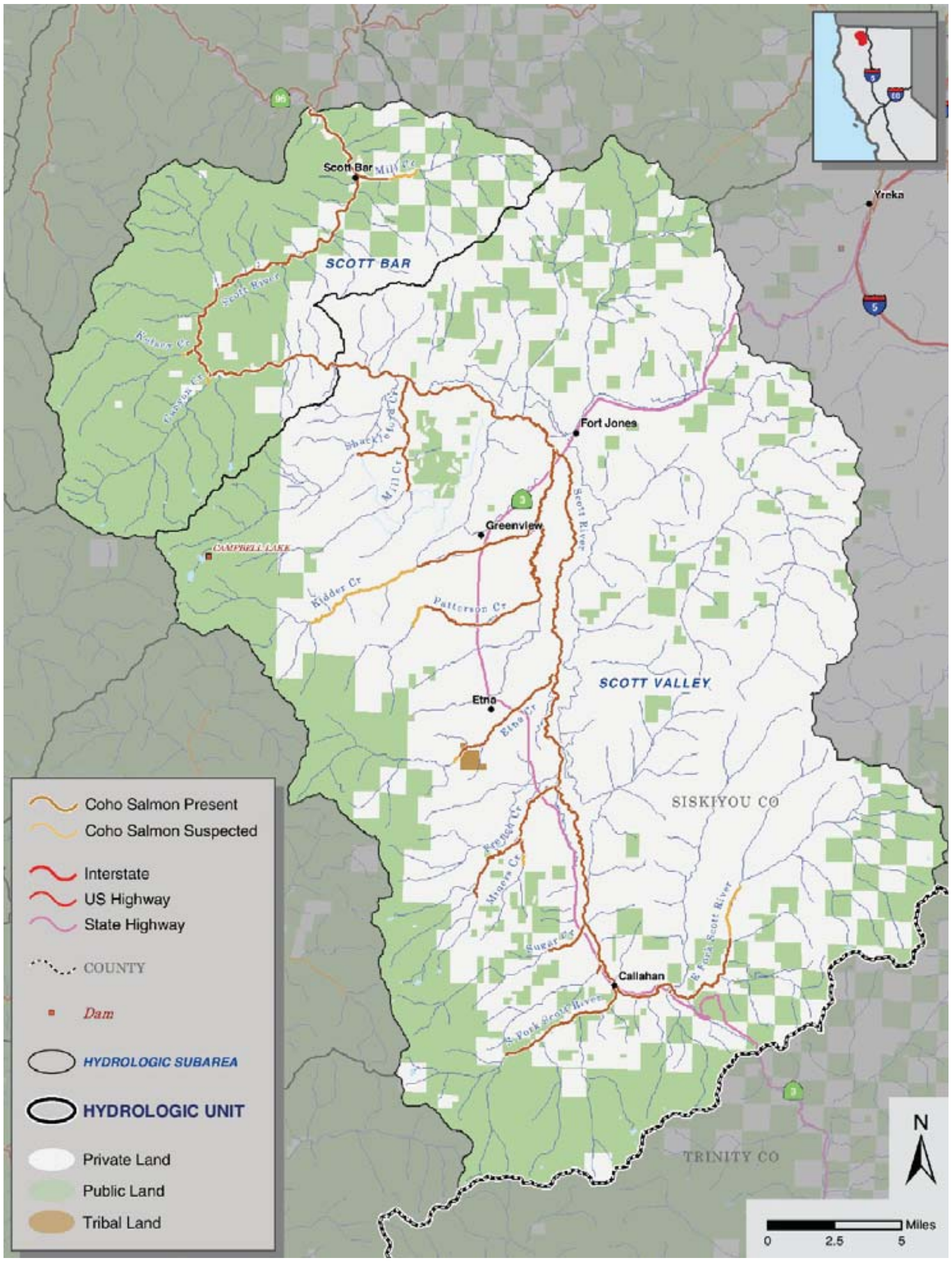

Figure 21. Coho salmon distribution map for known or potential Scott River spawning locations (from Maurer, 2001).

Grand Total by Species:	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTALS
Steelhead	10181	17693	5943	7127	7980	4158	5008	21982	79887	135319	69823	**365101**
Coho	15	433	0	253	3	8	538	30	69	30019	50	**31418**
Chinook	2	266	0	3	1	0	0	365	3191	0	0	**3828**
Totals =>	**10198**	**18392**	**5943**	**7383**	**7984**	**4166**	**5546**	**22377**	**83147**	**165338**	**69873**	**400347**

Table 2. Coho in California Department of Fish and Game trap records as taken from Siskiyou RCD (2004) Table 6c.

Scott River fall chinook returns likewise plummeted in 2004 and 2005 to the lowest level on record for two years in a row (Figure 22). Higgins et al. (1992) discussed the risk of extinction of northwestern California Pacific salmon stocks and discussed minimum viable population sizes, noting that:

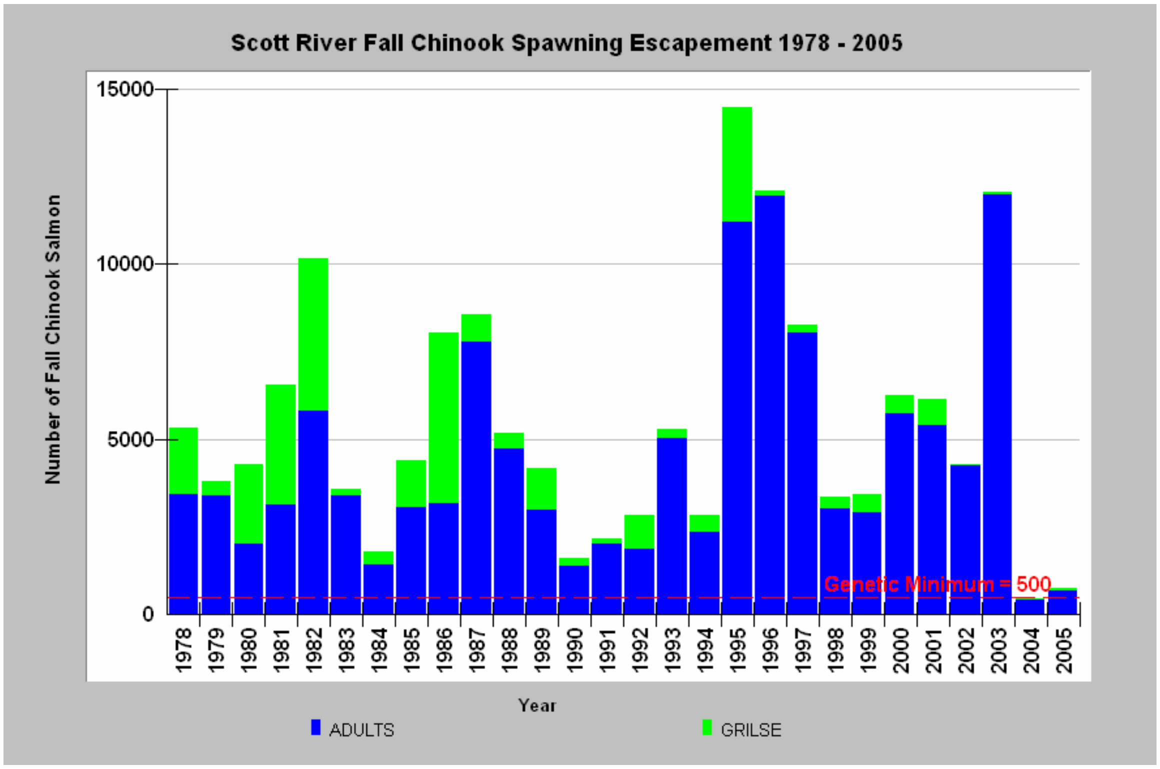

Figure 22. Scott River fall chinook escapement shows both 2004 and 2005 as the lowest years on record. Data from CDFG.

> "When a stock declines to fewer than 500 individuals, it may face a risk of loss of genetic diversity which could hinder its ability to cope with future environmental changes (Nelson and Soule, 1986). A random event such as a drought or variation in sex ratios may lead to extinction if a stock is at an extremely low level (Gilpin and Soule, 1990). The National Marine Fisheries Service (NMFS, 1987) acknowledged that, while 200 adults might be sufficient to maintain genetic diversity in a hatchery population, the actual number of Sacramento River winter run chinook needed to maintain genetic diversity in the wild would be 400 - 1,100."

In other words, despite favorable or average ocean conditions (Collison et al. 2003) and wet years with at least average flows, the population of fall chinook in the Scott River has fallen to critically low levels. These populations have some additional ability to rebound without loss of genetic diversity because chinook spawn at different ages (Simon et al. 1986), but the low adult returns should be viewed with considerable alarm. Low flow, water temperature problems and high sediment yield are all playing a role, although mainstem Klamath River water quality problems are also a factor in the decline of Scott River fall chinook (Kier Associates, 2006).

Discussions above show that flows in the lower Scott River in October do not even meet requirements of the *Scott River Adjudication* in October, when fall chinook salmon adults would be migrating upstream and spawning. Very low flows in the Scott River canyon cause a concentration of spawning by fall chinook in the lowest reaches (Figure 23). This concentration poses higher risk for egg survival than if flows were sufficient for chinook spawners to disburse upstream (Kier Associates, 2005). Epidemic transmission of disease also becomes a higher risk under such densities. Risk of increased peak flows that might mobilize the stream bed is also higher in the lower mainstem than in upstream reaches or tributaries. Large quantities of decomposed granitic sand in transport through the Scott River canyon may also be mobilized by high flows and smother eggs or entomb alevin.

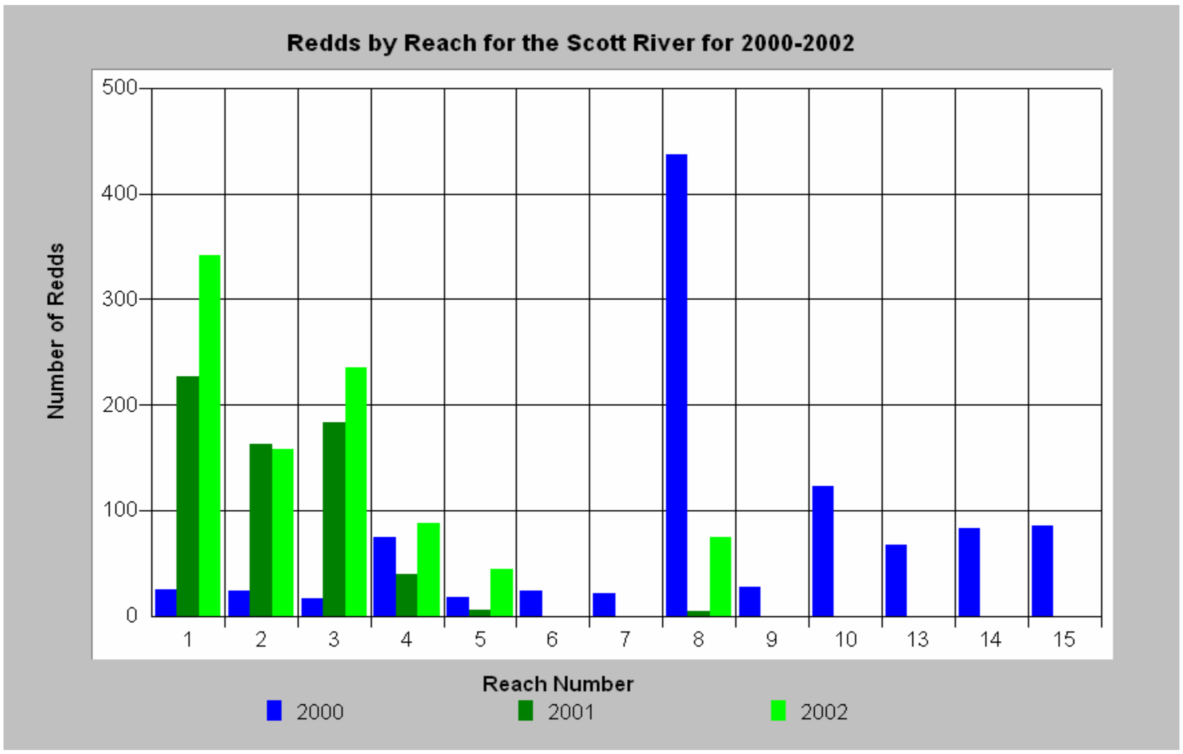

Figure 23. Data from CDFG spawner surveys show that fall chinook salmon spawned mostly in the lowest five reaches of the Scott River in 2001 and 2002, where eggs may be vulnerable due to potential for bed load movement or transport of decomposed granitic sands.

Collison et al. (2003) noted that we are presently experiencing relatively favorable conditions for salmonids in the ocean and in a wet on-land cycle that will likely reverse sometime between 2015 and 2025 in what is known as the Pacific Decadal Oscillation (PDO) cycle (Hare et al. 1999). That coho salmon and fall chinook salmon populations are at such low levels or showing declines during the positive cycle of the PDO is not a good sign. In order to restore Scott River chinook and coho salmon stocks, flow and water quality problems must be remedied by 2015 or whenever the PDO switches to less favorable conditions for salmon stocks or further extinctions are likely to occur.

References

Berris, S. N. and Harr, R. D., 1987. Comparative snow accumulation and melt during rainfall in forested and clear-cut plots in the western Cascades of Oregon: Water Resources Research. Y. 23, p. 135- 142.

Bradbury, W., W. Nehlsen, T.E. Nickelson, K. Moore, R.M. Hughes, D. Heller, J. Nicholas, D. L. Bottom, W.E. Weaver and R. L. Beschta. 1995 Handbook for Prioritizing Watershed Protection and Restoration to Aid Recovery of Pacific Salmon. Published by Pacific Rivers Council, Eugene, OR. 56 p. Available online at: http://www.krisweb.com/biblio/gen_xxxx_bradburyetal_1995.pdf.

California State Water Resources Control Board. (CSWRCD), 1980. Scott River Adjudication Decree No. 30662, Superior Court for Siskiyou County. Scott River stream system within California in County of Siskiyou. Sacramento, 152p.

Coffin, B. A. and Harr, R. D., 1991. Effects of forest cover on rate of water delivery to soil during rain-on-snow: Final Report for Project SH-1 (Rain-on-Snow Field Study) submitted to Sediment, Hydrology, and Mass Wasting Steering Committee, Timber/Fish/Wildlife Agreement, State of Washington Department of Natural Resources, 106 p.

Collison, A., W. Emmingham, F. Everest, W. Hanneberg, R. Martston, D. Tarboton, R. Twiss. 2003. Phase II Report: Independent Scientific Review Panel on Sediment Impairment and Effects on Beneficial Uses of the Elk River and Stitz, Bear, Jordan and Freshwater Creeks. Independent Science Review Panel performed analysis on retainer to the North Coast Regional water Quality Control Board, Santa Rosa, CA.

de la Fuente, J. and D. Elder. 1998. The Flood of 1997 Klamath National Forest - Phase I Final Report. November 24, 1998. USDA Forest Service, Klamath National Forest, Yreka, CA.

Dunne, T., J. Agee, S. Beissinger, W. Dietrich, D. Gray, M. Power, V. Resh, and K. Rodrigues. 2001. A scientific basis for the prediction of cumulative watershed effects. The University of California Committee on Cumulative Watershed Effects. University of California Wildland Resource Center Report No. 46. June 2001. 107 pp.
http://www.krisweb.com/biblio/gen_ucb_dunneetal_2001_cwe.pdf

Gilpin, M.E. and M.E. Soule. 1990. Minimum Viable Populations: Processes of Species Extinction. In: M. Soule (ed) Conservation Biology: The Science of Scarcity and Diversity University of Michigan Press. pp 19-36.

Higgins, P.T., S. Dobush, and D. Fuller. 1992. Factors in Northern California Threatening Stocks with Extinction. Humboldt Chapter of American Fisheries Society. Arcata, CA. 25p.
Jones, J.A. and G.E. Grant. 1996. Peak flow response to clear-cutting and roads in small and large basins, Western Cascades, Oregon. Water Resources Research, April 1996. Vol. 32, No. 4, Pages 959-974.

Kier Associates. 1991. Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program. U.S. Fish and Wildlife Service, Klamath River Fishery Resource Office. Yreka, CA. 403 pp.

Kier Associates. 1999. Mid-term evaluation of the Klamath River Basin Fisheries Restoration Program. Sausalito, CA . Prepared for the Klamath River Basin Fisheries Task Force. 303 pp.

Ligon, F., A. Rich, G. Rynearson, D. Thornburgh, and W. Trush. 1999. Report of the Scientific Review Panel on California Forest Practice Rules and Salmonid Habitat. Prepared for the Resources Agency of California and the National Marine Fisheries Service; Sacramento, CA. Available online at: http://www.krisweb.com/biblio/cal_nmfs_ligonetal_1999_srprept.pdf

Mack, S. 1958. Geology and ground-water features of Scott Valley, Siskiyou County, California. U.S. Geological Survey, Water Supply Paper 1462. Washington, D.C., 95p.

Maurer, S. 2002. Scott River watershed adult coho salmon spawning survey: December 2001-January 2002. Prepared for U.S. Department of Agriculture Forest Service, Klamath National Forest, Scott River Ranger District. Fort Jones, CA. 121 pp.

McCullough, D. A. 1999. A review and synthesis of effects of alterations to the water temperature regime on freshwater life stages of salmonids, with special reference to chinook salmon. Published as EPA 910-R-99-010 . Prepared for the U.S. Environmental Protection Agency (EPA), Region 10. Seattle, Washington . 291 pp. http://www.krisweb.com/biblio/gen_usepa_mccullough_1999.pdf

Montgomery, D. R. and J.M. Buffington, 1993. Channel classification, prediction of channel response, and assessment of channel condition. TFW-SH10-93-002. Prepared for the SHAMW committee of the Washington State Timber, Fish and Wildlife Agreement. Seattle, WA. 110 pp.

National Academies of Science (NAS). 2003. Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery. Prepared for the NAS by the National Research Council, Division on Earth and Life Studies, Board on Environmental Studies and Toxicology, Committee on Endangered and Threatened Fishes in the Klamath River Basin. Washington, D.C. 358 pp.

Nelson, K. and M. Soule. 1987. Genetic Conservation of Exploited Fishes. In: N. Ryman and F.Utter (eds). Population Genetics and Fisheries Management University of Washington Press. Seattle, WA.

Poole, G.C. and C.H. Berman. 2001. An ecological perspective on in-stream temperature: natural heat dynamics and mechanisms of human-caused thermal degradation. *Environmental Management* 27: 787-802.

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.

Quigley, D., S. Farber, K. Conner, J. Power, and L. Bundy. 2001. Water Temperatures in the Scott River Watershed in Northern California. Performed under contract to the Siskiyou Resource Conservation District with funding from U.S.W.S., Yreka, CA. 59 p.

Sommarstrom, Sari, Kellogg, Elizabeth, and Kellogg, Jim, 1990, Scott River watershed granitic sediment study: Report for Siskiyou Resource Conservation District, 152 p. plus appendices. Available online at: http://www.krisweb.com/biblio/klamath_srcd_sommarstrometal_1990.pdf.

Spence, B.C., G.A. Lomnicky, R.M. Hughes and R. P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. Funded jointly by the U.S. EPA, U.S. Fish and Wildlife Service and National Marine Fisheries Service. TR-4501-96-6057. Man Tech Environmental Research Services Corp., Corvallis, OR.

Sullivan, K., D. J. Martin, R. D. Cardwell, J. E. Toll, and S. Duke. 2000. An analysis of the effects of temperature on salmonids of the Pacific Northwest with implications for selecting temperature criteria. Sustainable Ecosystems Institute . Portland, OR. 192 pp. Available online at: http://www.krisweb.com/biblio/gen_sei_sullivanetal_2000_tempfinal.pdf.

Rieman, B., D. Lee, J. McIntyre, K. Overton, and R. Thurow. 1993. Consideration of extinction risks for salmonids. As FHR Currents # 14. U.S. Department of Agriculture, Forest Service, Region 5 . Eureka, CA. 12 pp.

Sommarstrom, Sari. 2001. Scott River monitoring plan: Sediment sampling and analysis 2000. Prepared for the Siskiyou Resource Conservation District and Scott River Watershed Council. 15 p. plus appendices.

U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Region 10 Office of Water, Seattle, WA.

Watershed Sciences. 2003. Aerial Surveys using Thermal Infrared and Color Videography Scott River and Shasta River Sub-Basins. Performed under contract to the NCRWQCB and U.C. Davis by Watershed Sciences LLC, Corvallis, OR.

Welsh, H.W., Jr., Hodgson, G.R., Harvey, B.R., and Roche, M.F., 2001, Distribution of juvenile coho salmon in relation to water temperatures in tributaries of the Mattole River, California: North American Journal of Fisheries of Management, v. 21, p. 464-470. Available online at: http://www.krisweb.com/biblio/gen_usfs_welshetal_2001.pdf.

COMMENT 5 (via email)

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Thank you for the opportunity to comment on the Scott Valley Community Groundwater Study Plan.

Overall, this study plan looks good and should provide some valuable insight as to how future water management decisions will be made in the Scott River.

We continue to look forward to working with the Scott River Watershed Council and others, to conserve, protect and enhance fish and wildlife resources for the public's benefit.

General Comment

A precipitation runoff model (to simulate streamflow conditions) in addition to the groundwater model may better explain precipitation/groundwater interactions.

Management alternatives may then be simulated and compared to existing conditions.

Alternatives include;
1. Current flow, existing conditions.
2. Line or pipe irrigation canals to limit seepage losses.
3. Increase surface water diversions through unlined canals for aquifer recharge.
4. Convert from surface-water to ground-water resources to supply water for irrigation.
5. Reduce or increase tree density or vegetation types in a particular reach.
6. Natural flow.

Will additional seepage measurements at point of diversion/return be needed in addition to measuring streambed seepage?

Do we know or have we mapped all the gaining and losing reaches within the basin? If not, this would be valuable information to obtain through this work. Basin wide consideration of streamflow gains and losses provide a broader context for the influence of irrigation canal seepage. These areas may also help prioritize habitat restoration projects, especially off-channel/floodplain restoration.

To what extent do irrigation diversions reduce low-flow discharge in the basin?

What fraction of groundwater re-charge is due to irrigation canal seepage?
How would increased groundwater pumping (rather then surface water diversions) influence low-flow discharge?

COMMENT 6

California Regional Water Quality Control Board
North Coast Region
John W. Corbett, Chairman

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Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

November 21, 2007

Thomas Harter, Ph. D.
Ryan Hines
125 Veihmeyer Hall
University of California
Davis, CA 95616-8628

Dear Dr. Harter and Mr. Hines,

Subject: Comments on Draft Scott Valley Community Groundwater Study Plan

File: Klamath Watershed, Scott River TMDL Implementation

Staff of the California Water Quality Control Board, North Coast Region (Regional Water Board) have reviewed the Penultimate Draft Scott Valley Community Groundwater Study Plan, dated October 9, 2007, and are pleased to have the opportunity to offer the comments below.

We commend you for compiling a large amount of background information relevant to the study, and identifying a comprehensive suite of analytical techniques and approaches useful for addressing the study of the interaction of groundwater and surface waters in the Scott Valley. We also recognize the efforts of Jim DePree of Siskiyou County, Danielle Quigley and Erich Yokel of the Siskiyou Resource Conservation District (SRCD), and Sari Sommarstrom of the Scott River Watershed Council (SRWC).

Chapter 2: Goals and Objectives

Please replace "RWB" on line 212 and again on line 216 with "RWB staff".

Regional Water Board staff would like to amend our previously stated expectation that begins on line 223. Please add the following language to the end of the sentence on line 224: "...and water quality, particularly stream temperature."

Chapter 3: Background: Current Scott Valley Conditions

While there is an impressive amount of relevant information presented in this chapter, the description of current Scott Valley conditions is lacking available information describing changes in surface flow trends, as measured at the USGS' "Scott River near Fort Jones" gauge. The surface flow trends are particularly relevant to groundwater conditions in Scott Valley because nearly all of the water passing the gauge in the late summer originates as groundwater in Scott Valley. Regional Water Board staff believe that investigating and presenting trends in annual low flow data (or some other measure of low flows), and comparing the timing of the low flow trends with changes in water management will be helpful in improving the understanding of the interaction of groundwater and surface water in Scott Valley.

Similarly, spatially distributed flows measured in 1972, 1973 (SWRCB, 1974), 2003 (presented in the TMDL), 2006, and 2007 (measured by SRCD) should be presented. These data show how flows increase from upstream to downstream through Scott Valley. These data, in combination with the infrared temperature surveys of 2003 and 2006, are very useful for defining the location and typical magnitudes of groundwater discharges to the Scott River. In fact, these data may satisfy most or all of the data requirements for Element 3 of Phase I, as described on lines 2839 and 2840 of the plan. Additionally, Regional Water Board staff believe these data are also useful for understanding the changes in low flow trends that have occurred since the early 1970s. Regional Water Board staff will provide these data at a later date.

Chapter 6: Road Map and Cost Estimates

Regional Water Board staff believe the information contained in this chapter is the aspect of the study plan that stands to benefit the most from further refinement. While we acknowledge the difficulty in developing a "road map" and associated cost estimates so early in an effort such as this, Regional Water Board staff believe it is important that more detailed information be developed to help the County and its stakeholders move forward effectively and intelligently in the face of scarce funding opportunities.

The Study Plan will benefit from a more transparent linkage between the research elements in Chapter 5 with the actions identified in Chapter 6. A description of the specific research elements required to complete each of the actions described in Chapter 6 would allow for easier refinements in the approach and cost estimates in the future. Likewise, where multiple research elements overlap or are redundant, the priorities of or preferences for the elements should be identified. For instance, both the fiber optic and thermal infrared temperature data collection methods give high resolution longitudinal temperature profiles, but differ in other ways. Which of the tasks are these techniques needed for, and are they both needed? Similarly, if installation of piezometers every square mile is not possible or has to occur in stages, how should a reduced well network be distributed? Is it more critical to distribute the piezometers near the river, or evenly throughout the valley? Incorporation of the answers to these types of questions will allow for more informed revisions in the future, and the best use of limited resources.

The assumptions used to develop the cost estimates provided in Chapter 6 should be described. This is important because these estimates will be used to pursue funding. More details describing costs will facilitate the development of funding requests by the County and its stakeholders, and will ultimately make for a more competitive funding request. Also, as the costs of specific research elements of the plan change in the future, the larger cost estimates can be more easily and accurately modified.

Finally, Regional Water Board staff are concerned that this study plan may give the impression that conclusions from the study will not be available until the completion of all phases of the plan are complete, possibly up to 20 years from initiation of the study. We believe that many significant conclusions can be established prior to completion of all phases of the study. Furthermore, Regional Water Board staff believe that we are in agreement with you on this subject, based on Dr. Harter's previous public statements. However, this idea is not described or acknowledged anywhere in the study plan. Regardless, Regional Water Board staff expect the study that comes out of this plan will result in some conclusive understandings and on-the-ground actions within a few years.

In conclusion, Regional Water Board staff thank you for the opportunity to comment on the Draft Scott Valley Community Groundwater Study Plan, and look forward to working with you on the plan and study in the future.

Sincerely,

Bryan McFadin
Water Resource Control Engineer
Scott River TMDL Coordinator

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Cc: Jim Depree, County of Siskiyou, PO Box 1085, Yreka, CA 96097

Carolyn Pimentel, Siskiyou RCD, PO Box 268, Etna, CA 96027

Bill Krum, Scott Valley resident, October 15:

Dr. Harter

Enclosed are my comments on the Penultimate Draft of the Scott Valley Community Groundwater Study Plan. I am utilizing the line number designation in the draft for ease of reference.

74. syntax

694. Suggest adding Shackleford Creek to this list

705. The northern portion of Scott Valley is bordered on the west by the Marble Mountains while the southern portion of the valley is bordered on the west by the Salmon Mountains. Suggest replacing “Marble Mountains” with “Marble and Salmon Mountains.”

751. I think this would more correctly reflect the concerns of the landowners in Scott Valley if after “…healthy ecological system” you inserted “while maintaining the viability of the local agricultural based economy”

812. The proper name for the RCD is Siskiyou RCD, not Siskiyou County RCD. This error is replicated throughout the document.

960. Verb usage/syntax

1361. Probably true as stated but misleading. Most of the stock water in Scott Valley utilizes existing irrigation ditches. The amount of water required to generate sufficient “head” and compensate for ditch loss far exceeds the actual consumption by livestock. As an example, on my ranch we have about 75 cattle and horses that get their winter water from my irrigation ditches, the water coming from French Creek. In order to get the water through the ditch to my ranch, and then distribute it throughout the ranch where the livestock are, as well as have enough flow to operate the self-cleaning brushes on the fish screen requires nearly 0.5 cfs or 1 acre-foot per day. Given this system is currently used for six months from the cessation of irrigation on Oct 1 until it begins again the following April 1, I alone divert 180 acre ft for this purpose.

Obviously this water is not lost to the watershed; most of it likely ends up back in the stream. Nonetheless, we believe there is a significant impact on fall stream flows that can be addressed by installing alternative stock watering systems domestic wells, pipes and watering troughs.

I would suggest adding a sentence to the end of this section saying something like, “Due to the fact that water for stock during the fall and winter is often delivered through open irrigation ditches, substantially more water than that actually consumed by the livestock is diverted into ditches during fall and winter.”

1377. Should “31 percent” be “30 percent”?

1540. The State Water Code was changed 4 or 5 years ago and no longer provides for watermaster costs being paid one-half by the State of California. It is now wholly the responsibility of the landowners per the State Water Code. For the last several years the Legislature has stepped in and picked up the increased cost. This is not going to go on forever which is the reason the Shasta and Scott Valleys are moving to form a special district to handle watermastering. I would suggest you just remove the sentence dealing with the 50 – 50 split of costs.

2133. syntax

2290-2293. It should be noted that data does exist for Shackleford-Mill and French-Miners Creeks as they are watermastered. Wildcat, Sniktaw and Oro Fino Creeks are also watermastered but the bulk of the water rights in the Scott River Decree are not.

The material in ( ) is not strictly correct. A correct statement for the bulk of water rights holders under the Scott River Decree would be “For diverters who participate in the Watershed-Wide Permitting Program being developed by DFG and the Siskiyou RCD their diversion rates will have to be verified by a watermaster or other means acceptable to DFG.”

2380. Should “the” be “that”?

2391. Should “was using” be “uses”?

2427. I have never seen “landuse” as a single word. Suggest “land use.”

2431 “totaling”?

2449. “may obtained” needs to be changed.

2510 -2516 Marcia Armstrong already made this point. Language needs to be added that all this has to take place while maintaining the local agricultural based economy and community.

2538. What is “physically defensive”?

2582. landuse

2616. “demandsui.”

2632 and 2643. It is not clear if InHM is a specific model or something else.

2726 – 2728. Sentence fragment

2748. Should read “Siskiyou RCD”. Also suggest deleting “Scott Valley” immediately preceding “Scott River Watershed Council” as it is redundant.

2784 – 2786. syntax

2799. Is “publics” correct?

2817 – 2819. Incomplete thought.

2862 – 2869. Numbering system has gotten mixed up with the points being made.

3299 – 3315. Written in the first person.

3370 – 3372. The language about augmentation of stream flow with ground water is incorrect. This language was in an early draft of the ITP but was eliminated in later drafts. A correct statement would be that the ITP requires “the development of a Dry and Critically Dry Year Contingency Plan.”

Marc Horney, NRCS, Yreka, October 15:

Erich & Thomas:

Attached are a few comments I made on Section 7 - further research questions. This follows some conversations regarding how to explain "Lagrangian components" to a general audience (which I am ill-equipped to do). Unfortunately I didn't care any more for most of these research topics than I did for the "hypotheses" in the early section. Were I an actual hydrologist or geologist, I might have been able to make more substantive and constructive comments. A pity that Bill's illness has taken him out of the loop this summer. I can't begin to fill his shoes in this regard. Moreover, I'm starting to worry that I'm just turning into a crank... :)

Best regards,

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(530) 842-4990 fax
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Lisa Thompson, UC Davis, October 19:

Hi Thomas,

That's a very thorough proposal you've put together!

I read over the sections you mentioned and they look good to me. I've made some minor suggestions.

Section 3.2.1. No changes.

Section 3.2.2.
I found a typo on page 19, line 794. I think it should read: At the southern end of the mainstem Scott...

Section 3.3.
Please see Word file, attached.

Good luck with the study!

Lisa

Aaron Packman, Northwestern University, Chicago, November 11:

Thomas,

Some quick thoughts:

-Modflow will give you the larger-scale components, but not the ones induced by the stream flow. My student Susa Stone is working on developing a 3D model that superimposes another flow solution on modflow to try to capture these effects. It's rough, but the best that we can do now for multi-scale modeling. That is, without trying to build a detailed 3D CFD-type model of the study reach to add to modflow. So this is what I was thinking about anyway, and maybe it would make sense to try to add that component.

-If Greg doesn't want to do the geomorphology work, then I suggest you contact Gordon Grant at the USDA Forest Service Lab in Corvallis -- and he also has an appointment at OSU, so this work he would probably do with students from there. Another possibility is John Buffington, who is at the Forest Service in Idaho and has a similar relationship with U. Idaho. Both of them have done geomorphology related to hyporheic exchange for fish spawning habitat.

[….]

--Aaron

Aaron Packman, Northwestern, November 4:

Thomas,

Sorry for the late reply -- have been super busy, and was sick for about 10 days too. Now actually have time to write since I'm on a plane to a workshop. I did put through the USDA subcontract budget, so that should be all done now.

The document you sent is pretty interesting. Obviously it will be a HUGE piece of work, but indeed it will be necessary to develop this type of information in order to support scientifically justifiable long-term decision-making (i.e., sustainable water management). The approach generally looks good to me, and I think you've identified the most important surface-groundwater interactions questions. I'm impressed that you identified and compiled so much background information on the site. That will help a lot, but it will still be a huge effort to turn all of that into practical decision-making tools. In many ways we still lack the necessary conceptual and theoretical underpinnings to address these questions, but we can only develop that through projects like this one.

Not too many people have really taken this on before. If you have not done so already, I suggest you check with Scott Larned at NIWA-Christchurch to learn about what they've been doing in the Selwyn River. The hydrogeology and geomorphology are somewhat similar to what you're dealing with, though the Selwyn is larger and more directly connects the mountains (Southern Alps) to the ocean. The Selwyn cuts right across the Canterbury Plain, and there are huge water diversions for agriculture -- mainly for sheep farming, and now for a ton of dairies as well. So they have been trying to develop this type of information for some time (though not for temperature, really just for stream flow and water quality).

Also, if he is not already involved, Greg Pasternack should really be able to help with the sediment issues.

What type of groundwater/surface-water interaction model are you thinking about developing? We have been developing a first-order type approach that could be used for this (the spectral scaling model with Anders Worman). It would be rough, but could be used as a good scaling and preliminary decision-making tool. The student working on this here (applying the model to river reaches) will be graduating in the spring and could maybe, just possibly, be a good person for you to get involved with this if it goes forward.

Please let me know how it goes! Do you know what the timing will be on these efforts??

--Aaron

COMMENT 7 - Attachment to Thompson's

3.3 Biological Setting

The Scott River historically supported a robust aquatic ecosystem, including anadromous salmonids.

Three salmonid species are currently present in the Scott River: Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and rainbow (steelhead) trout (*O. mykiss*). Chinook salmon are the basis of important commercial, sport, and tribal fisheries in Northern California and the Klamath River. Coho salmon in this area are listed as “threatened” under the California and Federal Endangered Species Act. These anadromous fish require suitable habitats on a watershed scale as they move from freshwater to estuarine and marine ecosystems and back in order to successfully complete their life cycle.

Impaired water quality and quantity in freshwater streams is believed to be one of the largest “bottlenecks” to the production of salmonid “smolts” entering the ocean and can impede adult salmonids from accessing suitable spawning areas. In addition to water quality and quantity parameters, it is hypothesized that in-stream habitat degradation and historic watershed alteration (upslope and in-channel) produce cumulative effects on freshwater survival from the egg stage to the smolt stage.

Figure 3-4: Salmon life cycle

The three different salmonids utilizing the Scott River follow the salmon life cycle depicted in Figure 3-4 with the different species having characteristic timing and lengths for the various stages. The exception is some rainbow trout that can complete the life cycle without a period of ocean residency. This discussion will focus on the Chinook and coho salmon due to their economic, cultural, and regulatory significance combined with their more “rigid” life cycle patterns and habitat preferences.

Adult Chinook salmon enter the Scott River in early October through November and largely spawn in suitable habitats of the main stem Scott River. Adult Chinook will

spawn in both the canyon and valley of the Scott River if the flow regime allows for fish passage through a series of barriers that include disconnected stream reaches in critically dry years. A major priority is to enable the adult Chinook to access as much suitable habitat as possible with emphasis placed on providing fish passage to the low gradient spawning areas of the Scott Valley above Etna Creek.

After successful spawning, the Chinook eggs incubate in the inter-gravel environment of the “redd” until fry emergence - starting in early March in the Scott River (Chesney and Yokel, 2003). During the fry and juvenile stages Chinook rear in the Scott River for several months and then outmigrate via the Klamath River for a period of ocean

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residence that can last from two to five years (three years is average). Outmigrant trapping efforts in the Scott River have shown that the majority (to all) juvenile Chinook emigrate from the Scott River before the flow regime reaches low (base) flow. For this reason, it is believed that groundwater's effect on instream flow (which would be greatest during the period of base flow) is not playing an essential role to the survival of juvenile Chinook.

The significant differences between the Chinook and coho life cycles are in the duration and timing of the life stages. Potentially the most significant difference lies is that juvenile coho typically rear for an entire year in freshwater habitat. This requires juvenile coho to survive the summer low flow period when habitat quantity and quality (especially temperature) can be limiting. During this period of summer rearing, groundwater effects on the Scott River can be locally significant (in some water years) in providing suitable rearing habitats for this cold water fishery.

Adult coho return to the Scott River as three year old fish in November and December and spawn mainly in the lower alluvial reaches of the large tributaries of the "west side" of the Scott Valley. Fry emergence occurs in early April through May – timing is affected by the different winter stream temperature regimes of the different tributaries. Fry and juvenile coho favor low velocity habitats with good cover and a suitable temperature regime.

The majority of documented juvenile rearing of coho in the Scott Watershed occurs in the natal tributaries in which water temperatures are suitable for most (all) of the low flow summer period. Monitoring efforts recording the "ambient" stream temperatures of the East Fork Scott River and mainstem Scott River have shown that during average to low water years there are periods in which the stream temperatures are stressful to lethal for juvenile coho (reference?). Direct observation surveys have shown that these reaches contain limited juvenile coho salmon utilizing areas with cold water input[This sentence is a bit unclear. Were coho observed crowded into area with cold water inflow, such as springs? And if so, were there coho that died because they were not able to access areas with cold water?]. Efforts to understand the distribution, nature, and biological utilization of the cold water inputs throughout the Scott Watershed are an ongoing effort.

These areas offering the rearing fishery "thermal refugia" are the most salient features showing a potential link between groundwater accretion and increased carrying capacity due to the amelioration of an impaired temperature regime. In dry water years (e.g., 2001 and 2007), portions of the main stem Scott River become disconnected, and the alluvial

portions of many tributaries become disconnected in most water years. These disconnected reaches negate juvenile rearing potential and can impede adult salmon migration if they persist into late fall and winter. An understanding of how the ground water and channel morphology are "interacting" might help us understand the processes that define losing and gaining reaches of the Scott River and tributaries.

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Comment [LT1]: In more northern areas they may spend 2 years in freshwater and1 year in the ocean

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Finally, stream temperature data has shown that the Shackleford – Mill watershed has warmer water temperatures in winter and cooler water temperatures in summer in the alluvial reaches of Quartz Valley, when compared to other significant tributaries of the Scott (e.g. the French – Miners). It is hypothesized that this watershed has a greater groundwater influence on the year round flow regime than other west side tributaries. This greater groundwater influence would moderate the stream temperatures year round. The more moderate temperature regime possibly benefits salmonids at all life stages allowing for earlier emergence and greater growth throughout the year creating emigrating fish with superior condition.

Scott River - timing of salmon life stages
Chinook salmon
month
lifestage October November December January February March April May June July August September
spawning
incubation
juvenile rearing
coho salmon
month
lifestage October November December January February March April May June July August September
spawning
incubation
juvenile rearing
steelhead trout
month
lifestage October November December January February March April May June July August September
adult rearing (1)
spawning
incubation
juvenile rearing

(1) - period of freshwater rearing for "summer" ecotype of adult Steelhead trout in Scott River. Timing of spawning for this ecotype is largely unknown.

Table 3-2: Scott River Salmonid Life Cycle Timing

Steelhead (rainbow) trout have a more robust and varied suite of life cycle options available for successful survival and spawning in comparison to the previously discussed salmon species. Steelhead and rainbow trout are two names for the same species of fish - a steelhead trout is an individual of the species that displays the anadromous form of the life cycle, that is, it has migrated to the ocean. The majority of steelhead (winter ecotype) migrate as sexually mature fish during the winter months and spawn from January through March or April in the Scott River. Additionally, the summer ecotype of steelhead migrates into fresh water

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as sexually immature adults in early summer. These adult “summer” steelhead must find suitable freshwater habitat in which to spend the summer until they spawn in the late fall and winter months. Insufficient water quantity and inadequate water quality (e.g. temperature) could impede the migration and/or survival of this important ecotype of steelhead trout.

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Juvenile rainbow trout rear in fresh water during all seasons of the year. Juvenile rainbow trout (especially ‘young-of-the-year’ trout) are not as sensitive to water temperatures and habitat requirements as juvenile coho salmon, yet they require suitable cold water

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habitats in the tributaries and mainstem of the Scott River for successful rearing. Larger juvenile rainbow trout (yearling, two year olds, etc.) require deeper waters and prefer the presence of fish cover elements. Habitat degradation coupled with increased water temperature regimes could limit the availability of habitat in the mainstem Scott River and East Fork Scott River during summer rearing. Additionally, limiting the suitable habitat for salmonids to a “small” volume in reaches of the Scott watershed could limit the condition and/or survival of all species by limiting the availability of “partitioned” habitats and creating inter-specific competition and predation.

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3.3.1 Adult spawning of Chinook and coho salmon in Scott River

Adult Chinook salmon have been found to predominantly spawn in two reaches of the Valley portion of the mainstem Scott River – above and downstream of the mouth of Shackleford Creek and an approximately 8 mile reach from Fay Lane to below the mouth of Etna Creek. Historic Chinook spawning ground surveys documented a significant utilization of lower Shackleford Creek by adults, but the aggraded mouth of Shackleford currently negates connectivity and access to adult fish during most water years. The reach of the Scott River from below Etna Creek to Meamber Bridge is characterized by low to very low occurrences of Chinook spawning. This is largely due to the lack of suitable sized and sorted spawning gravels and a high occurrence of sand and smaller gravels (reference for the info in this paragraph?).

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Adult Chinook surveys have not been performed upstream of the tailing pile below Callahan. It is hypothesized that some spawning could occur in the East Fork Scott River if the disconnected reach in the tailing pile becomes connected and allows adult passage.

Adult coho spawning occurs predominantly in the tributaries of the Scott River. Limited spawning of coho salmon in the main stem Scott River (around the mouth of Shackleford Creek and in the tailings) has been observed in the early period of the coho spawning season when access to the tributaries is prohibited or limited. It is not known if this main stem spawning is volitional or an adaptation to the inability to access preferred habitat.

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COMMENT 7 - Attachment to Horney's comments

7. Further Research Questions

- How did the Scott River originally maintain its temperature? While a higher riparian vegetation density would intercept groundwater flow, higher water levels on the valley floor may and no groundwater pumping may have been sufficient to offset riparian water use.
- Can a model reconstruct prehistoric stream temperatures in the Scott River during the summer and early fall months? Is there geologic evidence that can be used to reconstruct prehistoric stream temperatures?
- Prehistorically, were Scott River flows always sufficient to sustain salmon fishery or only in some years?
- Can modifications to the streambed force sufficient hyporheic exchange to lower the temperature without increasing water levels in the surrounding floodplain?
- What role may the dredge tailings play in lowering the stream temperature?
- Is there a Lagrangian component to diurnal stream temperature variations or other geochemical parameters of interest?
- What were pre-development groundwater flow patterns?
- The infrared thermal survey raised several questions:
  - Downstream of Meamber Bridge, stream temperatures drop by 4 centigrade. Is the drop in temperature because groundwater from Scott Valley is forced to the stream or because groundwater from Quartz Valley is forced to the stream?
  - Why is there a downstream temperature drop at Scott River & Kidder Creek despite the warmer temperatures of Kidder Creek?
  - Another temperature drop is observed downstream from SVID diversion for about 1-2 miles, despite much lower flow volume. Do canal recharge and irrigation force groundwater flow to stream, thereby cooling stream temps?
- What is the usable aquifer storage under various minimum flow requirements in the Scott River?

Comment [m1]: Who is it that actually knows what the Scott River's temperature "was"? We're talking about a dynamic system which has probably gained and lost a number of components over the decades/centuries/millennia, and so has its temperature regime, to some degree. It would be fun to try and model, but it seems to me that would largely be an academic and unverifiable exercise.

Comment [m2]: Are you kidding? I'd be fascinated by any serious attempt to accomplish this, but how would you verify the results? As it is, we can scarcely model the current system with the data we have available.

Comment [m3]: Ibid.

Comment [m4]: Is there a particular region of the river in mind, here? The streambed is sufficiently below the elevation of the surrounding floodplain throughout much of the drainage that I wouldn't think this likely in most cases.

Comment [m5]: For benefit of the laymen out there (including me), could this be restated in plainer terms, maybe something like, "Do daily changes in stream temperature or geochemical constituents follow simple, repeatable patterns, or are their variations more complex, responding to constraints imposed by external features of the local environment?"

Comment [m6]: An interesting question, but, if it is answerable at all, it may be easier to do after we have first established what the present groundwater flow patterns are.

Comment [m7]: Or maybe there are other contributing factors…

Comment [m8]: Or maybe there are other contributing factors…

Comment [m9]: This one might be the most easily addressed of this group. Wouldn't this be roughly the thickness of the aquifer (and specific yield) which lies between the "top" of the aquifer strata and the top of the Scott River, at whatever flow level was considered minimum during critical period(s)?