Initial Phase of the Scott River Watershed Council STRATEGIC ACTION PLAN

October 2005 Update

Fiscal Administrator:
Siskiyou Resource Conservation District
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ABSTRACT and ACKNOWLEDGEMENTS

The Scott River Watershed Council (SRWC) has developed this plan for the Scott River watershed for the purpose of cooperatively establishing a common strategy for restoration and management actions. Thus, the Scott River Watershed Strategic Action Plan (SAP) will form the basis for setting priorities for future projects and practices to be supported by the SRWC, the communities within the watershed, and the many funding sources.

The SRWC is supported in its current efforts to develop a comprehensive watershed restoration plan through funding provided by the Klamath River Basin Fisheries Task Force (KRBFTF), California Department of Fish and Game (CDFG), the State Water Resources Control Board (SWRCB), and the Cantara Trustee Council (CTC). Included in the SAP are identified goals, priorities, and strategic actions that will be used to develop projects and studies.

Oversight of the planning process is the responsibility of the SRWC. The SRWC provides a multi-interest effort to cooperatively seek solutions, to help manage local resources, and to solve related problems. The primary role is to inform the community on resource issues, to aid in resource management, and to recommend to the Siskiyou Resource Conservation District (RCD) prioritized project opportunities in the Scott River Watershed for funding and implementation.

The SAP has been organized using topical sections that describe the various components of the watershed. The abstract will provide a brief description of each of these sections.

General Description

The first few sections of the SAP: Introduction and Approach, Overview, Scott River Watershed, and Historic Watershed Conditions provides a general report which describes the planning process, history of community involvement, agency coordination, overall goals and objectives, and the background of watershed changes over time.

The various sections relating to specific watershed topics (such as fisheries, water, riparian and habitat, etc.) include the following items: history; current conditions; findings; reference to current and past actions; and the goals, objectives and strategic actions that will be used to develop projects and studies to assist in filling critical gaps. Prioritized objectives and the strategic actions are identified in the topic areas and include indicators for the term of accomplishment[1] (i.e. 2 year, 5 year, 10, year and 50 year). These watershed topics will be expanded with each phase of the SAP to further define current conditions and restoration needs.

Planning sections: Monitoring Plan, Developing Strategic Actions, and Outstanding Issues/Questions provide the SRWC with detailed information that will be used to develop a detailed workplan, help set priorities and identify gaps.

The remaining sections: Glossary of Terms, List of Acronyms, Works Cited, and Appendices contain reference material to assist the reader with information they may not be familiar with, provide supporting data, or for use when needing more information about a topic.

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[1] The term of accomplishment may not include completion of a project based on availability and receipt of funds. It will however include the completion of the proposal development.

Description by Section

1. ***Introduction and Approach***
   This section provides background information about the watershed, the primary focus, the approach the SRWC has taken in developing a comprehensive plan, and details about the SRWC itself.

2. ***Overview***
   The overview discusses restoration and conservation opportunities as well as the overall goals and objectives, the SRWC Mission Statement, and the Vision Statement for the Scott River watershed communities. In addition, reference is made to the coordination of the SRWC with various agencies and organizations.

3. ***Implementation Strategy***
   This section describes the basis for the Plan, process issues, and planning elements specific to the development of projects and overall restoration. Also included in this section is a discussion on how the Plan will be updated over time.

4. ***Scott River Watershed***
   Characteristics of the watershed (by region) along with location, precipitation, and climate are areas of information contained in this section.

5. ***Historical Watershed Conditions***
   The description of watershed changes over time can be found in this section. Areas of information include a full range of topics that are addressed throughout the document. At the end of this section you will find a *Chronology of Natural Resource Events.*

6. ***Fisheries***
   This section discusses the population, management, and issues of anadromous salmonids found in the Scott River watershed. This includes the Chinook salmon, coho salmon, and steelhead trout. Issues such as water quality (sediment) is also discussed within this section as it is directly related to fish habitat and survivability.

7. ***Summary of Limiting Factors***
   The SRWC is in the process of developing a Limiting Factors Analysis (LFA) to identify the various factors limiting the production of anadromous salmonids. The initial phase of the SAP will incorporate further details of the analyses at the time data becomes available.

8. ***Wildlife***
   This section will not be completed during the initial phase. However some listings and resources have been identified to provide information that will be useful in future phases.

9. ***Vegetation and Habitat Restoration***
   The initial phase of the SAP uses this section to describe habitat restoration for fish populations only. The information regarding vegetation implies the potential impact of riparian and upslope vegetation as it relates to fisheries. Future phases of the SAP will

identify information needed to complete studies that will incorporate other wildlife habitat and vegetation issues.

10. Geology and Soils

This section primarily describes the geological condition of the Scott River watershed for the purpose of providing information to the impact on fisheries as required for the initial phase of the SAP. The geology and soils of the watershed greatly influence the hydrology and biology of the watershed. Another way to view it is: the hydrology flows over the geology, and the biology lives in the hydrology (Mattole Restoration Council, 1995).

11. Hydrology/Water Supply

The water supply produced by the Scott River watershed is used for economical as well as ecological resources. The continuing dilemma over identifying the required amount of water needed for a healthy ecological system remains the primary question for landowners in the watershed. The information contained in this section reports the estimated water supply that is currently available but does not address quantities that are needed to sustain the economy nor fish populations and habitat. The initial phase of the SAP will provide the SRWC with information about the potential implication of water supply as it relates to fisheries.

12. Water Quality

The initial phase of the SAP has addressed water quality as it relates to fish populations and habitat. Primary issues are sediment and temperature. Other aspects of water quality "impairment" will be addressed through the efforts of the North Coast Regional Board to complete Total Maximum Daily Load (TMDL) assessments for temperature and sediment. The results of their assessments can then be incorporated into the SAP.

13. Land Use

Under the initial phase of the SAP this section was developed for the purpose of addressing the potential impacts of land use on fish population and habitat. Studies that relate to the improvement of various land use activities are currently under discussion and will be addressed in future phases of the SAP.

14. Fire

Wild fires remove riparian and upland vegetation which increases water temperatures. Destruction of duff layer increases sedimentation. These conditions have a negative impact on fisheries. This section discusses the attempt to reduce fire hazards in order to improve the health of streams and fish habitat as well as protection for the community and forest.

15. Community Resources & Socio-Economics

Although the initial phase of the SAP has a primary focus on fisheries, this section discusses the information as it relates to Siskiyou County's Community Action Plan and the revenues provided to the community through project implementation by the SRWC and RCD. Additional economic issues and discussions will be incorporated in future phases. The SRWC currently lacks estimated cost and benefits that would be derived from restoration activities. More information is needed about the potential for increasing viability of past practices that are currently declining due to regulatory requirements.

16. ***Community Relations & Education***

This section focuses on the efforts of the SRWC to increase community relations for the purpose of providing education about all watershed issues.

17. ***Monitoring Plan***

This section is used to summarize the SRWC's Monitoring Plan found in Appendix M.

18. ***Developing Strategic Actions***

Strategic actions are identified in each topic section and specify a priority indicator of high, medium, or low and the term of accomplishment (timelines of 2 to 50 years) for completing the action. Each strategic action is further defined with expected outcome, duration, and pre-requisites under this section. This will provide a mechanism for taking a controlled approach to completing project-specific workplans. In many cases a pre-requisite for completing a strategic action may include the completion of another strategic action.

19. ***Outstanding Issues/Questions***

This section provides a place to identify important issues that are not fully addressed within the initial phase of the planning document. The information in this section will be reviewed for priority consideration during the second phase of the SAP.

20. ***Glossary of Terms***

A reference section used to provide definitions of terminology used throughout the document.

21. ***List of Acronyms***

A reference section used to provide the definition of acronyms found through the document or used throughout the industry.

22. ***Works Cited***

A reference section indicating the documents and communications used to provide data or information for the SAP.

23. ***Appendices***

This section contains supporting documents such as previous planning documents, contacts, and additional data.

Updating the SAP

As the SRWC works to implement the SAP and begins development of future phases, proposed changes to the document is expected. The SAP will always be a *living document*.

Process

Changes to information will be identified and/or discussed within the five standing committees (see Section 1 for details about the structure of the SRWC) then presented to the SRWC at large for consideration about how to proceed with the suggested change (i.e. research, technical review, community input, etc.). The RCD would be advised of the existence of proposed changes by a SRWC representative at its next meeting

After a thorough review by the committees has been fulfilled, the proposed change would then come up for discussion and vote at a subsequent SRWC meeting provided there is a quorum of the Executive Committee. In the event a quorum is not present, the Executive Committee would then vote on it at its next meeting with a report at the following SRWC meeting.

Following final Executive Committee action, the Executive Committee would then report/recommend the outcome to the RCD at its next scheduled meeting.

Frequency

Actual document modification with the approved changes will occur on an annual basis in the form of addendums. For consistency, the addendums will be completed by June of each year beginning in 2005. If time permits, or there is an immediate need to insert an addendum prior to this time period, a frequency shorter than the annual update is acceptable.

Format

Document changes will be inserted within each section and titled as an addendum to that section. The table of contents (Contents by Section) will indicate when an addendum is present. Each addendum will be dated and clearly identified within the table of contents and relevant sections.

ACKNOWLEDGEMENTS

This plan was prepared for:

The Scott River Watershed Council and Community At Large

The Siskiyou Resource Conservation District and its Board of Directors	*George R. Thackeray, President* *David A. Black* *Dan Hayden* *Donald Howell* *William P. Krum*
California Department of Fish and Game	*Contract Manager:* *Mark Elfgen* *Klamath River Basin Planners:* *Mark Wheetley* *Mark Pisano*
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State Water Resources Control Board	*Contract Manager:* *Janet Blake*
Cantara Trustee Council	*Contract Manager:* *Richard Lis*

And, the community of the Scott River watershed

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Land Committee Chair	*Ernie Wilkinson*
Monitoring Committee Chair	*Tom Shorey*
Outreach Committee Chair	*Gareth Plank*
Water Committee Chair	*Sari Sommarstrom*

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Fruit Growers Supply Company	*Kelly Conner*
Klamath National Forest	*Brian Thomas*
USDA/Natural Resource Conservation Service	*Charlie Diehl* *Ayn Perry*
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Vision Statement, page 2-2	*George Williamson, Planwest Partners*
Watershed Characteristics, page 4-5	*Jay Power*
Fisheries, page 6-1	*Danielle Quigley*
Fisheries, page 6-9	*Sari Sommarstrom*
Fire, page 14-1	*Rhonda Muse*

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B. Funding Sources
C. SRWC/RCD Project List 1992-2002
D. 2003 Active Projects List
E. CRMP Final Reports 1992 through 1999
F. SRWC Final Report July 2003
G. GIS database layers
H. Assessment Data
I. Fish Population and Habitat Plan, 1997
J. Fish Population and Habitat Plan Additional Data, 2003
K. Fall Flows Action Plan, 1999
L. Fall Flows Action Plan Accomplishments, 2003
M. SRWC Monitoring Plan, draft 2003
N. Table of Limiting Factors for coho salmon and other species (in progress)

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1. Introduction and Approach

The Scott River Watershed Council (SRWC) has developed this Plan for the Scott River watershed for the purpose of cooperatively establishing a common strategy for restoration and management actions. Thus, the Scott River Watershed Strategic Action Plan (SAP) will form the basis for setting priorities for future projects and practices to be supported by the SRWC, the communities within the watershed, and the many funding sources.

The SRWC is supported in its current efforts to develop a comprehensive watershed restoration plan through funding provided by the Klamath River Basin Fisheries Task Force (KRBFTF), California Department of Fish and Game (CDFG), the State Water Resources Control Board (SWRCB), and the Cantara Trustee Council (CTC). Included in the SAP are identified goals, priorities, and strategic actions that will be used to develop projects and studies.

Oversight of the planning process is the responsibility of the SRWC. The SRWC provides a multi-interest effort to cooperatively seek solutions, to help manage local resources, and to solve related problems. The primary role is to inform the community on resource issues, to aid in resource management, and to recommend to the Siskiyou Resource Conservation District (RCD) prioritized project opportunities in the Scott River Watershed for funding and implementation.

Setting
The Scott River is located in Siskiyou County, in a sparsely populated area of northern California approximately 41 miles south from the Oregon border. Scott Valley's two incorporated areas are Etna and Fort Jones, and the valley's three unincorporated towns are Callahan, Greenview, and Mugginsville/Quartz Valley. Etna and Fort Jones are small retail and residential centers that provide the basic commodity needs of valley residents.

Context
From its earliest human settlement until the present day, the natural resources of this watershed have played a major role both in peoples' decision to move here as well as why they choose to stay. Over time the value of these resources has transcended the purely economic or survival value of food production and raw materials. Considerable significance, both economic and what might be best termed "spiritual", is now placed on the intrinsic aesthetic qualities of all aspects of the watershed, including the human communities that have evolved within it. This evolution has led to many challenges associated with resource management in the Scott River watershed.

Complex and potentially divisive interrelationships exist between scientific, economic, cultural, aesthetic, legal and governmental issues. The complete puzzle does not render itself to solution wherein any single interest or discipline dominates the diverse voices at the table.

In particular recognition of this latter fact, the Scott River Watershed Council (SRWC), in cooperation with the Siskiyou Resource Conservation District (RCD), has undertaken the development of this Strategic Action Plan for the Scott River watershed. The SAP will incorporate, to the greatest practical degree, the needs and desires of the various stakeholders into a plan whereby their interests in the natural resources of the area can best be satisfied to the intended benefit of all.

1. INTRODUCTION AND APPROACH

Adaptability, flexibility, education, cooperation and tolerance as well as the hard facts of science and law must be combined in a manner that allows both the human and natural communities to thrive. It is in pursuit of achieving these factors that this plan has been developed.

Primary Focus

Major concerns within the watershed presently focus on water quality and salmon and steelhead (anadromous salmonid) populations. Water quality of the Scott River system was listed as "impaired" for sediment and temperature under Section 303(d) of the Clean Water Act by the North Coast Regional Water Quality Control Board and the U.S. Environmental Protection Agency (EPA) in 1997**.** It is believed that the water quality has also affected the habitat of anadromous salmonids populations in the Scott River watershed. Secondly, coho salmon in the region were listed as threatened under the federal Endangered Species Act (ESA) in 1997 by the National Marine Fisheries Service (NMFS) and also the California Fish and Game Commission determined that coho salmon warranted listing in 2002.

These current resource "crises" require this Plan to examine the anadromous salmonid and stream habitat quality issues in more detail at this time. Other issues were also identified and considered important by the Council and community, but they will be addressed in the next phase in a few years (see below). These issues include: upland vegetation conditions, fuel management, wildlife, and economic development that will encourage best management practices for the benefit of the watershed and the community.

Goal of Plan

The goal of the ***Scott River Watershed Strategic Action Plan*** (SAP) is to *'improve the effectiveness of natural resource management and enhancement by assessing the condition of the watershed and by providing optimum implementation strategies with full consideration of the custom, culture, and economic well-being of the citizens of the community'*. The SAP is a working document and is being developed through the integration of existing watershed-wide data, plans, assessments and references into a comprehensive work-set. Since much of the information needed to evaluate the condition of the entire watershed is still in process or has not yet begun, the SAP will be completed in phases. Due to recent developments in the Klamath basin and the issues regarding anadromous salmonid populations, the intent of the initial phase of the SAP is to provide the Scott River Watershed Council with an assessment of conditions and establish guidelines for developing and prioritizing restoration projects that will benefit anadromous salmonids as well as identify critical gaps in watershed-wide restoration. The approach for completing the planning process consists of several phases that build upon information gathered from historical data, recent watershed assessments, and multiple planning workshops.

1. INTRODUCTION AND APPROACH

Phased Planning Process & Schedule
The timeline and description of the planning phases is as follows:

Phase	Due Date	Description
Initial	1/31/2004	Assessment of historical and current conditions for each topic as they relate to anadromous salmonids. Develop strategic actions to address those issues as well as identify critical gaps in watershed restoration.
Second	12/31/2005	Design and implement specific projects that will accomplish the immediate-term strategic actions defined in the initial phase. Prioritize other SAP topics with consideration to items identified in the Outstanding Issues/Questions section, gather information/data, and begin planning for the highest priorities. Add status indicators for all strategic actions and update supporting data. Set up tracking process using a newly developed Restoration and Conservation Information Management System.
Third	12/31/2007	Design and implement specific projects that will accomplish the short-term strategic actions, and new actions as defined during the second phase. Gather information/data needed and begin planning for topics identified as having a lower priority during the second phase. Begin implementation of strategic actions linked to higher priority topics specified in the second phase. Add/update status indicators for all strategic actions and update supporting data.
Fourth	12/31/2010	Design and implement specific projects that will accomplish the mid-term and long-term strategic actions. Begin implementation of strategic actions linked to lower priority topics defined in the third phase. Add/update status indicators for all strategic actions and update supporting data.

Description of the Scott River Watershed Council

In September 1992, the Siskiyou Resource Conservation District (RCD) sponsored the Scott River Watershed Coordinated Resource Management Planning (CRMP) Committee for the purpose of being proactive in developing cooperative solutions to resource management issues in Scott Valley, in particular the potential listing of salmon and steelhead stocks under the ESA. This initial group adopted, and later amended several plans: Fall Flows Action Plan (1995, amended 1999); Fish Habitat and Population Action Plan (1995, amended 1999). Each of these plans had objectives and numerous tasks. The overall goal was: "Seek coordinated resource management in the Scott River watershed which will produce and maintain a healthy and productive watershed and community." . Between 1994 and 1999, the CRMP and RCD worked closely in developing and implementing many projects, with the funding assistance of state, federal and private participants. The final reports for CRMP activities from 1992 through 1999 can be found in Appendix E.

The CRMP was dissolved on November 16, 1999 in order to restructure. On that same date, and for the same purpose, the Scott River Watershed Council (SRWC) was developed and established guiding principles and objectives and bylaws. It also adopted as its own the products that the previous CRMP had developed. Together, with the RCD, the SRWC works cooperatively to monitor the effectiveness of implemented programs, plans, and projects. Members serve as individuals and do not speak for organizations or agencies. Agency representatives are present, but serve only in an advisory capacity. Funding for the coordination of the SRWC/CRMP has been provided by the KRBFTF and CDFG. The most recent final report dated July 2003 is available in Appendix F.

The SRWC has structured five (5) Standing Committees, made up of interested community volunteers, to discuss issues and restoration needs. These committees are: Fish, Land, Monitoring, Outreach, and Water. Each committee may use whatever decision-making process that works best within the committee group and selects, or elects, one member as its representative to serve and vote on the Executive Committee. Four or five permanent core members are preferred among the Standing Committees. Each Standing Committee will receive and develop project ideas from the community. The project ideas are then presented to a Technical Committee for help in project development and evaluation of merit.

Technical Committee member composition consists of expertise from biological, economic, hydrological, and as many more disciplines as deemed necessary. Participants are selected by the Executive Committee.

The Executive Committee consists of the SRWC chair, plus the chair or delegated representative from each of the five (5) Standing Committees. This committee is responsible to provide final decision making for project prioritization with input from Technical Committee and full SRWC membership, present finalized project proposal recommendations to RCD or other appropriate entities for funding and implementation, and has final approval of project ranking criteria and planning documents.

Projects and Programs: The RCD has been implementing various restoration and conservation projects since its inception in 1949 (formerly called the Siskiyou Soil Conservation District). The volume and type of projects have increased since the SRWC, formerly the Scott River CRMP, was formed in 1992. Project categories are used to help manage the various kinds of projects. A recent effort to categorize projects has resulted in the following classifications:

Project Categories:	***Project Types:***
Fisheries	Management – Protect and manage what exists
Wildlife	Enhancement – Make improvements
Water Quality	Assessment – Evaluate condition
Water Supply	Monitoring – Record what happens
Riparian Zone	N/A – Not applicable
Land	
Planning/Coordination	
Outreach & Public Relations	

Each project is assigned a primary category and at least one type indicator. It is possible that projects will also be assigned secondary and tertiary categories in the event the project should be cross-referenced for multiple purposes. For a complete list of current and past projects, listed by category, refer to Appendix C and D.

2. Overview

Since the inception of the CRMP in 1992, community volunteers have worked towards improving conditions of the watershed. Volunteer efforts continue to provide the majority of project development under the current format of the SRWC. The committees of the SRWC have developed several planning documents as well as provided reports that indicate accomplishments that have been made possible through contributions of the many cooperators. For a complete review of these documents, refer to the Appendices section.

Prior to 1992, and continuing today, the RCD strives towards encouraging and implementing conservation practices within the watershed. Originally the Soil Conservation District, the RCD has developed and implemented several projects geared toward conserving the natural resources of the watershed.

Areas of opportunity include the following restoration and conservation accomplishments:

- Bank stabilization
- Fish passage and screening of diversions
- Riparian fencing and planting
- Alternative stock water systems
- Public education
- Habitat improvements and studies
- Flow studies and monitoring
- Erosion studies
- Temperature monitoring
- Tail water return systems
- Road reconditioning

Taking into consideration the past experiences of the SRWC and the RCD, the current planning process builds upon those efforts to accommodate the need for moving to the next step in identifying what is needed and how it may be accomplished.

Overall Goals and Objectives

Based on studies and knowledge of the restoration and conservation topics, the SRWC has developed a comprehensive strategy for identifying the next steps required for attaining the desired future condition of the watershed. The SRWC has looked at establishing the desired outcome and what it will look like in approximately 25 years (Vision Statement), the function of the SRWC and its purpose (Mission Statement), and a process that will accomplish the restoration activities (Project Planning). Goals, objectives, and strategic actions related to topics of interest are defined within each topic throughout this document.

Mission Statement

The SRWC's mission is to "promote a watershed-wide effort to manage and enhance the natural resources, to protect open space and a resource-based economy, and to seek mutually beneficial solutions to natural resource use through education and a voluntary collaborative community process".

2. OVERVIEW

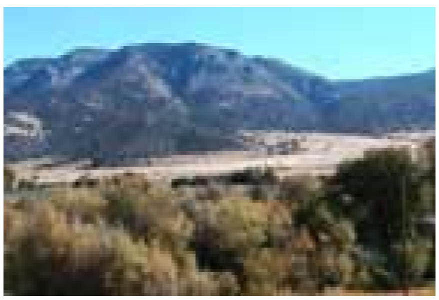
Vision Statement

[photos by George Williamson, Planwest Partners]

SCOTT RIVER VALLEY 2025: WHERE WE WANT TO BE *Approved - November 19, 2002*

Communities

The Scott River watershed communities are prosperous and the area's rural historic character is preserved for future generations. The watershed's precious open spaces, natural resources, and water sources are preserved. Successful community growth, development, and economic diversification emphasize stewardship and compatibility with the area's quiet, traditional, pastoral environment. Scott River watershed communities are known for their healthy, enriching quality of life for persons of all ages. The community is cohesive, and there is respect for the independent lives of others.



Watershed

The watershed is healthy, effectively managed, and well-functioning. Innovative, highly efficient irrigation and water storage systems enhance balanced use of water supplies for community, agricultural, fisheries, and recreational needs. Agencies and the community jointly monitor watershed health.

The River System

Water quality and fish habitat are renowned for their excellence. The SRWC, RCD, and landowners collaborate on successful voluntary, cooperative projects to enhance and maintain river system health. The SRWC monitors water flows to improve water quality and quantities for fish runs and irrigation. The river corridor is a vibrant, well-shaded, healthy riparian environment.

Economy

The Scott River community is a net exporter of diverse goods and services. Their economic model successfully balances harvesting, resource management, and entrepreneurial opportunities. Technological infrastructure enables rural-based businesses to interact easily with the world at large.

Natural Resources

Local leadership is consulted on all natural resource decisions. Local commitment to best management practices assures optimal levels of fish and wildlife populations and plant species diversity. Sound agricultural, forestry, water, and fisheries management enable the watershed's traditional, natural-resource-based businesses to flourish.

2. OVERVIEW

Regional & Agency Coordination

AGENCY PARTNERSHIPS

Partnerships with various entities have been instrumental in the implementation and accomplishments made in the Scott River watershed. In addition to providing funds and in-kind contributions, partners have given support by participating in SRWC planning and working committee meetings.

Coordination of the SRWC is supported through funding provided by the following entities:

Klamath River Fishery Restoration Program – US Fish and Wildlife Service
California Coastal Salmon Recovery Program – California Department of Fish and Game

Funding for specific restoration projects, monitoring and assessments have been provided by the following entities:

California Department of Fish and Game
Cantara Trustee Council
Dean Witter Foundation
Department of Water Quality
Farm Services Agency
For Sake of the Salmon
Jobs-In-The-Woods
Klamath River Basin Fisheries Task Force
Klamath National Forest
National Fish and Wildlife Service
National Marine Fisheries Service (NOAA Fisheries)
Natural Resource Conservation Service
Pacific States Marine Fisheries Commission
Siskiyou County Fish and Game Commission
State Water Resources Control Board
US Bureau of Reclamation
US Fish and Wildlife Service
UC Sustainable Agriculture Research and Education Program
Wildlife Conservation Board

MULTI-AGENCY COORDINATION

A quarterly forum (known as the Scott Quarterly Information Forum - SQIF) has been established to meet and discuss the issues and solutions surrounding restoration activities in the Scott River watershed. In addition, participants will provide information regarding laws and regulations as they relate to watershed restoration. The forum invites State and Federal agencies, local landowners, timber companies, and interested groups. Agency representatives provided 51% of the hourly contribution to this forum during 2003 (see Figure 2-2).

The intent is to develop an understanding of common goals, to coordinate activities through a combined effort, and to provide a cooperative forum for effective communication.

2. OVERVIEW

The goals for the SQIF are:

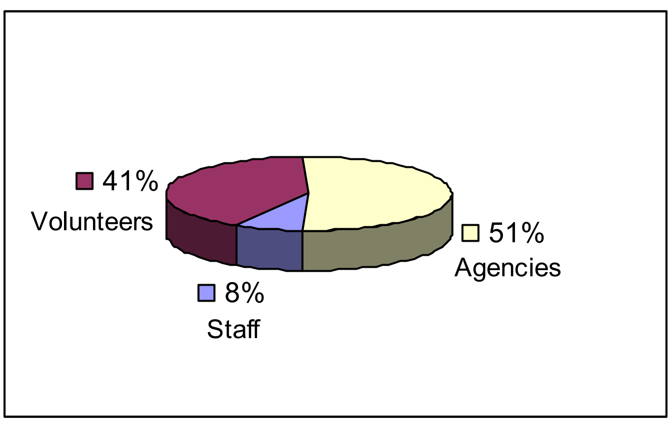
To provide a forum where representatives can share information about current or future watershed projects, regulatory requirements, and discuss topics that have the potential for public comment.

In addition to information sharing, this forum will be used to identify obstacles and possible solutions, chart common projects having the potential of data sharing and coordinated efforts, and to document accurate and pertinent project information for public knowledge.

Figure 2-1: Hourly Contribution for SQIF meetings in 2003, excerpt from the SRWC Time Contribution Report

By Month:		***Quarterly Forum:***		
Year	***Month***	***Staff***	***Vol***	***Agency***
2003	Jan			
2003	Feb			
2003	Mar			
2003	Apr	11.00	42.00	55.00
2003	May			
2003	Jun			
2003	Jul	5.00	40.00	20.00
2003	Aug			
2003	Sep			
2003	Oct		4.25	34.00
2003	Nov			
2003	Dec			
TOTAL		**16.00**	**86.25**	**109.00**

Figure 2-2: Percent of Hourly Contributions for SQIF, 2003



2. OVERVIEW

ANNUAL TIME CONTRIBUTIONS

Agency contributions provide approximately 38% of the total annual hours the SRWC spends on the development of studies and on-the-ground projects. Actual hours contributed during fiscal year 2002-2003 are specified in Figure 2-3.

Figure 2-3: Percent of SRWC Annual Hours, SRWC Time Contribution Report

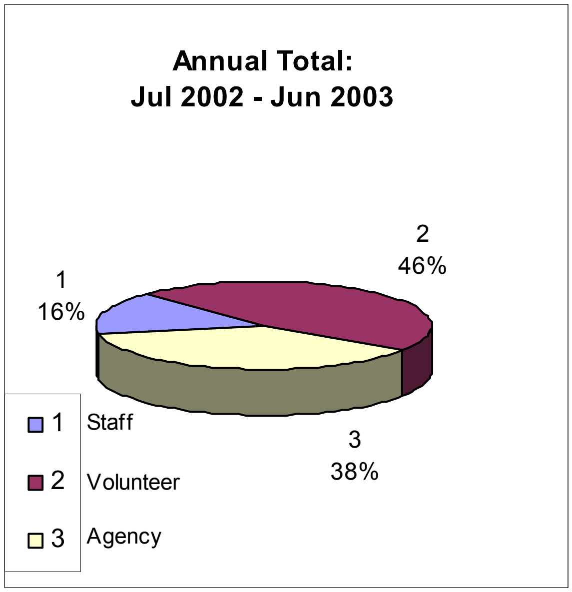


Figure 2-4: Hourly Contributions for SRWC Meetings, FY 2002-2003

By Month:		Montly Meetings:			Quarterly Forum:			Summary of Totals:		
Year	Month	Staff	Vol	Agency	Staff	Vol	Agency	Staff	Vol	Agency
2002	Jul	25.00	66.50	37.50				25.00	66.50	37.50
2002	Aug	10.00	34.00	43.00				10.00	34.00	43.00
2002	Sep	18.00	41.25	26.50				18.00	41.25	26.50
2002	Oct	8.75	39.25	52.25				8.75	39.25	52.25
2002	Nov	9.25	36.50	26.50				9.25	36.50	26.50
2002	Dec	10.75	33.25	21.75				10.75	33.25	21.75
6-mos subtotal:		***81.75***	***250.75***	***207.50***	***0.00***	***0.00***	***0.00***	***81.75***	***250.75***	***207.50***
2003	Jan	20.00	67.00	58.50				20.00	67.00	58.50
2003	Feb	27.00	64.00	42.25				27.00	64.00	42.25
2003	Mar	14.00	47.75	34.25				14.00	47.75	34.25
2003	Apr	26.00	62.00	50.00	11.00	42.00	55.00	37.00	104.00	105.00
2003	May	12.50	55.50	17.00				12.50	55.50	17.00
2003	Jun	12.25	23.00	31.25				12.25	23.00	31.25
6-mos subtotal:		***111.75***	***319.25***	***233.25***	***11.00***	***42.00***	***55.00***	***122.75***	***361.25***	***288.25***
TOTAL		**193.50**	**570.00**	**440.75**	**11.00**	**42.00**	**55.00**	**204.50**	**612.00**	**495.75**

2. OVERVIEW

Accomplishments (New 10-31-2005)

RESOURCE PROGRAMS: OBJECTIVES and ACCOMPLISHMENTS

- **COMMUNITY AWARENESS AND EDUCATION:**
  - The Scott River Watershed Council is a citizens advisory group to the RCD, coordinating restoration efforts to improve and protect conditions in our watershed.

  - **ACCOMPLISHMENTS:**
    - **12+ years of Scott River Watershed Council activities including sub-committee and public meetings.**
    - **Educational workshops & speakers throughout the year regarding resource issues of interest to the community.**
    - **Newsletters & articles on events and activities.**
    - **Advertising brochure highlighting events of past 10 years and listing future endeavors.**
    - **Watershed Education Program**
    - **Scott River Watershed Council & Siskiyou RCD websites; established domains and updated content: www.scottriver.org and www.siskiyourcd.org**
    - **Scott River Watershed Council postcard.**
    - **Scott River Watershed Council brochure describing organization.**
    - **Development of the Scott Valley Fire Safe Council**

- **WATER CONSERVATION:**
  - Efficient Irrigation and Stock Watering Systems
  - Improving Irrigation systems and management
  - Working with Irrigation District and ditch owner
  - Seeking better understanding of watershed hydrological balances.
  - Increase the instream flow of water available during low flow periods.

  - **ACCOMPLISHMENTS:**
    - **Stock water systems - 12 completed resulting in 11cfs of flow returned to the river, and more systems awaiting funding approval.**
    - **In the process of developing a water balance to graphically map where the water comes from and where it goes.**
    - **Evaluating the ground water and surface water recharge effects of the irrigation ditches (Wolford Slough Project).**
    - **Identified minimum adequate flows needed for a self-sustaining fall Chinook population.**

- **Constructed and evaluated temporary flow modification structures (Beaver Dams Demonstration Project).**
- **Pursued upland vegetation management to enhance water supply and timing (treatment project at Scott River Ranch).**
- **Emergency flow release in 2002.**
- **Encouraged monitoring of water usage through gauging of diversions and pumps (DWR Watermaster).**
- **Began implementation of the Sugar Creek Flow Enhancement through Diversion Piping project to improve the efficiency of water conveyance through ditches.**
- **Exploring options to develop and pursue economic incentives to improve the efficiency of all water delivery systems, including irrigation (Scott River Water Trust).**
- **Exploring water rights implications of conserving water through increased efficiencies (Assessment of the Scott River Flow Enhancement Options).**

- **WATER QUALITY AND SOIL EROSION REDUCTION:**
  - Removing or reducing sources of water quality impairments
  - Promoting riparian zone protection and improvement through fencing and revegetation
  - Increasing cooperators knowledge regarding proper land use management.
  - Monitoring water quality to ensure local knowledge of its condition.
  - Reduce soil erosion from timberlands, roads, stream banks, croplands, and rangelands.
  - Encouraging proper rangeland management, forestry practices, road improvements and maintenance.
  - Promote riparian zone protection and improvements including instream structures to reduce stream bank erosion.

➢ **<u>ACCOMPLISHMENTS:</u>**

- **Stream bank protection - 17,150 feet have been protected.**
- **Instream habitat improvement structures – 313+ structures.**
- **Riparian planting - 175 acres have been planted to pine, cottonwood and willows.**
- **Riparian fencing - over 90% of Scott River and miles of tributary have been fenced.**
- **Roads inventoried – 400+ miles.**
- **Road restructuring - 127miles of road erosion reduction out sloping, culvert removal, and rocking.**
- **Decommissioned roads – 19.2 miles both public and private.**
- **Sediment studies – 1998 and 2000.**
- **Water Balance – Phase 1, year one completed in 1999. Currently in process for designing graphical maps as a model for the Scott River watershed.**

2. OVERVIEW

- **Moffett Creek Upland Gross Assessment**

- **FISHERIES & WILDLIFE HABIT IMPROVEMENTS:**
  - Prevent fish loss in diversions ditches
  - Promote riparian zone protection and improvement
  - Encourage proper land and water management.

  - **<u>ACCOMPLISHMENTS:</u>**
    - **Diversion fish screening – 60+ completed with maintenance.**
    - **Adult Coho Spawning Surveys – 2002, 2003, 2004 and 2005**
    - **Ongoing habitat assessments improvement projects (i.e. Spawning Gravel Development and Summer Rearing Habitat Utilization).**
    - **Ongoing riparian restoration projects including inventory and evaluation.**
    - **Fish passage and geomorphic restoration projects.**

- **MONITORING PROJECTS:**
  - **Photo-point**
  - **Macroinvertebrate assessments – data collected through 2005**
  - **Temperature monitoring – data collected from 1995 to 2005.**
  - **Flow gauges installed – data collected through 2005**

- **PLANNING PROJECTS:**
  - **Scott River strategic action planning and assessment.**
  - **Scott River water trust program.**
  - **Limiting Factors Analysis for coho and other fish species.**

3. IMPLEMENTATION STRATEGY

The SAP begins as a compilation of the previous planning documents implemented by the various standing committees of the SRWC. The various planning documents can be found in their entirety within the appendices. The focus of the SAP is to provide a 'blueprint' for implementing restoration projects, and over time will replace the previous planning documents as each goal and objective are addressed. The SAP is a working document that will be updated in phases as defined in section 1, Introduction and Approach.

Strategic actions are identified in each topic section and specify a priority indicator of high, medium, or low and the term of accomplishment (timelines of 2 to 50 years) for completing the action. In the event funding is not available within the term the accomplishment may represent the completion of a well-defined project proposal. Each strategic action is further defined with expected outcome, duration, and pre-requisites under the section titled *Developing Strategic Actions.* This will provide a mechanism for taking a controlled approach to completing project-specific workplans. In many cases a pre-requisite for completing a strategic action may include the completion of another strategic action.

Using the priority indicator, as documented for each objective, and the term of accomplishment, prioritization and a timeline can be established for developing specific projects and studies. Each strategic action is assigned an alpha-numeric indicator that will be used for tracking progress and links them to the appropriate standing committee responsible for development. The format for the alpha-numeric indicator is described at the end of this section.

Community Process Issues

Data vs. Action: In identifying natural resource issues and developing management strategies, it is imperative that great effort is made to discuss the issues with as much credible input as possible. Actions must be in proportion to site-specific data. Though standards in this regard are virtually impossible to establish, incorporating "action in proportion to evidence" is an underlying principle of this strategic plan.

Science: Actions arising from a community-supported strategic plan must be developed and prioritized on the basis of scientific evidence that is compelling to the bulk of the experts and community.

Limitations: A community-developed strategic plan will only be as effective as community support and governing regulation allows it to be. We must strive to insure to the greatest practical degree that action is guided by sound information that will promote community confidence. This therefore demands strict adherence not only to the lawful rights of the citizenry, but as well to the genuine consideration and courtesy upon which community cohesion depends.

3. IMPLEMENTATION STRATEGY

Project Planning

The project planning concept used in the development and implementation of the SAP is to 'provide the most accurate, extensive and compelling scientific background possible, for identifying issues and actions relative to natural resource management on the Scott River watershed'. The purpose of this process is to identify the current conditions of the watershed and indicate the best methods for improving them. The SRWC will use the following steps as a tool for developing the work plan associated with restoration projects:

1. Define the process for completing projects based on the Plan
   - Identify what we have
   - Identify what we need
   - Identify how we get there (gap fill)
2. Consider specific restoration projects to accomplish the strategic actions by referencing committee level plans.
   - Review and update existing plan data
   - Compile missing information and obtain approval from the Council
   - Confirm SRWC's adoption of existing plans, and obtain approval of information if necessary
3. Encourage best management techniques.
   - List what has worked in the past
   - List what has not worked in the past (locally and in other areas)
   - Identify areas of improvement
   - Research accomplishments of other watersheds
4. Seek funding when necessary for the implementation, maintenance and monitoring of projects.
   - Research grant opportunities for implementing projects that are consistent with the purpose of the project
   - Research grant opportunities specific to monitoring programs and maintenance of existing projects
5. Coordinate and combine baseline data collection.
   - Obtain a list of 'tools' used by agencies, in order to conform to a common format
   - Develop a database to maintain a current list of available data by program category and type as defined at the RCD
   - Develop protocols for obtaining and handling data
6. Gather, organize and compile data in a useable format, beginning with public information.
   - Obtain common formats used within the various agencies
   - Identify 'best fit' of formats used within the SRWC and RCD
   - Compile standard format where feasible
7. Provide education to the community.
   - Continue workshops and educational or outreach events that are specific to restoration projects
   - Highlight project accomplishments in public presentations and newsletters

3. IMPLEMENTATION STRATEGY

Restoration Planning

Each SRWC standing committee, Fish, Land, Monitoring, Outreach, and Water, has developed a set of goals and objectives specific to their area of responsibility. The committees then added strategic action items that would assist with achieving the objectives. These will be identified within each restoration topic found in this document and will indicate the originating committee for the purpose of integrating previous planning documents (See Appendices List for identification of previous planning documents).

For the purpose of tracking progress, the goals are numbered and preceded with an alpha indicator of the originating standing committee. The alpha indicator allows the SRWC to link the goal back to previous planning documents.

Alpha Indicators:

F = Fish Committee
L = Land Committee
M = Monitoring Committee
O = Outreach Committee
W = Water Committee

The objectives have been prioritized for the purpose of implementing the initial phase of the SAP using high, medium, and low indicators that will assist the SRWC in making decisions for implementing projects and studies. The criterion is based on education or production of habitat or species population.

Prioritization ranking of the objectives was accomplished by setting numeric standards and having individual SRWC members rank each objective. An average value was then calculated using the number of responses indicating a score above zero (0).

Ranking Values Used:

0 = Not enough info or knowledge to rate

1 = Immediate negative impact on education or production of habitat or species population

2 = Will have negative impact on education or production of habitat or species population over time

3 = No change in the education or production of habitat or species population

4 = Believed increase in the education or production of habitat or species population over time

5 = Believed to have an immediate increase in education or production of habitat or species population

3. IMPLEMENTATION STRATEGY

Results of ranking are then translated as follows:

0 – 2.9	=	Low Priority
3 – 4.4	=	Medium Priority
4.5 – 5	=	High Priority

Each Strategic Action is identified with a code that will be used as a link to the section *'Developing Strategic Actions'*.

Description of Strategic Action code:

Sample: X – 1 – A . a

X = Originating Committee (alpha indicator)

1 = Numeric indicator of the Goal

A = (Upper case) Alpha indicator representing the Objective for the related Goal

a = (Lower case) Alpha indicator representing the Action Item

3. IMPLEMENTATION STRATEGY

Updating the SAP

As the SRWC works to implement the SAP and begins development of future phases, proposed changes to the document are expected. The SAP will always be a *living document*.

Process

Changes to information will be identified and/or discussed within the five standing committees (see Section 1 for details about the structure of the SRWC) then presented to the SRWC at large for consideration about how to proceed with the suggested change (i.e. research, technical review, community input, etc.). The RCD would be advised of the existence of proposed changes by a SRWC representative at its next meeting

After a thorough review by the committees has been fulfilled, the proposed change would then come up for discussion and vote at a subsequent SRWC meeting provided there is a quorum of the Executive Committee. In the event a quorum is not present, the Executive Committee would then vote on it at its next meeting with a report at the following SRWC meeting.

Following final Executive Committee action, the Executive Committee would then report/recommend the outcome to the RCD at its next scheduled meeting.

Frequency

Actual document modification with the approved changes will occur on an annual basis in the form of addendums. For consistency, the addendums will be completed by June of each year beginning in 2005. If time permits, or there is an immediate need to insert an addendum prior to this time period, a frequency shorter than the annual update is acceptable.

Format

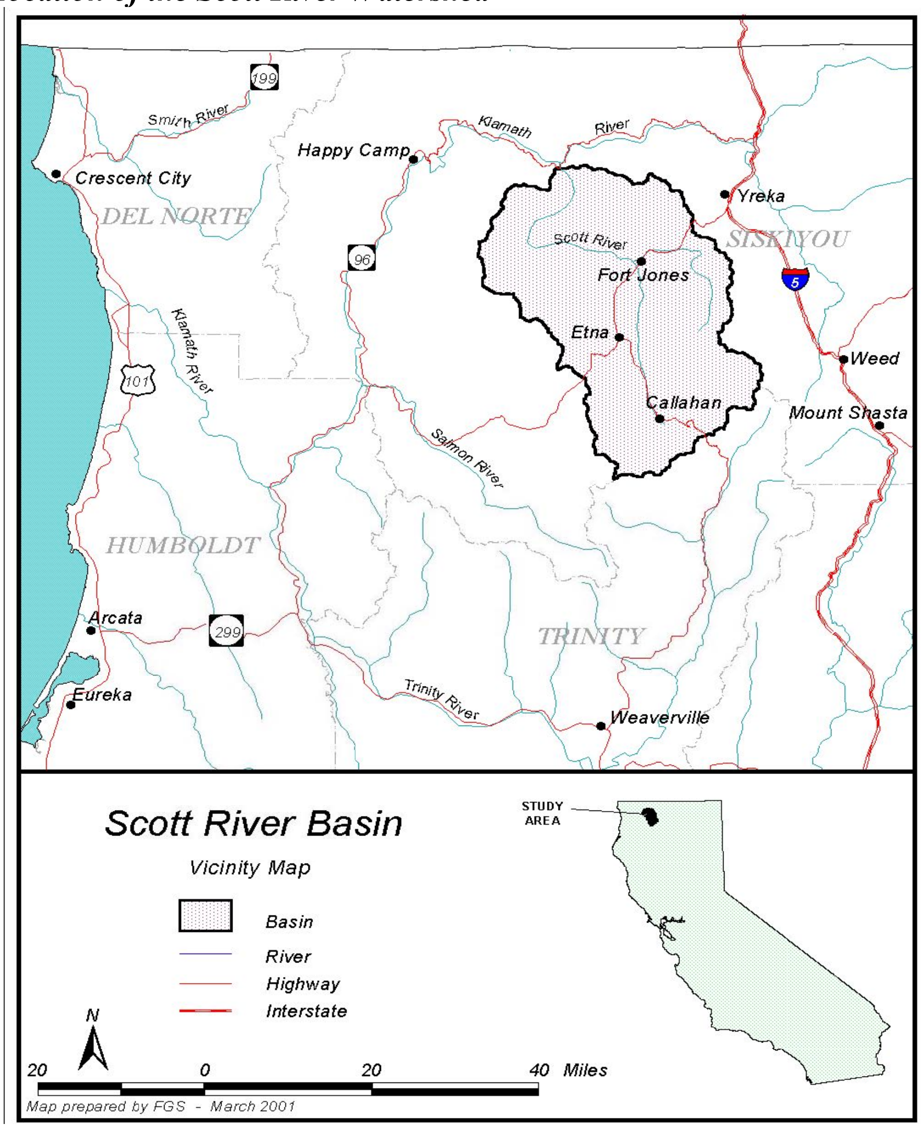
Document changes will be inserted within each section and titled as an addendum to that section. The table of contents (Contents by Section) will indicate when an addendum is present. Each addendum will be dated and clearly identified within the table of contents and relevant sections.

4. Scott River Watershed

Location

The Scott River is part of the Klamath Mountain Province, which encompasses land in both Southern Oregon and Northern California, and is one of four major tributaries of the Klamath River, entering the Klamath at River Mile 143, at an elevation of 1,580 feet (482.6 m). The Scott River watershed is a large area with substantial variation in geology, geomorphology, and climatology. The watershed drains approximately 520,617 acres (812.2 mi^2 or 2,107 km^2). Major tributaries to the 58 mile long Scott River in the Scott Valley include: Shackleford / Mill, Kidder, Etna, French, and Moffett Creeks, and also the South and East Forks. Native vegetation consists of riparian vegetation along the streams, mixed-conifer forest on the western mountain slopes, with scattered meadows and brush, while the eastern mountains are covered by extensive areas of brush, oak, western juniper, and both annual and perennial grasses.

Figure 4-1: Location of the Scott River Watershed



4. SCOTT RIVER WATERSHED

Topography, Precipitation, & Climate

The Scott River drainage is bordered to the west and south by 7,000 to 8,000 foot (2,134 to 2,438-m) elevation mountain ranges: the Marble, Salmon, Trinity Alps and Scott Mountains. These ranges exert a strong orographic effect on incoming storms, which allows the higher elevation mountains, along the west and south side of the Scott drainage, to receive 60 to 80 inches (152 to 203 cm) of precipitation annually. In contrast, the rain-shadow effect that the west-side mountains create reduces the amount of annual precipitation to 12 to 15 inches (30.5 to 38.1 cm) on the eastside of the watershed.

The elevation of Scott Valley ranges from 3130 feet at Callahan in the southern end, to 2747 feet at Ft. Jones near the valley center, to 2620 feet at the north end. The mouth of the Scott River below Scott Bar is at 1600 feet. The area experiences distinct seasons of a Mediterranean type. Predominant weather systems are from the northwest with diminishing levels of precipitation as systems spread southeast.

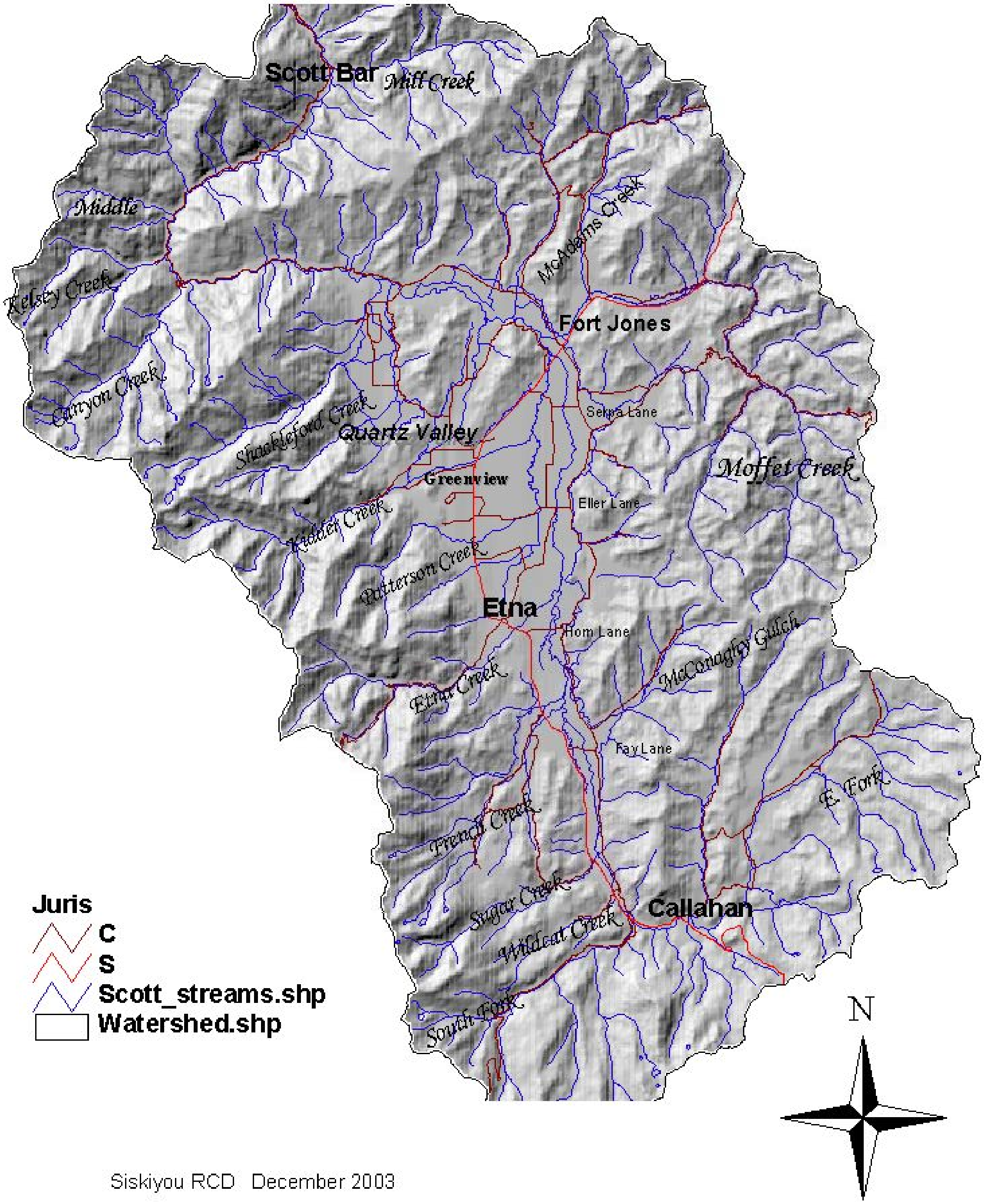
Air temperatures in Fort Jones range from a mean of 69.7^{o}F (20.9^{o}C) in the summer to a mean of 32.9^{o}F (0.5^{o}C) in the winter. The Scott River is an inland drainage with hot dry summers. Summer temperatures commonly exceed 100 F during a four-week period including later July and early August.

Average annual precipitation for the entire Scott River watershed, including high and low elevation areas, is 36 inches (91 cm). Fort Jones, located at the northern end of Scott Valley, has averaged 21.8 inches (55.7 cm) since records began in 1936. Rainfall has ranged in Fort Jones from 10.1 inches (1949) to 35.07 inches (1970), showing the wide variation that can occur. Most of the precipitation in the Scott River watershed falls on the west side, with snow prevailing during the winter above the 5,500 foot level. Snowfall is an important component of the precipitation.

4. SCOTT RIVER WATERSHED

Overview of Watershed Characteristics

Figure 4-2: Sub-Watersheds (Tributaries) of the Scott River Watershed



4. SCOTT RIVER WATERSHED

Mainstem Scott River:

The Scott River is 58 miles long and is one of the four major tributaries to the Klamath River contributing about 5% of the entire Klamath's runoff (yearly average of 615,000 acre feet). The forks of the Scott River begin high in the Trinity Mountains. At their confluence, the Scott River meanders thru a wide open agricultural valley (Scott Valley). The river then descends into a canyon carved along the eastern edge of the Marble Mountains before reaching the Klamath River. The Scott River remains one of California's most scenic rivers.

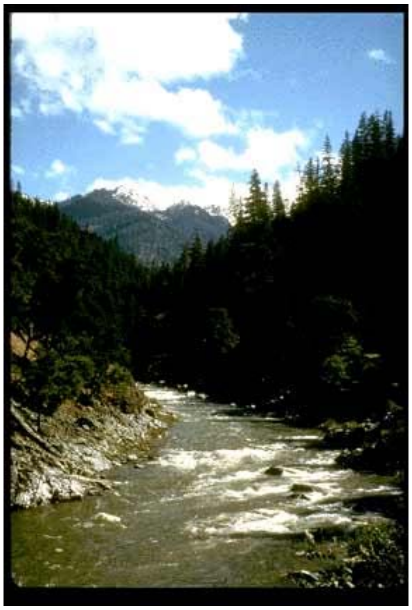
Figure 4-3: Runoff, Yield, and Basin Areas for the Klamath Watershed (National Academies Press, 2003)

Location	Average Annual Runoff, 1000 acre-ft	Drainage Area, mi^2	Runoff, %	Drainage Area, %	Ratio of Average Runoff to Drainage Area, acre-ft/mi^2
Klamath River below Iron Gate Dam	1581	4630	12	38	341
Shasta River near mouth	136	793	1	7	172
Scott River at mouth	615	808	5	7	761
Other tributaries	615	709	5	5	867
Klamath River below Scott River	3020	6940	23	57	435
Indian Creek at mouth	360	135	3	1	2667
Salmon River at mouth	1330	750	10	6	1773
Other tributaries	1350	650	10	5	1500
Klamath River at Orleans	6060	8475	47	70	715
Trinity River at Hoopa	3787	2950	29	24	1283
Other tributaries	3021	675	23	6	4476
Klamath River at mouth	12868	12100	100	100	1109

[a]Data compiled from reports of the California Division of Water Resources 2002, representing average current conditions (including depletion caused by consumptive use) and gage records of the U.S. Geological Survey. Periods of record for data vary by site from 22 to 50 yr, principally between 1951 and the present, and include both pre- and post-Trinity River Diversion operations.

4. SCOTT RIVER WATERSHED

Characteristics of the mainstem Scott River can generally be described using five reaches;



This picture was taken in the canyon area of the Scott River. [photo by Jay Power]

- From Callahan to French Creek the river is wide and dominated with large cobble and consists of pools greater than 3 feet deep which provide optimum habitat.
- From French Creek to Hartstrand Gulch the river is low gradient, gravel dominated and provides riffle habitat.
- The river's substrate from Hartstrand Gulch to Fort Jones is dominated with sand.
- From Fort Jones to the canyon, the river is wide and dominated with sand and gravel.
- The canyon area to Scott Bar/Klamath River is a moderately steep gradient, bedrock-entrenched channel. Once reaching Scott Bar, the river is characterized by a flat gradient channel with broad vegetated floodplain.

Valley Region - Upslope Characteristics:
The northern, western and southern mountains surrounding Scott Valley area are covered with mixed conifer forested stands with mixed hardwoods and complex plant and animal life. The eastern mountains are covered more with annual and perennial grasses, shrubs and foothill transition type grading to conifer stands dominated by ponderosa pine. Streams, lakes and the Scott River provide water for wildlife, including steelhead and salmon, irrigation and recreation.

For further characterization, the sub-watersheds of the Scott River watershed are divided into 6 geographical regions. These regions have been identified as; East Headwaters (East Fork above Callahan), West Headwaters (South Fork above Callahan), Valley (Callahan to lower end of Scott Valley) Westside Mountains (Marble Mountains), Eastside Foothills and Moffett Creek, and Canyon.

Figure 4-4: Regions of the Scott River Watershed (basin = watershed), Source: Fruit Growers Supply Co.

4. SCOTT RIVER WATERSHED

Sub-watershed Characteristics by Region

<u>East Headwaters (East Fork above Callahan)</u>: The East and South Fork of the Scott River meet at the town of Callahan to form the headwaters of the Scott River mainstem. The East Fork drains the Scott Mountains flowing in a southwesterly direction where it meets the South Fork (Scott River Mile 58). Elevations of this drainage range from 3,120 feet (951 m) at Callahan to 8,540 feet (2,603 m) at China Mountain. The East Fork drains a total of 72,650 acres (113.5 mi^2 or 294 km^2) or 14% of the Scott River watershed. The headwater tributaries in this region are generally small, steep high gradient streams. These high gradient streams flow into alluvial channels of low gradient, moderately confined valley bottoms. These low gradient valley channels are bordered by discontinuous alluvial floodplains. Land use consists of a mix of federal and commercial forestland, rangeland and irrigated agricultural land.

<u>West Headwaters (South Fork above Callahan)</u>: The South Fork of the Scott River drains the Salmon Mountains in the Southwest portion of the Scott Valley and flows in a northeast direction towards its confluence with the East Fork. Elevations in this reach range from a low of 3,120 feet (951 m) at Callahan to 7,400 feet (2,255.5 m) at the Scott-Salmon divide. The South Fork drains 25,133 acres (39.3 square miles or 101.8 square km), which represents 4.8% of the Scott River watershed. Mean annual precipitation ranges from 40-60 inches (101.6 to 152.4 cm). This watershed is comprised primarily of commercial forestland and wilderness areas with scattered rural residences along the South Fork. The morphological characteristics of this watershed include small, low-order, steep headwater tributaries, which are significantly influenced by snow accumulations and runoff that transport quickly through steep stream reaches to the lower gradient Scott River.

<u>Valley (Callahan to lower end of Scott Valley)</u>: This region area includes about 37 miles (48.3 km) of the Scott River which runs south to north turning west near Ft. Jones and turning in a northerly direction again in the canyon area near Canyon Creek. Elevation ranges from a high of 3,120 feet (951 m) at Callahan down to 2,630 feet (801.6 m) at the heading of the canyon area. The valley encompasses nearly 60,000 acres (93.8 square miles or 242.9 square km), which represents 11.5% of the watershed. Precipitation ranges from 10 to 35 inches (50.8 to 76.2 cm) annually. Land use is primarily agricultural (32,000 irrigated acres). Much of the river and the lower reaches of tributaries within the valley's channels are stabilized by riprap to prevent erosion. The US Army Corps of Engineers built levees for flood control in the middle of the valley in the late 1930’s.

The morphological characteristics of this region include the lower end (alluvial deposits) of numerous tributaries. Some of the larger tributary streams are French Creek, Etna Creek, and Kidder Creek. The stream channels are generally unconfined and contain streambed gradients of less than 2%. This region also includes the alluvial valley mainstem channel of the Scott River. General landform processes have created a wide, flat floodplain and a sinuous channel pattern where bars, islands, side and/or off-channel habitats are common. The gradient of the Scott River through Scott Valley averages less than a 0.1% slope, typical of a broad, alluvial valley. The most gentle gradient reaches near Fort Jones are sand-dominated, while the higher gradient reach near Callahan is cobble-dominated. The rest of the river channel's streambed is primarily gravel (Sommarstrom et al., 1990).

4. SCOTT RIVER WATERSHED

<u>Westside Mountains (Marble Mountains)</u>: The Marble Mountains lying to the west of Scott Valley are the source of several perennial streams. Major tributary streams emanating from the Marbles include from south to north: Sugar Creek, French Creek, Etna Creek, Kidder/Patterson creeks, and Shackleford/Mill creeks. Elevations range from 2,700 feet (823 m) in Quartz Valley to 8,200 feet (2,499.4 m) at Boulder Mountain. The Westside region drains 116,342 acres (181.8 mi^2 or 470.9 km^2), which represents 22.3% of the watershed. Mean annual precipitation ranges from a low of 30 inches (76.2 cm) at the lower elevations to a high of 80 inches (203.2 cm) at the upper elevations. Most of the precipitation above 5,000 feet (1,219.2 m) falls as snow, which sustains tributary flows through the early summer months. Numerous diversions originate in the mid to lower reaches of these tributaries. Land use in this region is primarily wilderness and commercial forestland with an increasing rate of rural residences in the lower elevations.

The geomorphic characteristics of this region include steep headwater tributaries that are generally small, low-order, high gradient streams. Streamflows are greatly influenced by snow accumulations and snowmelt runoff, which transport quickly through steep stream reaches, slowing down when flows reach the lower gradient valley reach. These high gradient streams flow into narrow alluvial mountain channels that are low gradient, moderately confined valley bottom streams. The tributary stream channels are bordered by discontinuous alluvial floodplains in their lower reaches. In most west side streams, flows naturally go sub-surface through the pronounced alluvial fans during the summer months. (Mack, 1958)

<u>Eastside Foothills and Moffett Creek:</u> The eastside of the Scott Valley is dominated by generally dry foothills extending north from the Scott Mountains. The elevation of this region ranges from 2,700 feet to 6,050 feet (823 to 1,844 m). The largest watershed is the Moffett Creek that drains 145,846 acres (227.9 mi^2 or 590.3 km^2) representing 28% of the Scott River Watershed Other streams along the eastside are ephemeral, flowing only during the winter and spring months after prolonged periods of precipitation. In the dry summer months much of the water sinks into the coarse, permeable gravel of the upland areas, and the streams do not normally maintain flow to the valley floor after the beginning of July. (Mack, 1958)

<u>Canyon</u>: The lower Scott River winds for approximately 20 miles (32.2 km) in a steep canyon through the center of the region. The dissecting of these mountains with streams has established a wide variety of slopes, aspects, elevations, and soil types that support a very diverse vegetative cover. Vegetative cover in the landscape area is primarily of the Klamath mixed conifer type. Douglas fir and at least two other conifer species define the Klamath mixed conifer type. Douglas-fir/live oak is typical at the lowest elevations while true fir and sub-alpine types are found at the higher elevations. Perennial tributaries in this river reach include Canyon, Kelsey, Middle, Tompkins, and Mill Creeks. Six different geomorphic landscapes occur in this area, predominated by steep, mountainous terrain prone to debris slides and flows (KNF, 2000 - TBO).

5. Historical Watershed Conditions

Scott Valley was named as "Beaver Valley", and the river as Beaver River, by the Hudson Bay trappers in the 1830s. What is seen today in the watershed is quite different from its beaver heydays 170 years ago. Historical descriptions of Scott River and its watershed reveal that many changes have occurred. Post-settlement impacts, from minor to major, have occurred from various activities over time: beaver removal, mining, urbanization, tillage, irrigation, channel alteration, livestock grazing, vegetation alteration, timber harvesting, road-building, and fire suppression. Identifying the changes that have occurred to the Scott watershed's landscape over the historic years of human activity is important toward understanding what is happening today. An assessment of more recent changes and conditions will be presented in each relevant chapter.

Watershed Conditions at the Time of Pioneer Settlement

The earliest visual indication of roughly pre-settlement conditions is the 1852 map of 'Scotts Valley' prepared for the U.S. Army, as shown in Figure 4-1 (Williams). Another source describing the area's "original" state of its natural resources is the written account made of the October 1851 visit to the valley by Colonel Redick McKee, in his role as U.S. Indian Agent, from the diary of George Gibbs.

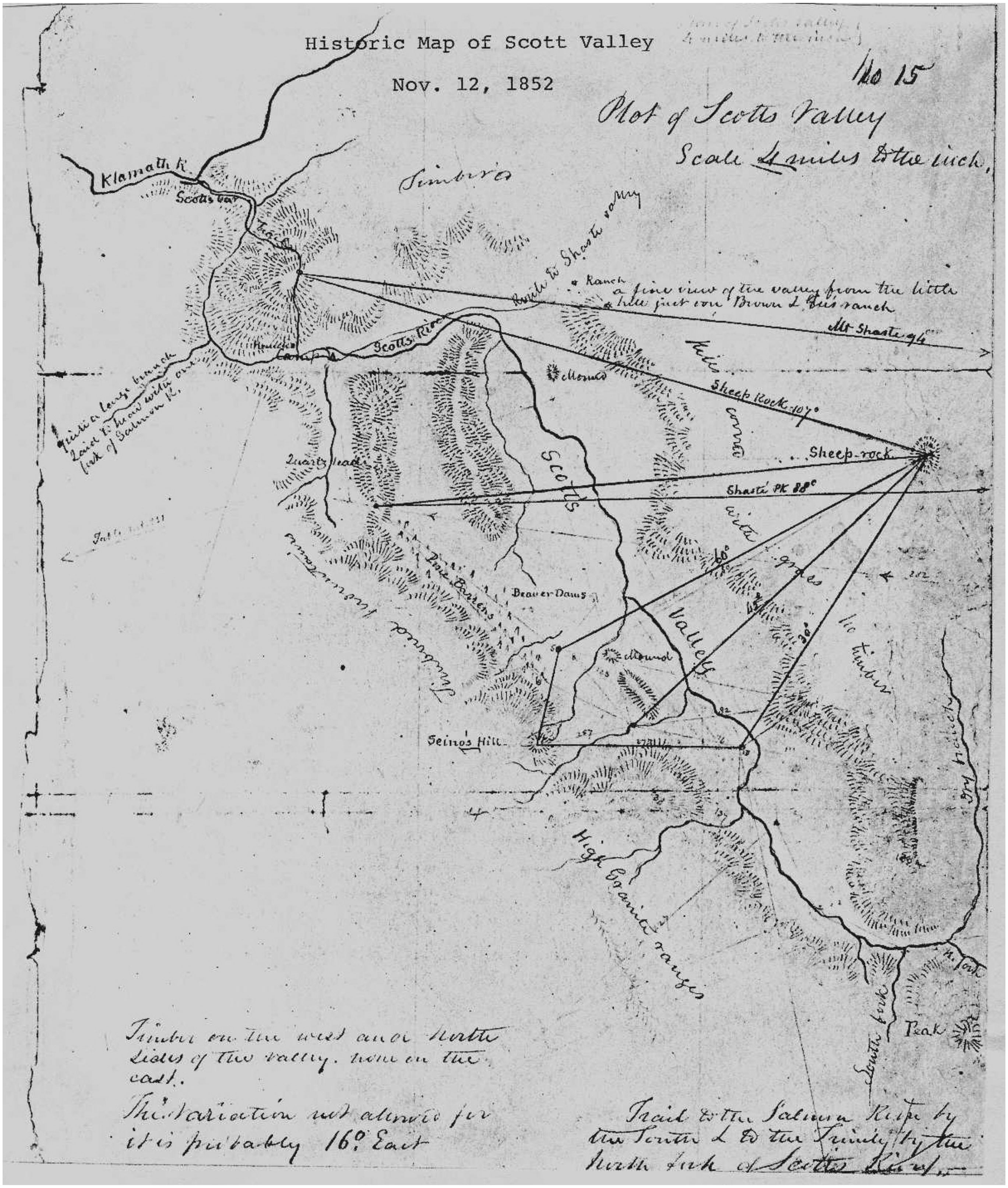
Vegetation

The northern and western sides of Scott Valley were indicated on the map as "timbered". Fire scars, tree rings, and early descriptions indicate that the trees were scattered, denser on northern aspects, and quite large on the average (KNF 2000). On the drier east side hills, with serpentine outcroppings, plant life was not as diverse. Conifers were much less common, limited to isolated areas of north-facing slopes or seeps. Oaks and junipers dotted the lower slopes. As shown on the 1852 map, the eastern side of the valley was noted as "hills covered in grass – no timber". This grass was "fine bunch-grass", "affording excellent and most abundant pasturage" (Gibbs).

Much of Scott Valley was covered with grass – bunch-grass and wild clover – in the "main prairie" (Gibbs); the valley's yellow grass was described as "knee high" in an October 1, 1854 diary entry by a miner (Stuart). "Pine Barrens" – of primarily ponderosa pine – were mapped along the western, gravelly flat between Etna and Quartz Valley. Pine also covered the eastside portion of the valley and other areas that were not too wet. The richest soils were noted to be in the vicinity of "old beaver dams" in 1851, which created a tangle of sloughs. The map indicates the beaver dams to be in the vicinity of Kidder and Big Slough west of the Scott River. At that time, much of the valley was described as "being too dry and gravelly for cultivation". Along the Scott River and its tributaries were riparian shrubs and deciduous trees, as well as conifers in some riparian areas. It is not clear how well vegetated the alluvial fans found in the lower reaches of the west-side tributaries would have been.

5. HISTORICAL WATERSHED CONDITIONS

Figure 5-1. Historic Map of Scott Valley, 1852



5. HISTORICAL WATERSHED CONDITIONS

Fishery Resources

Spring-run chinook salmon were very important historically in the Klamath Basin, substantially outnumbering the fall chinook run (Hume in Snyder 1931). The snow-fed runoff into the Scott River would have supported spring chinook. "Salmon ascend the river in large numbers, before the waters subside in the spring", remarked Gibbs in 1851. Fall chinook were also common in the Scott. Salmon "three to four feet long" were "forcing their way up the stream over the riffles where the water was not deep enough for them to swim", observed a miner in Scott Valley on October 2, 1854 (Stuart). Winter steelhead would probably seek the upper tributaries for spawning and rearing (as they do now), while summer steelhead would most likely have over-summered as adults in the mainstem Scott River and used both the river and the lower reaches of the nearby tributary streams for spawning and juvenile rearing (as they do now in the Salmon River) (Maria, personal communication).

Though historic references for the Scott River are lacking, coho salmon would likely have inhabited the extensive sloughs created by the beavers and their dams in the valley and up the forks, based on their identified habitat preferences. Coho were originally called "silver salmon" in California, and were not differentiated by commercial fisheries and fish culturists as a separate species until about 1908; before then, all salmon were commercially classed as "Quinnat". The California Fish and Game Commission remarked upon this relatively new distinction in its 1911-12 biennial report: "[The silver salmon] run abundantly in the Klamath and Smith rivers…[It] is not considered as valuable a fish as the Quinnat; they are smaller, run late in the fall, and are lacking in color and oil. Nevertheless, they are an excellent food fish when taken as they enter the rivers from the sea."

Populations of these anadromous fish species inevitably cycled due to natural causes, such as floods, droughts, and ocean conditions.

Wildlife Resources

Beaver were once abundant throughout Scott Valley. According to one Hudson Bay trapper who first trapped here in the 1830s, "Beaver Valley" was "the richest place for beaver I ever saw" (Meek, in Wells). An indication of their population numbers is the trapper's story claiming to capture 1800 beaver on both forks (East and South) of the Scott River in one month. Beaver dams were also once concentrated in the Kidder/Big Slough area, based on the 1852 map.

Wildlife formerly present included grizzly bear, elk, and antelope, as well as the current species.

Stream Condition

The Scott River within the valley was described as "from thirty to forty yards in width, deep in many places, with a current from five to seven miles per hour" in May 1855, by one observer (Metlar). Through the wide, alluvial Scott Valley, the Scott River has changed course many times over its history. Indicators include gravelly channels in farm fields far from the river and ox-bow patterns of channel remnants apparent on aerial photos. For example, the 1861 flood, of greater than a 100-year recurrence in magnitude, caused the upper Scott River to alter its course from the west side to the east side of the valley downstream of Callahan (Jackson).

5. HISTORICAL WATERSHED CONDITIONS

At the northern end of Scott Valley, the river channel was very winding and heavily vegetated with willow and cottonwood (Jackson; Lewis, personal communication). Tributaries on the east side were mainly ephemeral, with springs supporting base flow in some headwater areas. In 1851, Gibbs commented that "only two or three small branches" of the Scott River in the valley "continue to flow during the dry season", with "arroyas" from the mountains cutting up the gravelly valley through the "pine barren" near "Seino's Hill" (Whiskey Butte near Etna). He also observed the river had a "bed of sand and gravel".

Fire Disturbance

Fire greatly affected the natural landscape of the watershed (KNF 2000). Lightening fires would have occurred somewhere in the watershed nearly every year, as they do now. Smoke was common during the fall. The severity of impact would have depended on available fuel, weather conditions, and topography. Vegetation patterns, such as the mosaic of brush fields and hardwoods within the dominant coniferous forest zone, reflected the fire regime. During the pre-settlement period (1627-1849), fires in the Klamath region occurred on an average of every 14.5 years (Taylor and Skinner in KNF), ranging from 8 years on south aspects to 16 years on east aspects. Native Americans also used fire as a tool to encourage certain seed crops and to drive deer. Fires were set when the oak leaves began to fall to capture deer.

Floods & Droughts

The natural hydrologic cycle of high and low rainfall and runoff patterns affected the Scott's watershed condition. In 1851, Scott Valley was already known for having parts of it covered with water (Gibbs). The watershed is susceptible to experiencing warm rains on top of a deep snowpack in late December. Intense winter storms can completely alter a stream channel's course and encompass a huge floodplain, as "Old Etna" discovered when it was washed out by the flooding of Etna Creek and Whiskey Creek in 1861-62 (Campbell and Young). This flood was determined to be comparable in magnitude to the one in 1955. However, an even larger flood inundated the valley in 1964 (54,600 cfs peak discharge at river mile 21). Geological and botanical evidence indicate that an even larger flood occurred in about 1600, and floods of the 1964 magnitude have occurred in the "more recent past" in the Scott River (Helley and LaMarche- TBO). Even smaller floods like those of 1852, 1875, and 1880 (see Timeline on page 5-10) covered "all but the high places" in the valley.

Droughts also occurred periodically, based on the hydrologic record of the past century. Without tree ring analysis of local old growth trees for drought patterns, speculating about the frequency and severity of droughts in the watershed over the past few centuries can be challenging. However, tree ring analysis has indicated a fire frequency pattern, which might be related to drought frequency (see above).

Native American Resource Use

In the Scott, the Iruaitsu band of Shasta was one of the four tribes that originally occupied the Scott Valley, Shasta Valley, and Klamath River region (Renfro). Before European contact, the regional Shastan-speaking population is estimated to have numbered anywhere from 2,000 to 10,000, with most villages supporting only 25 to 40 inhabitants. Their ancestors likely arrived from Asia at least 10,000 years ago.

Most villages were placed along streams, with each village claiming fishing rights to a certain portion of the river. As a hunter-gatherer society, the Shasta followed food sources seasonally within their tribal territory. Acorn, deer meat, and salmon were the staples of their diet, supplemented with nuts, berries, roots, bulbs, and greens. To encourage the growth of certain plants, the Shasta bands used fire to remove or suppress competing and less desirable species. Insects, such as grasshoppers, crickets and yellow jacket larvae, and freshwater shellfish (mussels and crawfish) were also collected for food. Deer for food and hides were supplemented with bear, mountain lion, elk, and bobcat. Small game included rabbits, beavers, minks, squirrels, and quail.

The mouth of the Scott River was one of the three known sites in the Klamath River for a major weir or fish dam, while net fishing, spears, and basket traps were used elsewhere. Social and religious customs governed when and where salmon were harvested, possibly evolving from past experiences with food shortages after periods of over-harvest (McEvoy). Spring chinook were unlikely to have made up a large part of their salmon diet since the fish's high body fat made it unsuitable for drying and smoking (McEvoy). Besides salmon, other fish were harvested by the tribe: steelhead trout (and resident rainbow), Pacific lamprey, and suckers.

5. HISTORICAL WATERSHED CONDITIONS

Settlement History and Land Use Changes

This section describes activities and changes that occurred between the 1830s and about the 1970s. More recent natural resource uses and effects are discussed in later chapters.

Mining

Mining activities have left a strong imprint throughout the watershed. Gold miners arrived in Scott Bar in 1850 on the lower Scott River and soon spread upstream to sites around Scott Valley. Mining ditches and flumes were built in almost every stream from the South Fork to Scott Bar (Stumpf). Hydraulic and sluice mining were very active in the 1880 on the South Fork, Quartz Valley, Oro Fino Creek, north Patterson Creek, and the lower Scott (Wells). These operations washed large portions of stream banks downstream (Lewis). From 1934 to 1951, huge Yuba dredges excavated gold from ancient river deposits in the floodplains and left extensive, cobble-sized tailings piles in the floodplains of the upper Scott below Callahan, Wildcat Creek, and McAdams Creek. Sediment plumes from these dredges extended far downstream and reduced the population of aquatic insects in the Scott River below the operations through siltation (CDFG; Taft and Shapovalov). Since 1950, gold mining has mainly occurred through small-scale operations, such as suction dredging in the lower Scott near Scott Bar. Sand and gravel mining in the mainstem and in Kidder Creek has continued at varying intensities over the years.

Land Ownership

Tribal lands changed ownership, mostly by the late 1850s, to the settlers and the federal government. Family farmers and ranchers developed the productive agricultural land in the valley and surrounding hills. The Klamath National Forest was created in 1905. Public ownership of forest lands focused on the more remote areas "especially on the upper watersheds of the many full-flowing streams" since the U.S Forest Service's early activities "were largely devoted to the conservation of water supply that means so much to the farmers in the valleys" (French). In 1915, public lands in the Forest reserves were still being homesteaded in Siskiyou County. More accessible tracts near roads and in the middle to lower elevations were developed as private timberlands. Residential and commercial property was centered in the two cities and four towns. The Quartz Valley Indian Reservation came to represent the remaining tribal lands in the watershed.

Farming and Ranching

Hay cutting in the valley and cattle grazing in the valley and the hills began as early as 1851 to support the increasing population of miners in the Scott and Salmon watersheds (Wells 1881). Native bunch-grass and clover gave way to farmed crops in the fertile soil. A large ranch in the upper East Fork supported 2,000-3,000 head of cattle by 1880 (Jones). Stock also was brought to the mountains for summer grazing. Grazing by large numbers of cattle, sheep, and horses has reduced the amount of perennial grasses and forbs in uplands over the years (KNF 2000). Dairies were developed in the Greenview area. Farmers tried various crops and settled on alfalfa hay, grain, and pasture as the primary production crops for this mountain valley.

Water Diversions & Use

Stream diversions to irrigate pastures and crops began in the 1850s. Placer mining of the 1800s demanded numerous water diversions. Many of these original mining ditches were eventually converted for irrigation purposes. In 1915, about 15,000 acres were estimated to be under irrigation. Scott Valley's water use was more colorfully described by French: "cascading torrents bound joyously to serve the needs of miner and rancher." Young's Dam, the only permanent diversion dam on the Scott River, was constructed in 1917 for irrigation to the eastside. It was washed out in the 1955 and 1964 floods and was rebuilt in 1965. Surface water became supplemented with groundwater for irrigation and domestic use, increasing in relative use after the 1950s (Mack). Trends in water use over the past 50 years are described in Chapters 11 and 13.

Stream Alterations

Removal of most of the beaver in the valley was the first major change to the Scott River stream system. Beaver dams would have slowed the movement of water in lower stream reaches, trapped woody debris, and increased water storage in the small ponds. Hydraulic mining created very significant changes in the channel and floodplain of the Scott and its tributaries. By 1855, the lower Scott near Scott Bar was almost constantly "turbulent and muddy", while the Klamath River was usually "clear and transparent" (Metlar). Gold mining impacts to the channel were most extensive in the South Fork, McAdams, Oro Fino and Shackleford/Mill Creeks, with lesser activity in French Creek and the East Fork. A 5-mile length of the upper Scott River and its floodplain remains covered with tailing piles of large cobble as a legacy of the Yuba dredge operations of 1934-51, constricting flood flows and inhibiting channel restoration.

Following a serious flood in the winter of 1937-38, Siskiyou County requested the U.S. Army Corps of Engineers to "clear the rivers throughout Scott Valley of debris from flooding". This work began in August 1938, and included constructing flood levees along the middle channel near Black Bridge (Etna *Western Sentinel*, 8/10/38). The Corps' "debris clearing" also removed much of the remaining riparian vegetation through the middle of the valley (Lewis, personal communication). Aerial photos of the river from 1944 reveal little or no vegetation along the Scott River's banks.

A series of damaging floods from 1940 to 1974 further altered the Scott River channel through the valley through bank erosion and channel widening. Earthen flood control levees were built along lower Etna, Kidder and Moffett Creeks. Designed by the U.S. Soil Conservation Service (now the Natural Resource Conservation Service – NRCS), permanent bank stabilization structures were also tested, with large rock proving to be the most flood-proof. As a result, rock riprap has been placed with the assistance of the Siskiyou RCD along much of the Scott and its tributaries to prevent loss of farmland.

Fish Barriers

Barriers to fish migration were created by mining dams, unscreened diversions, and inadequate culverts at road crossings. This problem began to be addressed fairly early. An inventory of major fish barriers in the Scott stream system identified mining dams and unscreened diversions on almost every tributary in June, 1934 (CDFG). Fish screening of diversions started in earnest in the Scott Valley in the 1930s, by both the U.S. Forest Service and the State, after a report that ditches in the county were destroying more fish than the Mount Shasta hatchery was propagating (Western Sentinel, 3/9/38). In the 1950s, the California Dept. of Fish and Game (DFG) began an aggressive program in the Klamath Basin to remove abandoned mining dams which blocked salmon and steelhead (Coots). By blasting or laddering natural barriers and removing log jams, DFG opened up additional spawning areas. Fish ladders were added to Young's Dam and the Etna City dam on Etna Creek.

Urbanization

Mining camps grew and shrank, while towns became established at logistical sites of commerce in the cities of Etna (1855) and Fort Jones (1852) and the towns of Callahan, Greenview, Mugginsville, and Scott Bar. By 1880, Scott Valley's "white" population was 2,862 (Jones). Community water systems and city streets were developed.

Roads

Trails (often narrow and steep) were immediately built to connect the extended mining camps and emerging towns via foot, mule or horse (Campbell and Young). Roads were built over some of the trails, with toll roads to Yreka (1854) and over Scott Mountain (1854-59) and Salmon Mountain (1891). The California-Oregon Stage Road followed the east side of the valley and over Scott Mountain as the primary "interstate" route between Sacramento and Portland, until the railroad in Shasta Valley was completed in 1887. Upper elevation road construction began on the Klamath National Forest in the 1930s by the Civilian Conservation Corps, with the road system mainly designed to serve fire protection needs (KNF). Access roads for timber harvest on public lands did not begin until the late 1950s. On private lands, logging roads had already accessed the timber in the middle elevations. Roads were extended into the steeper areas in the 1960s-70s, often with poor designs for roadbed stability and erosion control (KNF). The highly erosive granitic soils on the western mountain slopes were particularly impacted by road-building during this era (Sommarstrom, Kellogg, and Kellogg).

Timber Harvest

Timber was originally needed for mining as well as for construction purposes. Logging became intense around Scott Bar during its peak mining years (KNF) and probably around Quartz Valley and other valley mining areas also. The first sawmill in Scott Valley was built in 1852. By 1880 eleven sawmills supported production of 3.5 million board feet per year (Wells). By 1915, "large tracts" of forest were being opened up for lumbering operations (French). Although small mills remained active during the Depression, logging became more intense after World War II. In 1953, 13 mills in the valley were producing 205,000 board feet per day (or 75 million board-feet per year) (Mack). Early logging practices were known to produce some serious environmental effects in the Klamath region, such as siltation and loss of aquatic habitat (Coots). In response, regulatory oversight of timber harvest on private and public lands became stricter in California by the late 1970s, and has continued to increase.

Fire Suppression

Human-caused fires increased with the influx of miners and settlers (KNF). Ranchers would burn the rangeland as a common practice to create better forage production. Since 1905, fires have tended to be suppressed in the watershed when the Klamath National Forest initially began controlling wildfires. KNF later adopted an aggressive response program in 1920, followed by the State of California for private forestlands. In fact, a momentous State experiment took place in Moffett Creek in 1922 by the California Forestry Committee to evaluate the practice of excluding fire from forest land, which led to the State adopting the Forest Service's fire exclusion policy statewide (Clar).

Earlier fires were easier to control due to less vegetation and fuels, but modern equipment since 1948 has improved the success rate of fire suppression. As a result, most fires during the past century were contained to less than one acre. However, a few large fires have occurred, mostly in drought years: Moffett Creek (9,600 acres in 1920), Crystal Creek (8,900 acres in 1924), Kidder Creek (14,562 acres in 1955), and Kelsey-Deep-Tompkins in the lower Scott (8,790 acres in 1987). (Clar; Morford; KNF). Instead of the "natural" fire frequency of 14.5 years, the post-suppression return rate is 21.8 years. Concern is now expressed that a century of effective fire suppression has created high fuel loadings which have increased the probability of large, severe fires in the Scott River watershed. (KNF)

Fish Harvest

Salmon were commercially caught for a cannery in the lower Klamath River from 1876 until commercial river harvest was outlawed in 1933. DFG operated an egg collecting station on Shackleford Creek from 1925 to 1940 to help supplement the local fishery. In 1938, the Etna newspaper's editorial bragged about the Scott River as being "widely famed as one of the finest fishing streams in the state" (*Western Sentinel*, 3/9/38). In a study of angler use of the Scott in 1970-71, the harvest of an estimated 7,152 juvenile steelhead, mostly in the lower 25 miles, and an estimated 682 adult steelhead (about 15-30% of the mainstem population) was determined to be "intensive" (Lanse). The report recommended to significantly reduce the harvest of juvenile steelhead from the Scott River through delaying the season past May and reducing the daily bag limit from 10 to 3 fish.

Summary and Conclusions

Multiple historic activities have contributed to both temporary and permanent changes in the Scott River watershed over the past 170 years. Many of the negative impacts were unintended consequences of good intentions, during a period of new and expanded use when resource availability often appeared to be inexhaustible. Changes to the natural landscape and streams were needed to sustain the area's residents, develop communities, and support the local economy. However they have occurred, undesirable changes have led to increased concern regarding the management of the watershed's natural resources. This watershed Action Plan is an outgrowth of that concern. An evaluation of current watershed conditions and recommendations to address them follow in succeeding chapters.

Scott River Watershed

Chronology of Natural Resource Events*

Year	Event
8,000BC	Shasta Tribe (Iruaitsu people) occupied Scott Valley.
1830s	Hudson Bay trappers discover "Beaver Valley" and the "Beaver River". Reportedly 1800 beaver were trapped in one month on both forks of the Scott River in 1836.
1850-51	Gold discovered at Scott Bar, beginning settlement of area. Hay cutting and cattle grazing began.
1852	First sawmill built in Scott Valley. Wheat, oats & barley and livestock were raised.
1852-53	Flood washed out mining structures. Streams near placer mines were diverted into mining ditches, and repaired after washouts. By 1880, "great many" ditches.
1861	Very large flood destroyed "Old Etna" on Etna Creek. River rerouted below Callahan from the west side to the east side.
1864	Flood damage; "water covered all but the high places" in valley.
1875	Flood damage; "extremely high water".
1880	Flood damage, bridges washed out at Callahan. Total of 11 sawmills in valley with capacity for 3.5 million board feet per year. Hydraulic and sluice mining on South Fork, Quartz Valley, Oro Fino, north Patterson Ck., lower Scott.
1915	About 15,000 acres irrigated in valley; US Forest Service "largely devoted to the conservation of the water supply which means so much to the farmers in the valleys", but opening up large tracts for lumbering operations.
1917	Scott Valley Irrigation District constructed Young's Dam for diversion.
1923-1934	Prolonged drought period.
1924	Driest year on record. Scott River dries up throughout valley. Large (9,000 ac.) fire up Crystal Creek.
1933-34	California Conservation Corps (CCC) built roads to access upper westside forests on Klamath National Forest.

1934	Gold dredging with large Yuba-type dredgers began on upper Scott River below Callahan, Wildcat Creek, McAdams Creek. Largest excavated to a depth of 30-50 feet below water line, removing millions of cubic yards of soil and gravel and leaving large cobble tailing piles. River channel straightened.
1937-38	Large flood damage. Nov. '37 had 10 inches of rain in 2 weeks. County Supervisors request assistance from state and federal governments.
1938	Scott River "cleared of debris" from floods by US Army Corps of Engineers. Levees built along mid-Scott River for flood control; channel straightened in sections; riparian vegetation removed.
1940-41	Flood damage and extensive bank erosion.
Dec. 1941	Gage Station began operation on Scott River at river mile 20.5.
1944	Aerial photos of Scott River reveal little or no stream bank vegetation.
1949	Siskiyou Soil Conservation District formed; bank stabilization high priority for district projects, designed by USDA Soil Conservation Service.
1951	End of mining activity by large gold dredgers. Increased logging activity, with 4 large and 9 small sawmills in the valley.
1953	Total water use for all purposes in Scott Valley was estimated by the State about 40,000 acre-feet; total of 6 irrigation wells.
1955	Very dry water year, followed by large (15,000 ac.) forest fire in upper Kidder/Patterson Creek area, followed by record flood in December.
1957	SVID constructed lower diversion dam on Scott River below Moffett Creek.
1958	One of the highest water runoff years: prolonged high flows and serious bank erosion.
1964	Largest flood of record with extensive damage; peak discharge of 54,600 cfs.
1974	Very large flood and runoff; peak of 36,700 cfs similar to 1955 flood.
1976-77	Extreme drought; 1977 second driest year on record.
1980	Scott River Adjudication became final. Groundwater in certain areas of valley were considered interconnected with surface water of the Scott River and included in adjudicated rights.
1982-83	One of the wettest years, with high runoff and record snowpack.

1986-89 Lower SVID diversion dam on Scott below Moffett Creek removed.

1986-94 Prolonged drought period; 1994 third driest on record, with most of river dry.

* compiled by Sari Sommarstrom from Wells (1881), Etna Western Sentinel, and other sources

6. Fisheries

This section discusses the population, management, and issues of anadromous salmonids found in the Scott River watershed. This includes the Chinook salmon, coho salmon, and steelhead trout. Issues such as water quality (sediment) is also discussed within this section as it is directly related to fish habitat and survivability.

This Chinook was found spawning at Johnson's Bar in 2003. A clear picture of the redd is found underneath the fish.

[photo by Danielle Quigley]

History

The Scott River and many of its tributaries support runs of three species of anadromous salmonids: Chinook or king salmon (*Oncorhynchus tshawytscha*), coho or silver salmon (*O. kisutch)*, and steelhead (*O. mykiss idideus)*. The Scott River watershed also supports populations of anadromous Pacific Lamprey (*Lampetra tridentata)* and a variety of native resident species (Table 6-a). The Scott River produces approximately 9.2% of the natural fall Chinook salmon in the Klamath River system (Hampton, personal communication).

Table 6-a. Native Fish Species present in the Scott River Watershed.

Common Name:	**Scientific Name:**
Pacific Lamprey	*Lampetra tridentata*
Coho Salmon	*Oncorhynchus kisutch*
Chinook Salmon	*Oncorhynchus tschawytscha*
Steelhead/Rainbow Trout	*Oncorhynchus mykiss*
Speckled Dace	*Rhinichthys osculus*
Tui Chub	*Gila bicolor*
Klamath Small-scale Sucker	*Catostomus rimiculus*
Marbled Sculpin	*Cottus klamathensis*

According to historical accounts, the floor of the Scott Valley once contained many beaver ponds, prompting the first-arrived Europeans to name it Beaver Valley. The Scott River likely followed a meandering channel that frequently shifted its location on the floodplain due to the natural deposition of gravel and the activity of beavers. This would have created many side channels and wetlands that, along with the beaver ponds, provided prime rearing habitat for juvenile salmonids depending on seasonal flows. Willows, cottonwoods, and other riparian trees grew in the wetter parts of the valley, while pines grew in the drier parts of the valley floor. Shade from trees and groundwater fed by the tributaries cooled the waterways in the valley during the summer.

On the west side of the watershed, the snow pack in the mountains was the major source of streamflow in the watershed. Peak flows occurred after large storms and at snowmelt, but the undisturbed forest soil/duff probably held runoff longer than it does today, so floods were moderated and streams flowed later into the summer. Old growth forest contributed woody debris to the streams that provided habitat for fish as it worked its way down through the watershed. Rocks, gravel and sediment from the mountains also moved down the waterways. On the east side of the watershed, the hills were covered by native grasses, chaparral, junipers and pines, in a mosaic that was maintained by the burning activities of the Shasta Indians. Streams on the east side dried up in the summer, but early accounts describe more year-round springs than there are today.

The arrival of European trappers in the 1820's brought changes to the Scott River Watershed. By the 1830's the beaver population had been wiped out, so their dams and ponds were no longer maintained. In the 1850's the mining boom began in the headwaters of the Scott River (including hydraulic mining). Mining changed the hydrology, rerouting streams with extensive ditch systems, blocking fish passage and de-watering spawning and rearing habitat. Placer mining brought thousands of tons of sediment into river beds, burying spawning gravel, filling pools and creating floods. In 1934 a fish biologist noted that the Scott River was so badly sedimented that it no longer provided fish habitat. In 1943 a large Yuba dredge began operating in the Scott River below Callahan and in McAdams Creek, excavating down 50-60 feet to bedrock, processing and piling millions of cubic yards of gravel and soil, and re-routing the river along the edge of the flood plain. The dredge operated through the early 1950's. Below Callahan, the tailings are piled along 6 miles of the river, and are as tall as 40 feet in places.

Historically, two state egg collecting stations were once located in the Scott system: Shackleford Creek (1925-1940) and Tompkins Creek (1935) (CDFG 1970 - TBO). The eggs were probably taken to the Mt. Shasta or Fall Creek Hatcheries for rearing. While steelhead were planted in east side streams "in accordance with demands of local residents", CDFG in 1934 recommended discontinuing such planting (Taft, 2). It was noted that exotic (non-native) salmonid species (Eastern Brook and Loch Leven trout) plantings were unsuccessful in the Scott system and that "native steelhead and salmon are best adapted to most of the streams".

6. FISHERIES

LIFE HISTORY: The life history traits of anadromous salmonid species inhabiting the Scott River Watershed are complex and varied. A brief description of each species is provided below.

Fall-Run Chinook

Adult fall-run Chinook salmon (aged 3 to 5-years old) migrate upstream into the Scott River system beginning in early-to-mid September although a few late fall-run Chinook have been observed at the mouth of the Scott as late as mid-December (USFWS, 1997) The peak of the migration occurs in October. A small percentage of each year's return consists of sexually mature 2-year old males known as grilse or jacks.

Fall-run Chinook spawning extends from October into mid December. The eggs incubate in the gravels of the redd (nest) until hatching into alevins (larval fish with yolk sacs attached to their abdomens). The alevins must stay in the gravel for two to ten weeks until their yolk sac is absorbed, and then they become fry (juveniles). The fry emergence from the gravel in mid-March or early April, depending on water temperatures, and then migrate downstream. Some of these young fish will reside in the Scott River during the summer months before they migrate into the estuary and ocean during the fall or winter months.

Spring-Run Chinook

The Scott River no longer has a viable population of spring-run Chinook, but it is possible that spring-run Chinook from the Salmon River may stray into the Scott River watershed. Based on what we know of the Salmon River's population, adult spring-run Chinook (aged 2 ½ to 4 ½ years) probably migrated up the Scott River system between April and June, and sought out deep cool pools in which to spend the summer before spawning in the fall. Spawning probably took place about a month earlier and higher up in the river system than fall-run Chinook spawning. After the spring-run Chinook fry emerged from the gravel (March to early June), they spent the summer rearing in the watershed. Some of the fry migrated in the fall down to the Klamath River estuary to rear, but most spent the winter in the watershed and migrated out in the spring as one-year-olds (National Research Council 2003, TBO).

Coho

Coho salmon have a relatively simple salmonid life cycle. They spend their first approximately 18 months in fresh water before migrating to the ocean for their next 18 months of growth and development prior to returning their natal stream for spawning. Adult coho salmon enter the Klamath River in September, and make their way upstream to spawn in the Scott River watershed in late November through January. Most adult coho salmon are 3 years of age however; a small percentage of each year's return consists of two-year-old, sexually mature males known as jacks or grilse. Generally, spawning coho salmon prefer smaller streams than Chinook salmon and make their redds in gravel that is smaller than 15 cm diameter, the size of a softball, with oxygen rich water circulating through it. Coho eggs hatch in 38 to 48 days (depending on water temperature), and then the alevin (hatchlings) must stay in the gravel for two to ten weeks or until their yolk sac is absorbed. Fry emerge from the gravel in March, April and May. For the next year, through the hot, dry summer and winter storms, they must find safe places to rear with cool, slow-flowing water, an adequate food supply, and good cover. Some young of the year (YOY – 0+) coho juveniles apparently become large enough in the June or July following emergence, that they undergo smoltification and start to outmigrate towards the ocean. After one year in fresh water, the juveniles make their way out to the ocean beginning in March. Coho juveniles have been observed out migrating as late as early July (Chesney and Yokel, 2003).

Steelhead

Steelhead are rainbow trout that go to the ocean for part of their life. Scientists do not fully understand why some individuals migrate to the ocean while others remain as residents. Within the Scott River Watershed, steelhead displays a variety of life history patterns which make up different fresh and saltwater rearing strategies. These varied strategies help ensure the survival of the species especially in an environment that has been shaped by active and sometimes catastrophic geological and hydrological disturbances. Adult steelhead may return from the ocean from April through June (summer steelhead), August through October (fall steelhead), or November through March (winter steelhead), but all spawn in the watershed starting in January and lasting through April. Prior to returning to their natal streams for spawning, steelhead spend from 1 to 4 years in the ocean. Unlike salmon which die soon after spawning, steelhead may spawn several times during their life time (Leidy and Leidy 1984). Steelhead spawn in the forested tributaries, but in higher, steeper areas, than coho. Egg incubation begins immediately after spawning and continues through mid-June (Leidy and Leidy 1984) and fry emergence extends through mid-July (Leidy and Leidy 1984, Chesney and Yokel 2003). Most juvenile steelhead in the Klamath system rear for two years in freshwater (fry through parr life stages), enter a "half-pounder" life phase, and then outmigrate to the ocean approximately three years in age to enter the adult phase (Hopelain 1998, TBO). Steelhead juveniles can tolerate faster water than coho juveniles.

6. FISHERIES

HISTORIC POPULATION ESTIMATES

No estimates are available of the salmon and steelhead populations in the Scott River before the 1950s. 'Historic' is referring to the population estimates made by CDFG in the 1950s and 1960s.

Figure 6-1: Historic Salmon & Steelhead Population Estimates by CDFG

Chinook (King) Salmon: Fall-run			**Coho (Silver) Salmon**			**Steelhead: Winter-run**		
Years of Estimate	**Estimated Run Size**	**Source**	**Years of Estimate**	**Estimated Run Size**	**Source**	**Years of Estimate**	**Estimated Run Size**	**Source**
1955	5,000	CDWR, 1960						
early 1960s	8,000-10,000	CDFG, 1965 CDWR, 1965	Early 1960s	2,000	CDWR, 1965	early 1960s	20,000-40,000	CDWR, 1965
1965	2,000	CDFG - 1965	Early 1960s	800	CDFG, 1965	early 1960s	5,000	CDFG, 1965
1967	5,000	CDFG – 1967						

Reference Sources:
CDFG. 1965. California Fish and Wildlife Plan. Vol. III. Sacramento.
CDFG – Annual aerial King Salmon redd counts – Scott River. Unpublished data in Scott River files at CDFG office, Yreka.
CDWR. 1960. Klamath River Basin Investigation. Bulletin 83. Sacramento.
CDWR. 1965. North Coastal Investigation. Bulletin 136. Appendix C – Fish and Wildlife. Calif. Dept. of Fish & Game, Sacramento.

Chinook: Prior to intense water development, mining, timber harvest and road building in the Klamath Watershed, spring-run Chinook salmon represented the dominant Chinook salmon run (Snyder 1930). Under current conditions, spring-run Chinook are primarily found consistently in the Salmon River and the fall-run Chinook salmon is now the most numerous and economically important salmon run in the Klamath Basin. Early estimates of the number of fall-run Chinook returning to spawn in the Scott River ranged between 8,000 and 10,000 fish (CDFG 1965, CDWR 1965). More robust fall-run Chinook escapement estimates for the Scott River watershed have been made annually since 1978 (see Figure 6-2 in Summary of Findings).

Timing and distribution of fall-run Chinook salmon spawning within the watershed has been documented annually during cooperative spawning ground surveys in the Scott Basin since 1992. Fall Chinook salmon primarily utilize the mainstem Scott River from its confluence with the Klamath River to approximately Faye Lane. Spawning distribution within the mainstem can be limited during periods of low flow as fish are unable to leave the canyon and ascend into the valley areas due to a lack of water.

Coho: Current knowledge on the distribution and numbers of coho salmon in the Scott River watershed is extremely limited. Coho have been observed spawning in the South Fork of the Scott River and some of its tributaries, the East Fork of the Scott River and some of its tributaries, and lower portions of some forested tributaries of the Scott (Maurer, 2003).

Between 1982 and 1991, the CDFG operated a weir near the mouth of the Scott River from early September through mid-November. Although the primary purpose of the weir was to facilitate development of fall Chinook escapement estimates, early returning coho were counted while the weir was operating. This period is earlier than the primary upstream migration & spawning period for coho in the Scott River, which tends to run from late November through January.

Table 6-b; Year, dates of operation and counts of coho salmon observed at the Scott River weir operated by DFG1/

Year	Dates of Operation	Grilse (2 yr olds)	Adults	Total2/
1982	9/14 to 10/29	0	5	5
1983	9/14 to 11/3	1	21	22
1984	9/10 to 10/31	12	38	50
1985	9/3 to 11/12	0	1	1
1986	9/11 to 11/19	18	49	67
1987	9/25 to 11/18	12	248	260
1988	9/24 to 11/9	No coho reported		
1989	9/8 to 10/22	1	7	8
1990	9/8 to 10/28	1	6	7
1991	9/10 to 11/5	0	3	3

1/ DFG unpublished data. Yreka, CA.
2/ Total numbers of coho observed should not be construed as escapement values as the weir was removed prior to peak of the coho run.

Steelhead: Information on the timing and spawning distribution of steelhead is primarily limited to the tributaries of the canyon section of the Scott Basin such as Tompkins, Kelsey, and Canyon Creeks. The U.S. Forest Service monitored these streams between 1980 and 1985, 1994 and 1995 (USFS Lower Scott Ecosystem Analysis, 2000) and in 2001 and 2002 (Salmon River Restoration Council, Cooperative Spawning Ground Surveys). The number of redds observed each year in each stream has ranged from 0 to 16. It should be noted however, viewing conditions for observing steelhead spawning are highly variable and depend on streamflow and turbidity levels. According to the USFS Fish Species Range map of the Callahan Watershed, the range of steelhead indicates the following streams; Mill Creek, Clarks Creek, French Creek, the lower reaches of Miners, Sugar, Wildcat, Boulder and Fox Creeks as well as the South Fork Scott River (KNF, 1997).

6. FISHERIES

Description of Current Conditions and Issues

MANAGEMENT:

Several programs and practices have been followed to manage fish populations within the Klamath River basin including the Scott River watershed. Some of these programs and practices are described below:

Fish Rescue: Juvenile fish are stranded in pools in the mainstem and in major tributaries when the streams are dewatered during late spring and summer months. A good example is Kidder Creek. Kidder Creek has excellent spawning gravel and tends to produce a high number of juveniles, especially steelhead. Much of this production is lost, however, when the stream becomes dewatered during the summer. While CDFG has often spent significant funds rescuing steelhead and transporting them down river, it is not clear that the efforts are effective. In their new stream locations, rescued steelhead must compete for space and food with other anadromous and native fish. It is believed that available habitat may become over utilized under such conditions putting both the rescued and endemic fish at risk (West et al). For several years, 1990 through 1993, rescued Scott River steelhead were hauled downriver to Orleans to be reared in a community rearing pond for later release in the Klamath River.

Table 6-c. CDFG Trapping Results for the Scott River Sub-basin 1993-2003

Etna Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	994						65					**1059**
Coho	0						1					**1**
Chinook	0						0					**0**
Totals =>	**994**	**0**	**0**	**0**	**0**	**0**	**66**	**0**	**0**	**0**	**0**	**1060**

French Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	914	1801	126	101		34	291		2726	4538		**7264**
Coho	1	95	0	40		8	8		49	8586		**8635**
Chinook	0	0	0	0		0	0		159	0		**159**
Totals =>	**915**	**1896**	**126**	**141**	**0**	**42**	**299**	**0**	**2934**	**13124**	**0**	**16058**

Kidder Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	459	2637	1364	2056			3056	3657		569	2408	**16206**
Coho	3	0	0	61			518	0		5436	0	**6018**
Chinook	0	0	0	0			0	0		0	0	**0**
Totals =>	**462**	**2637**	**1364**	**2117**	**0**	**0**	**3574**	**3657**	**0**	**6005**	**2408**	**22224**

Patterson Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead							270			277	431	**978**
Coho							0			1287	11	**1298**
Chinook							0			0	0	**0**
Totals =>	**0**	**0**	**0**	**0**	**0**	**0**	**270**	**0**	**0**	**1564**	**442**	**2276**

Mill Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead		141		469	1551		73					**2234**
Coho		0		20	0		0					**20**
Chinook		0		0	0		0					**0**
Totals =>	**0**	**141**	**0**	**489**	**1551**	**0**	**73**	**0**	**0**	**0**	**0**	**2254**

Shackleford Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	2016	6966	477	2744	5313		291	47	13890	51277	36061	**119082**
Coho	11	28	0	36	0		0	23	20	3066	39	**3223**
Chinook	2	31	0	3	0		0	0	388	0	0	**424**
Totals =>	**2029**	**7025**	**477**	**2783**	**5313**	**0**	**291**	**70**	**14298**	**54343**	**36100**	**122729**

McAdams Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	4166		3970			4124		15612	23762	51498	28697	**131829**
Coho	0		0			0		0	0	0	0	**0**
Chinook	0		0			0		365	0	0	0	**365**
Totals =>	**4166**	**0**	**3970**	**0**	**0**	**4124**	**0**	**15977**	**23762**	**51498**	**28697**	**132194**

Moffett Creek:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	1099		6		1034		432			2232	2226	**7029**
Coho	0		0		0		0			0	0	**0**
Chinook	0		0		0		0			0	0	**0**
Totals =>	**1099**	**0**	**6**	**0**	**1034**	**0**	**432**	**0**	**0**	**2232**	**2226**	**7029**

Scott River (mainstem):	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**TOTALS**
Steelhead	533	6148		1757	82		530	2666	39509	24928		**76153**
Coho	0	310		96	3		11	7	0	11644		**12071**
Chinook	0	235		0	1		0	0	2644	0		**2880**
Totals =>	**533**	**6693**	**0**	**1853**	**86**	**0**	**541**	**2673**	**42153**	**36572**	**0**	**91104**

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**

Fish Propagation and Stocking: Hatchery raised non-native trout and rainbow trout are stocked only in some of the high mountain lakes, above the headwaters of the Scott, but some trout may escape into streams below the lakes (CDFG, 1969 - TBO). Some exotic, non-salmonid fish are presently found in the Scott: brook stickleback, brown bullheads, and green sunfish. CDFG's present policy is to not introduce non-native fish in streams like the Scott River. Conservation of the genetic integrity of the Scott River's native salmon and steelhead stocks is considered to be very important.

Harvesting and Poaching: Sport fishing for steelhead, but not Chinook or coho, is allowed in the mainstem Scott below State Highway 3, near Fort Jones and take of wild steelhead (unclipped fish) is currently prohibited. Until 1972, fishing regulations allowed anglers to take large numbers of juvenile steelhead as parr and as smolts, which may have had a "depressing effect" on the numbers of returning adults. To increase their numbers, the California Fish and Game Commission delayed the opening of trout fishing season and reduced the daily bag limit of trout (Lanse, 1972). The present trout fishing regulations have not been re-evaluated whether they are adequate to protect juvenile steelhead. Coho salmon in the Klamath River has been listed as an endangered species under the Endangered Species Act on a federal level and is about to be listed at the state level. Therefore, the take of coho salmon is not permitted. According to local wardens, poaching mainly occurs where the river is close to the county road, but otherwise, poaching does not appear to be a serious problem.

Tribal fishing occurs downstream in the Klamath River by the Yurok, Hoopa and Karuk tribes for subsistence, ceremonial, and sometimes commercial purposes. To conserve Scott River and other natural stocks, the Yuroks are managing the timing of their gill netting to target the hatchery runs and stopping their own commercial harvesting.

ISSUES:

Issues affecting fisheries will be further identified, refined, and quantified as to importance of impact by the ongoing process to complete a Limiting Factors Analysis. Several reports have stated that rearing and spawning conditions for anadromous salmonid stocks in the Scott River system are affected by: excessive sediment, lack of water, high stream temperatures, and lack of instream cover (CDWR, 1965; CDFG, 1974; CH2MHill, 1985; West et al, 1991; KRBTF, 1991). Some of these conditions are described below:

Sedimentation: Excessive sand-sized sediment was identified in earlier reports to be a significant limiting factor constraining Scott River's salmon and steelhead production (CH2M Hill, 1985; West et al., 1990). Fine sediment can impact spawning and rearing conditions in several ways: the smothering of eggs and aquatic invertebrates, affects developing alevin, the elimination of bottom cover, and a reduction in the volumes of pools [see photo on next page]. While the low gradient sections of the river and its tributaries represent existing and potential spawning habitat, this area also is where sand and other fines (<6.3 mm) tend to be deposited in the stream system.

Sand-sized sediment in Miner’s Creek, tributary to French Creek, 1990

[Photo by Sari Sommarstrom]

A sediment budget was prepared for the Scott River sub-basin in 1990, focusing on sources, transport, storage, and impacts of sand-sized sediment derived from the highly erodible, decomposed granitic soils (DG) prevalent on the south and western slopes (Sommarstrom et al., 1990). The sources of accelerated DG erosion were: roads (63% of total), upslope streambanks (23%), logging skid trails (13%), and other (1%). The greatest contributing sub-watersheds were French (23%) and Boulder (15%).

Figure 6-2: Sand-sized Sediment by Source in the Scott River Sub-Basin, 1990 (Sommarstrom et al. 1990)

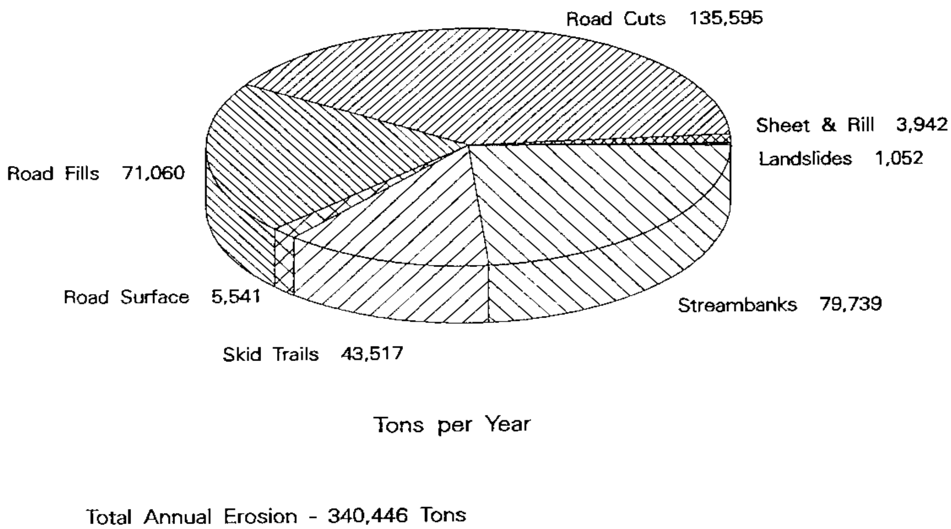
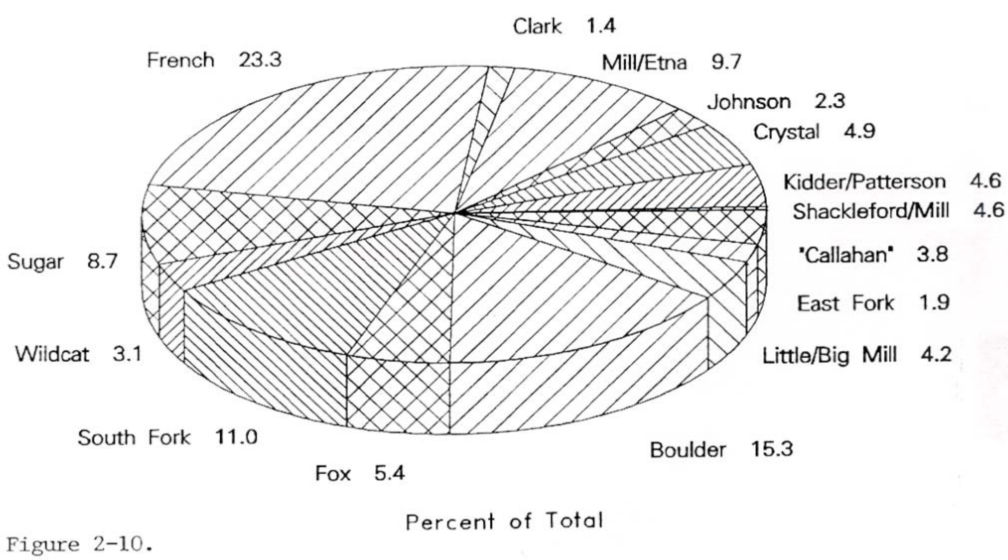


Figure 6-3: Sand-sized Sediment by Sub-Watershed, 1990 (Sommarstrom et al. 1990)



The French Creek source of the sediment problem became targeted in 1990 by the French Creek Watershed Advisory Group (FCWAG), which has focused on road management and monitoring. The major road-related sediment problems were treated within four years. As discussed in Chapter 12, monitoring results since 1992 have shown a sustained reduction over baseline in the amount of fines within pools (using the V* method), dropping from 32% to under 10% (which is considered natural background level) (Power, J. and S. Hilton. 2003. French Creek V* results, 1992-2003, unpublished data, US Forest Service, Fort Jones; Lisle, T. and S. Hilton.).

Recent sediment monitoring in 2000 revealed that the mainstem Scott River appears to be getting coarser in its sediment composition, particularly in the mid-section of the valley near Fort Jones. Fine sediment (<0.85 mm) had significantly declined by 35-56% at these mid-valley sites; 10 of 12 river sites showed reduced fine sediment levels, with the highest site at 17% fines < 0.85. For the tributaries, two of the sites showed slight increases and two small decreases. (Sommarstrom, 2001). More discussion of sedimentation data and issues can be found in Chapter 5 - Historical conditions, Chapter 10 - Geology & Soils, and Chapter 12 - Water Quality.

Lack of Streamflow: In prolonged droughts, large portions of the mainstem Scott are completely dry (i.e., 1924, 1977, 1991, 1994, 2001 and 2002). Low flows, occurring June to November in most years, are a common condition in the mainstem Scott and some major tributaries. While some streams naturally dry up, these flows are believed to significantly impact salmon and steelhead production. Low flows can impede the migration of adult Chinook and coho salmon through the canyon reach preventing these fish from reaching more suitable spawning habitat available in the lower valley reaches. Under these conditions Chinook salmon are forced to spawn in the lower river in areas that are undoubtedly more vulnerable to redd scour during floods that can occur in the preceding winter season when eggs are still incubating in the gravel. Reports have identified the dewatering of streams in the Scott system to be a problem (CDFG, 1974; West et al. 1990). Many thousands of juvenile salmon and steelhead are stranded each year due to dewatering of streams in the Scott River Watershed, based on CDFG fish rescue records. There is a potential for chinook redds to become dewatered in extremely dry falls, if rainfall causes instream flow levels to rise temporarily (Quigley personal communication). The CRMP Water Action Plan seeks to facilitate increased streamflows and reconnecting stream reaches, with an initial emphasis on fall flows.

Streamflow usually goes subsurface in the lower reaches of Etna, Patterson, Kidder (including Big Slough), Moffett and Shackleford Creeks each summer through early fall. Most eastside drainages and gulches are considered ephemeral streams, only flowing temporarily during high rainfall periods. If these flows coincide with the salmon and steelhead spawning season, spawning could occur there but rearing would likely occur elsewhere.

Fish Passage Barriers

Fish passage barriers exist mostly due to the geology of the streams. Barriers during certain times of the year do not pose a detrimental affect to fish. Therefore they do not necessarily adversely effect rearing in the streams.

During summer months, particularly in dry water years, flows at the mouths of some tributaries can become reduced to the point that movement of juvenile and adult fish, either upstream or downstream, is impaired or prevented.

Other barriers include some diversion dams on tributaries. A partial inventory and assessment has occurred on County and some USFS maintained crossings. Very little work has been done to assess private crossings (Taylor, 2002). Known barriers for juvenile passage exist at the Quartz Valley Mine on lower Mill Creek, Big Mill Creek (East Fork of Scott River) at a HWY 3 crossing (Cal-Trans), and on Jackson Creek and on National Forest Service lands. At very low flows, adult fish passage barriers occur in the lower canyon area. The need for a survey to gain more knowledge of barriers caused by diversions has been expressed by some members of the community.

For adult migration of fall Chinook it has been found that 30 cfs at the USGS will move fish into the valley. Summer juvenile rearing for Steelhead and coho barriers are present when streams are dry. CDFG code 5937 required fish passage over dams and impoundments (not natural) (Black, personal communication).

Unscreened Diversions: Each year, many juvenile salmon and steelhead and some adults enter unscreened agricultural diversions and are lost. While a focused fish screen program began for the Scott in 1938, the effort to screen all ditches is not yet complete. Cooperatively, over 75 fish screens have been installed and 85 to 90% of operating diversions within known or suspected coho habitat are currently screened. The RCD has funding for an additional 15 fish screens. Since the Scott River Adjudication in 1980, most river pumps have been replaced with wells and only a very few remaining river pumps are still operating.

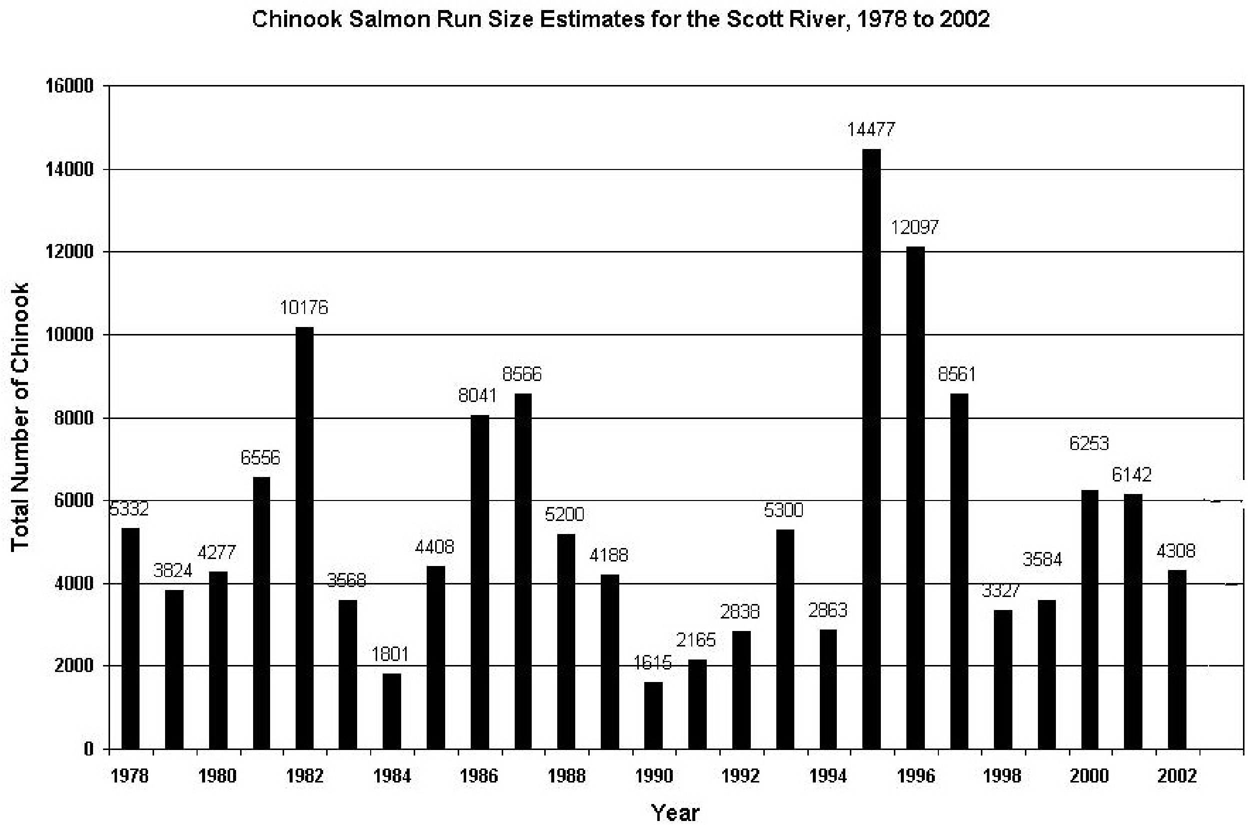
6. FISHERIES

Summary of Findings

Fish Population Findings

Chinook: Fish population information for the Scott is best for Chinook salmon. The preliminary estimate for the 2003 fall chinook run size for the Scott River is about 10,000 (Hampton personal communication).

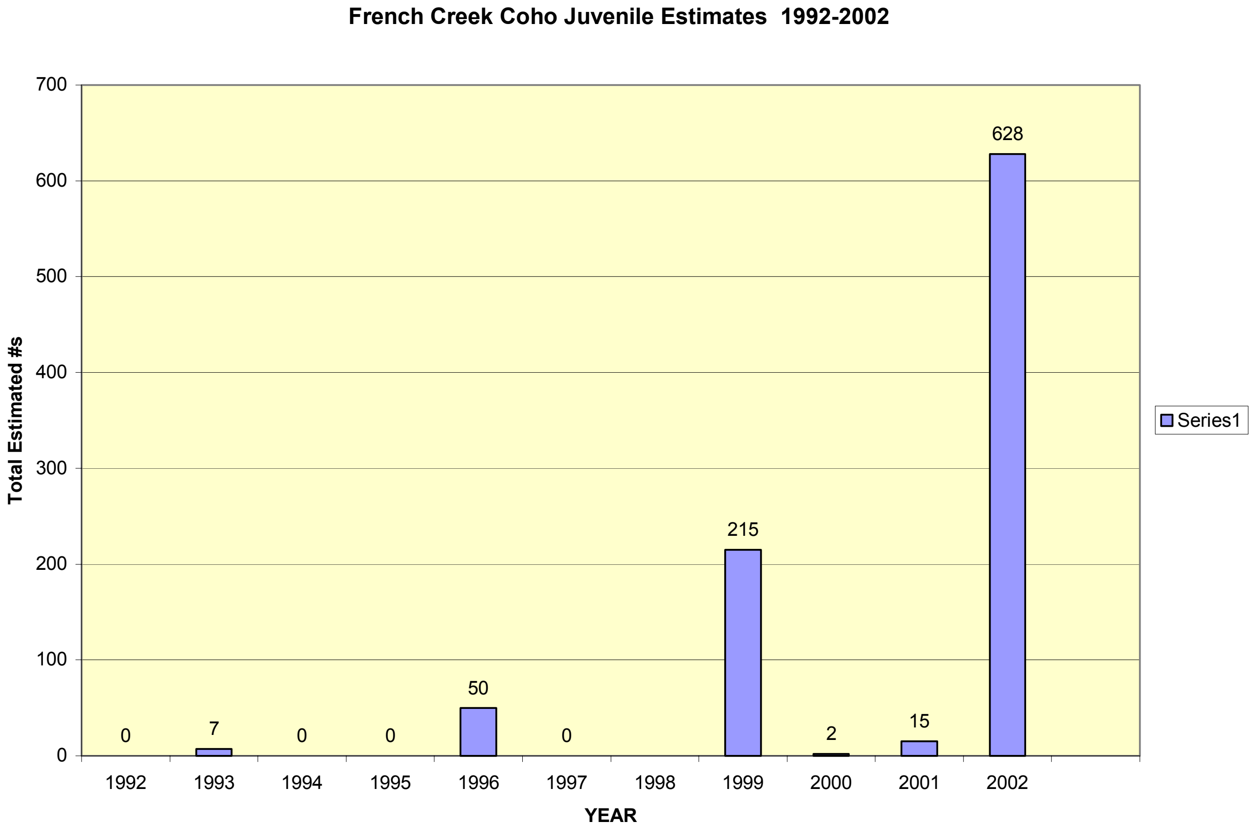
Figure 6-4: Fall Chinook run size estimates for the Scott River, 1978-2002.



6. FISHERIES

Coho: The best coho data in the Scott River are the juvenile coho measurements collected through annual (September) electrofishing monitoring at 6 sites in French Creek and its tributaries since 1993 by CDFG. Note that fish were only found every 3 years until 2000, and now are being observed every year. The reason for the two weak coho return years and the one strong one is not clear, but one possible explanation is that this pattern is the result of devastating effects from major flood and/or drought years in the past (Maria personal communication).

Figure 6-5: French Creek Coho Juvenile Estimates 1992-2002



Adult coho spawning surveys were performed in 2001-2002 and in 2002-2003 through a coordinated effort by several interested and responsible parties. The final reports including data collected during these surveys can be found in the RCD office library, which is available to the public. To summarize the findings, see Table 6-d.

In 2003, the Department of Fish and Game conducted a presence/absence survey by diving or electro fishing in ten pools each within the lower, mid and upper reaches of known or suspected coho streams. The survey provides indicators when coho are present. Only one coho needs to be observed to indicate presence. The results of the 2003 survey are summarized in Table 6-e. (Maria personal communication)

Table 6-d: Summary of findings from Adult Coho Spawning Surveys 2001-2002/2002-2003

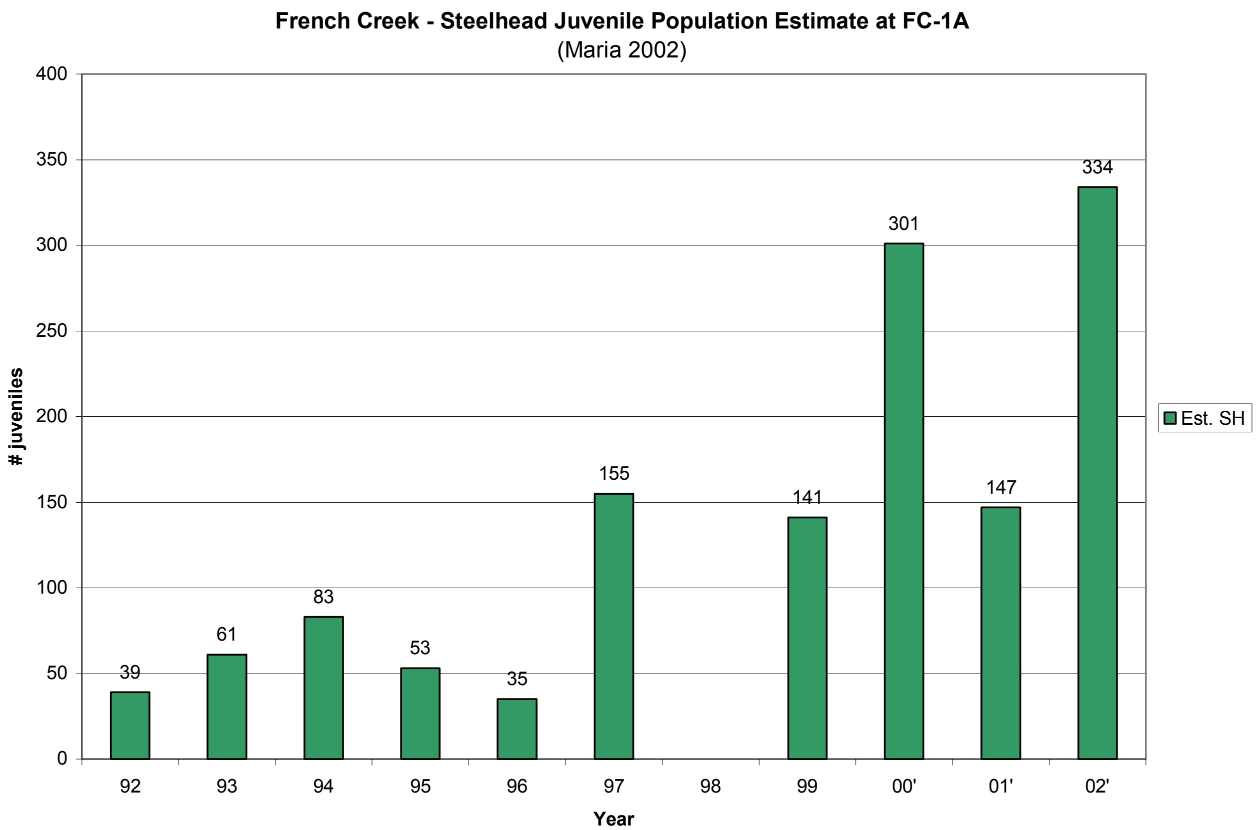
	2001-2002	**2002-2003**
Tributary Miles	23.7	33.9
River Miles	0	12.1
Redds (nests)	212	20
Live Fish	173	17
Carcasses	115	2

Table 6-e. Presence/Absence Survey Results, 2003 (CDFG)

Stream	**Results**
Mill Creek at Scott Bar	Coho present (1 young of the year near mouth)
Tompkins Creek	No coho present
Kelsey Creek	No coho present
Canyon Creek	No coho present
Mill/Shackleford Creek	Coho present in each stream
Sugar Creek	Coho present (1 yearling)
French Creek	Coho present (1 yearling)
Miners Creek	Coho present (several yearling coho and approximately 10 young of the year coho)
Wildcat Creek	No coho present
Big Mill Creek	No coho present
East Fork Scott	Coho present (1 yearling)

Steelhead: Spawning surveys for steelhead have occurred irregularly, most recently in 1988/89 in the lower Scott and Shackleford Creek (West et al, 1990). The best steelhead data for the Scott River are the measurements made by CDFG for the annual monitoring effort of juvenile steelhead in French Creek since 1992 (French Creek WAG 1992). This figure represents the estimated numbers of juvenile steelhead found at one of the six sites – the lower site below Miner's Creek confluence. Annual variation is apparent, but the average population in this reach has been appreciably higher in the past 6 years than for the first part of the 1990 decade.

Figure 6-6: French Creek – Juvenile Steelhead Population Estimate at FC-1A



6. FISHERIES

Fish Habitat Findings

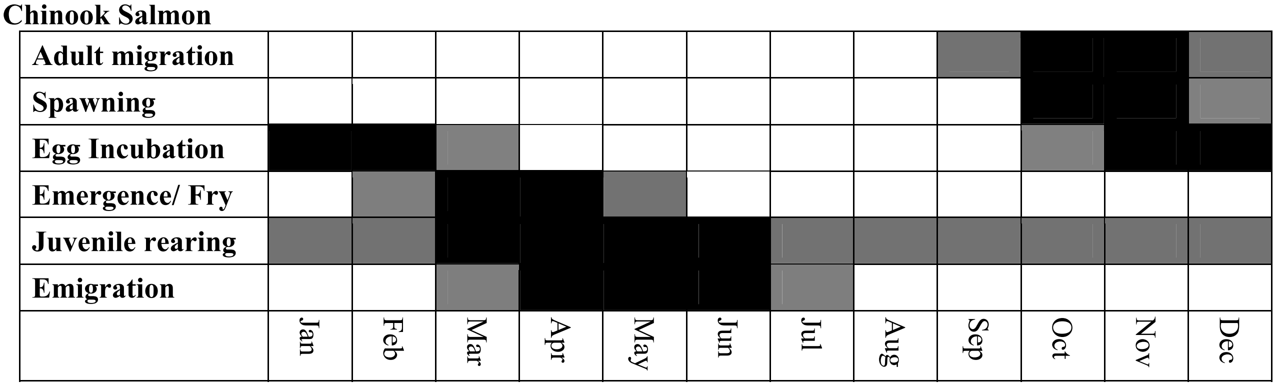
Habitat conditions for the spawning, rearing, and holding needs of salmon and steelhead vary widely within the watershed. Some streams or sections of streams affected by little or no development have habitat that is in relatively good condition, such as some of the tributaries located in the canyon. At the other extreme are sites where both quality and quantity of the stream habitat are poor. Habitat conditions in some sections of the Scott River and in some of its tributaries are not well documented. Efforts are currently underway to channel and habitat type the mainstem Scott River and select tributaries to improve our understanding of current habitat conditions.

Riparian cover conditions range from poor to excellent in the valley, canyon, and upland reaches of the Scott River drainage. As noted in the previous historical discussion, mining, floods, lowering of water tables, changes in the river channel, flood control practices, and some agricultural practices have contributed to lack of riparian cover in many of the valley reaches. This legacy of historic uses and changes is pervasive in the watershed and can forestall recovery of stream habitat without a thorough understanding of their implications.

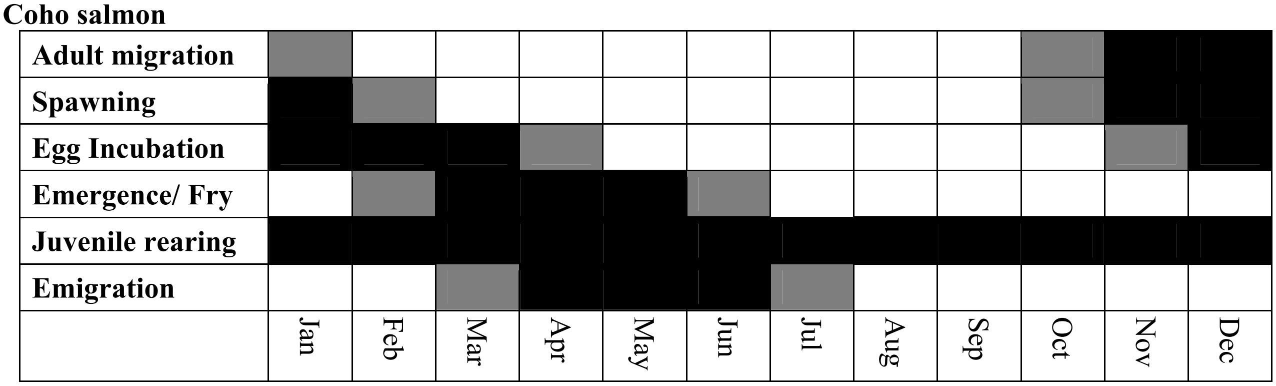
To indicate the timing for increased habitat needs a chart of spawning, egg incubation, and migration periods for salmon and steelhead in the Scott River is provided in Figure 6-2.

Figure 6-7. Seasonal presence by life stage of Chinook and Coho salmon and steelhead in the Scott River Watershed.

Chinook Salmon

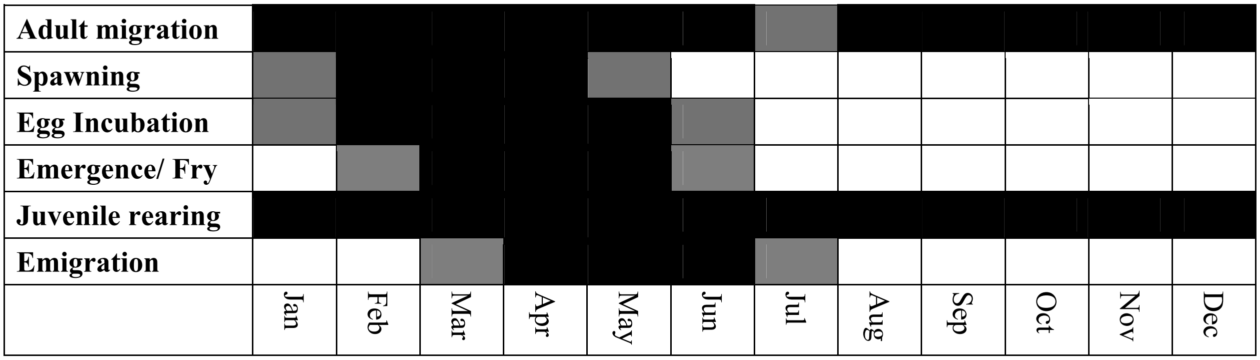


Coho salmon



6. FISHERIES

Steelhead



Note: *Dark shading indicates months of peak activity for a particular life stage; the lighter shading indicates months of lesser activity.*

6. FISHERIES

Reference to past and current projects

The following actions have been taken to help our understanding of fish population and habitat needs:

1. Monitor and maintain records of adult escapement of coho, Chinook, and steelhead.
2. Monitor and maintain records of outmigration of adult coho, Chinook, and steelhead.
3. Gather DNA tissue samples from surveys.
4. Implement and continue a Fish Screening Program.
5. Implement a full evaluation of any proposal for artificial propagation of anadromous salmonids (this is being done by CDFG, Hatchery Operations Committee).
6. Request information that will improve our understanding of the process and protocol used in CDFG's fish rescue project.
7. Perform habitat assessments.
8. Conduct adult spawning surveys.
9. Identify limiting factors by life stage.
10. Siskiyou County-maintained stream crossing assessment.

Specific projects that have been implemented for fisheries include:

- Fish Screen Program – ongoing, 1994-present (RCD #93, 86I, 86II, 66, 53, 57, 69, 79, 86III, 61, 48, 61II, 61III, 63, 65, 35, 38, 40, and 86IV)
- Orleans Rod and Gun Club Steelhead Rearing Project, 1994 (RCD #orleans)
- Canyon Creek Spawning and Gravel Development, 1995 (RCD #gravel)
- Mill Creek Corridor Restoration, 1998 (RCD #58I)
- Adult Coho Spawning Surveys, 2001 and 2002 (RCD #34)
- See Section 9 for habitat projects

Goals, Objectives, and Strategic Actions

F1) **GOAL** (originating committee = Fish Committee):

Increase and/or maintain native anadromous salmonid populations at self-sustaining levels.

Objective F1-A	*Priority: High*	*Strategic Action Code And Term*	*Strategic Action Description*
Improve understanding of basic life history requirements, population trends, and habitat preferences of all species of anadromous salmonids in the Scott River watershed.		F-1-A.a 2 year	Continue and/or increase efforts to monitor spawner escapements within the watershed. Continue and/or increase efforts to monitor and evaluate juvenile habitat utilization, survival and outmigration.
		F-1-A.b 5 year	Support and encourage studies of life history patterns and identify limiting factors for Scott River watershed anadromous salmonid stocks.

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Objective F1-B	*Priority: Medium*	*Strategic Action Code And Term*	*Strategic Action Description*
Improve understanding of natural processes (historical and on-going) occurring within the Scott River watershed which directly or indirectly impacts the quality and quantity of the aquatic environment.		F-1-B.a 5 year	Support efforts to complete a comprehensive Scott River Watershed Assessment.
		F-1-B.b 10 years	Identify, prioritize and seek funding for fish habitat riparian restoration opportunities as identified in the Scott River Watershed Assessment (see Vegetation and Habitat Restoration section)
Objective F1-C	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Identify unique or distinguishing genetic characteristics of Scott River watershed anadromous salmonid stocks.		F-1-C.a 5 year	Support and encourage the analysis of genetic tissue samples collected from Scott River watershed anadromous salmonids.
Objective F1-D	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Continue to support the California Fish and Game Commission's policy to prevent the introduction of non-native fish into the Scott River system (anadromous waters).		F-1-D.a 10 year	Encourage CDFG to investigate relationship of lake stocking, rainbow to steelhead and native resident trout.
Objective F1-E	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Prevent the loss of anadromous salmonids by stream diversions		F-1-E.a 2 year	Develop a procedure for monitoring the effectiveness of screened diversions.
		F-1-E.b 2 year	Continue program for maintenance and periodic replacement of screens to help maintain proper functioning.
		F-1-E.c 2 year	Review inactive and unknown diversions for future and potential screening.

		F-1-E.d 2 year	Continue fish screening program.
Objective F1-F	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Evaluate feasibility of a temporary fish rescue program that has a high likelihood of success until such time that anadromous salmonid habitat and hydrologic connectivity is improved and/or increased in the mainstem and tributaries.		F-1-F.a 2 year	Evaluate results and monitor success of fish rescue program through mark/recapture studies; spawning ground surveys; direct observation dives.
		F-1-F.b 5 year	Determine current stocking of areas under consideration for relocation of rescued fish.
		F-1-F.c 10 year	Relocate rescued fish to fill rearing capacity in natural streams, if and where feasible.
		F-1-F.d 10 year	Evaluate the feasibility of an alternative rescue operation (e.g. Kidder Creek, Tailing Ponds, Kelsey Channel, etc.).

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ADDENDUM
06/25/2004

Section 6: Fisheries

Description of Current Conditions and Issues

Introduction

An instream habitat inventory was completed on selected streams in the Scott River Watershed during the summers of 2002 and 2003. Streams were selected based on known or suspected use by anadromous salmonids, (coho, chinook, or steelhead) as well as previous habitat restoration efforts. The California Dept. of Fish and Game Protocol was used (*California Anadromous Salmonid Habitat Restoration Manual* 1998)

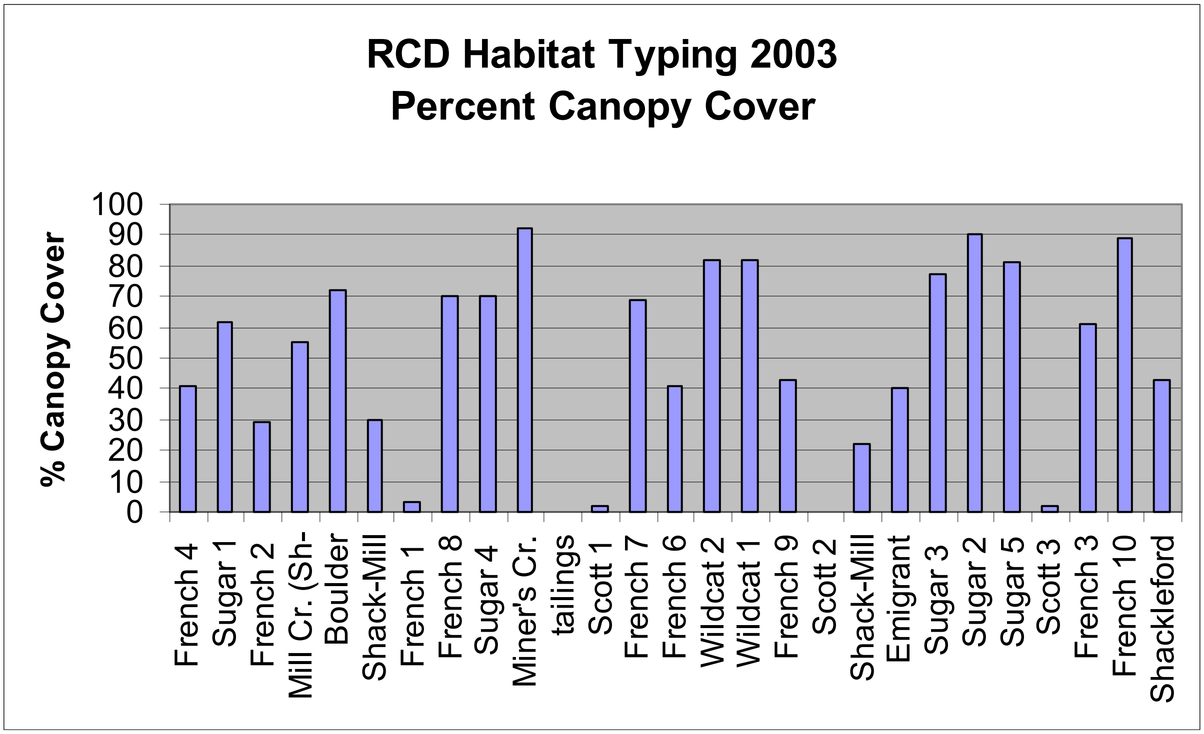
Stream habitat survey was completed in 2002 on the Scott River Mainstem in the lower canyon; from the confluence with the Klamath River to the mouth of Kelsey Creek. Streams surveyed in 2003 included: Scott River mainstem (Scott valley portion from Horn Lane to above Fay Lane, canyon mainstem from Kelsey Creek to Meamber Gulch Creek, and mainstem tailings from Sugar Creek to the vicinity of Wildcat Creek) Shackleford Creek, Mill Creek, French Creek, Miners Creek, Sugar Creek, Wildcat Creek, and Boulder Creek. All streams have the documented presence of anadromous salmonids, during some part of the year (fish life cycle). In all a total of 17.4 miles of tributary and 32.5 miles of mainstem Scott River were surveyed in 2002 and 2003.

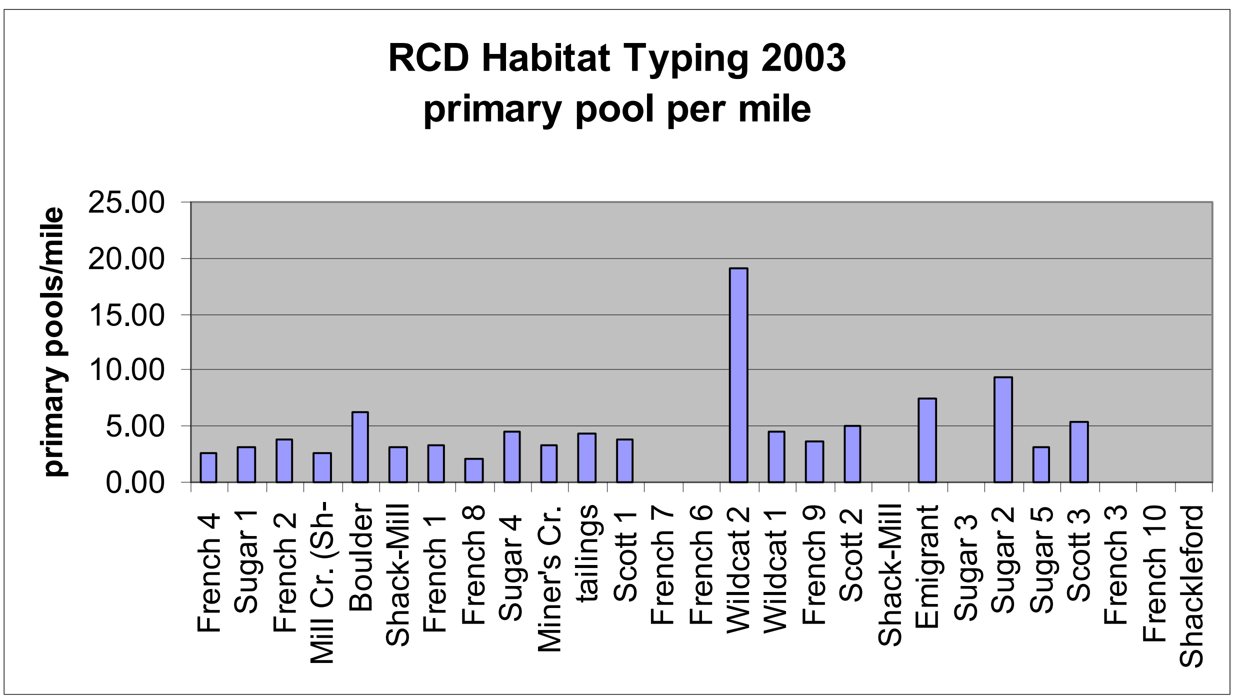
The purpose of this habitat inventory was to: 1.) collect instream habitat and water quality data in streams currently used by salmonids, 2.) establish a relative scale of habitat quality for the Scott River. 3.) evaluate the success of selected instream restoration projects. 4.) Provide a framework for prioritizing locations for potential restoration efforts.

Methods

The key habitat elements surveyed were water temperature, riparian canopy, pools (number, size and instream cover type), aquatic insects, and substrate. Details on the sampling strategy and data collection are provided in the Methods section.

6. FISHERIES – ADDENDUM 06/25/2004





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Stream	length (mi)	# pools		pools >3'	# pools mile	3+/mile	pool/mile	
Shackleford	0.72	4		0	6	0	5.533141	N/A
Sh-Mill	5.60	18.00		7.00		1.25	3.214286	Med/High
Mill Cr. (Sh-MI)	2.30	19		6	8	2.605048927	8.249322	High
French	5.43	38.00		13.00		2.394106814	6.998158	High & Low
Miner's Cr.	0.61	8		2	13	3.25223283	13.00893	High
Boulder	2.09	42		13	20	6.205587198	20.04882	High
Sugar	3.00	35.00		13.00		4.333333333	11.66667	Med/High
Wildcat	0.55	7.00		4.00		7.272727273	12.72727	Low
Scott	6.40	31.00		30.00		4.6875	4.84375	varied
Tailings	2.09	26		9	12	4.312942458	12.45961	High
Emigrant	0.13	3		1	23	7.521367521	22.5641	Med/High

	Water Temperature		Macroinvertebrates BIBI (max score of 50)	
Tributaries	Ave MWAT	2003	Spring	Fall
Shackleford-Mill	No Data	No Data	No Data	No Data
Shackleford	No Data	No Data	No Data	No Data
Mill Creek	No Data	No Data	No Data	No Data
Emmigrant	No Data	No Data	No Data	No Data
Lower French	67.8 F	66	50	32
Upper French	61.5 F		44	44
Miners	No Data	No Data	No Data	No Data
Sugar Creek	62.9 F	62.4	48	46
Upper Sugar Creek	59.7F (15.4C)		No Data	No Data
Wildcat Creek	No Data	No Data	No Data	No Data
Boulder	No Data	No Data	No Data	No Data
Mainstem				
Scott @ Johnson Bar	No Data	No Data	34	18
Scott @ Meamber Gulch	68.40	66.5 F	30	28
Scott near Shell Gulch	No Data	No Data	24	24
Scott Cantara	67.10	68.4 F	No Data	No Data
Scott Tailings	68.40	68.7 F	No Data	No Data
Scott near Wildcat	No Data	No Data	30	38
East Fork	68.40	71.8 F	32	36
South Fork	60.80	63.3	46	44

Siskiyou RCD Habitat Typing 2003
Coarse Woody Debris Totals

	pieces of wood per mile			
	D>4"	all D>1'	D>1' L>20'	D>18"
Shackleford-Mill – Reach #1	57.0	36.8	33.4	3.0
Shackleford-Mill – Reach #2	36.2	16.1	4.0	12.1
Shackleford Cr.	5.1	1.3	0.0	1.3
Mill Cr. (Shackleford-Mill)	42.9	4.7	1.9	1.6
Emigrant Cr.	376.1	90.3	30.1	37.6
French – Reach #1	39.6	16.3	10.2	2.0
French – Reach #2	42.8	41.0	39.1	5.5
French – Reach #3	200.8	180.7	155.6	15.1
French – Reach #4	77.3	46.9	45.0	0.0
French – Reach #5	88.9	61.1	61.1	0.0
French – Reach #6	48.4	40.8	40.8	0.0
French – Reach #7	113.1	43.7	43.7	3.0
French – Reach #8	72.2	3.8	3.8	2.9
French – Reach #9	40.9	16.9	1.2	2.4
French – Reach #10	172.3	0.0	0.0	0.0
Miners Cr.	79.7	8.1	3.3	1.6
Scott River – Reach #1	14.5	10.3	9.3	0.0
Scott River – Reach #2	7.5	6.3	1.3	0.6
Scott River – Reach #3	14.5	16.4	11.6	1.9
Sugar Cr. – Reach #1	111.5	157.9	118.1	1.3
Sugar Cr. – Reach #2	107.3	71.6	67.8	3.8
Sugar Cr. – Reach #3	117.1	34.2	29.3	0.0
Sugar Cr. – Reach #4	105.4	44.5	41.6	1.5
Sugar Cr. – Reach #5	196.5	135.9	111.9	12.5
Wildcat Cr. – Reach #1	10.8	0.0	0.0	0.0
Wildcat Cr. Reach #2	0.0	0.0	0.0	0.0
Boulder Cr.	121.3	115.1	103.7	3.5

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Summary of Findings

Results and Stream comparison

High mountain streams (Sugar Creek, Boulder Creek and Upper French)

The Sugar Creek and Boulder Creek Watersheds are approximately the same size; 8,000 acres. Land use in these watershed is dominated by public and private timber land, and wilderness. The entire French Creek Drainage is 20,584 acres, land use is public and private timber land, wilderness area, small residences, and agriculture (in the lower section). Sugar Creek also has some small private residences. All of Boulder Creek (2.1 mi), and the upper 1.82 miles of Sugar Creek habitat typed were B channel (Reaches # 3-5). Upper French Creek was surveyed from the confluence with Miners Creek, to just below the confluence with the North Fork, then from approximately 1 mile above the North Fork to Paynes Lake Creek, channel type varied between B and F channel. A comparison of stream reaches follows. The main difference between the streams is the steeper gradient found in Boulder Creek.

Pools

Habitat conditions were comparable between Sugar and Boulder Creeks. In Boulder Creek, pools made up 13% of total length, and 10% for Sugar Creek. Both streams had a majority of primary pools (87% and 85% respectively), and pools greater than 3 feet (21% and 30%). Pool shelter values were high in Boulder Creek, and med-high in Sugar Creek. Sugar Creek showed better riffle cover than Boulder, with wood, and aquatic and terrestrial vegetation. This is probably partially a factor of the steeper gradient in Boulder Creek. Upper French Creek(above the confluence with Miners Creek) had a variation in habitat. Pools in Reach #7 (below North Fork) and # 8 (above N. Fork) had the best pool quality, while pools in Reach #9 were dominated by boulders.

Spawning

Both Boulder and Sugar Creek had a high percentage of pool tail-outs designated as unspawnable, due primarily to large boulders and bedrock. Sand appears to dominate in most habitat types in Sugar Creek, and potential upland sources should be investigated. Pool tail-out substrate in Upper French Creek was predominately boulder, with small and large cobble.

Overall Habitat Quality

Overall, physical habitat and water quality indicate that Boulder, upper French and upper Sugar Creek would provide adequate rearing habitat for salmonids. None of these stream reaches provide an abundance of spawning habitat, due to substrate being dominated by boulders and/or bedrock. Pool cover complexity is good in these reaches. However, the amount of pools is low, as is the percentage of cover in pools. Boulder Creek may have several potential fish passage barriers, including gradient and logs, these should be investigated in the future. Water temperature data and macroinvertebrate samples taken in both Sugar Creek and Upper French Creek show consistent water quality throughout the summer months. No water quality data was collected in Boulder Creek.

Alluvial Valley Streams (French-Miners, Shackleford-Mill, Lower Sugar)

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The lower sections of French, Shackleford, and Sugar Creek are low gradient, 1-2%. These are natural sediment deposition areas. The significant difference between these watersheds is that Shackleford-Mill is primarily ultramaphic rock, while French Creek and Sugar Creek have large granitic deposits, which is highly erodible. Shackleford-Mill Creek drains a total of 31,869 acres, and the French-Miners Creek drainage totals 20,854 acres.

All reaches in Shackleford-Mill, lower Sugar Creek (Reach # 1 & 2), and lower French Creek (Reaches # 1-6) had less than 2% slope, and were channel typed as F channel. In dry years Shackleford-Mill and French Creek can go subsurface near their confluence with the Scott River, while Sugar Creek typically has year round flow. Anadromous salmonids have been documented as spawning in all stream reaches, and have been documented as rearing in all streams.

Habitat quality overall was highest in lower Sugar Creek, and Shackleford-Mill. Habitat quality was varied in French Creek. French-Miners Creek showed good quality of habitat in many reaches; with good cover complexity. However, habitat type data shows that sand dominates in many habitat units, particularly in Miners Creek and Reaches # 1 & 2 of French Creek.

Pools

All three streams had reaches which ranked in the highest for pool quality surveyed in the Scott River in 2003. This ranking is based on complexity of cover, and amount of cover. French Creek Reach # 4 had highest pool quality of all reaches surveyed in the Scott River, followed by Sugar Creek Reach # 1, French Creek Reach # 2, then Mill Creek and Shackleford-Mill # 2 (these two reaches are contiguous)

Spawning

Shackleford-Mill (Shackleford Mill # 1 & 2 and Mill Creek) showed the least amount of sand, and had suitable spawning gravel throughout. Lower French Creek had a high percentage of sand, but Reach # 2 showed adequate spawning gravels. Adult coho have been seen in this section of French Creek. Upper French Creek was dominated by large substrate, and should not be considered spawning grounds. Lower Sugar Creek had adequate spawning gravels, and coho spawning has been documented in the lower reach. However, Reach # 1 in Sugar Creek was short, and the unsurveyed reach between #1 and #2 potentially has spawning habitat. (coho have been documented as spawning in this reach. *Maurer 2001*)

Overall habitat quality – alluvial tributaries

Habitat inventory on Shackleford-Mill indicated high quality habitat, in those sections that have year round flows. However, habitat is limited in Shackleford-Mill due to connectivity problems, both in Mill Creek, and Shackleford Creek. Sections of stream go subsurface in mid-July, and in a late rainfall year might not flow again until December (2003 Adult coho survey observation-Siskiyou RCD). Coho are known to use this system at all stages of the life cycle, and steelhead also use Shackleford-Mill. Water quality data has not been collected in the alluvial sections, and should be a priority for future monitoring.

Habitat quality was varied in lower Sugar and lower French Creek. Both systems were dominated by sand, in the lower channel sections. All pools in French Creek showed a high percentage of sand as substrate. Sand also showed up in Sugar Creek (primarily in the slow water glides and runs in the lower section). Both French and Sugar Creek had a low percentage of pools, indicative of the sediment problem. However, in both French and Sugar Creek, pool cover complexity was good, although the percentage of pool covered was low. All three streams are used by coho salmon for spawning.

Mainstem Scott River- Horn to Fay Lane and Tailings

Horn Lane to Fay Lane

This reach of the Scott River includes the mouth of French Creek. Riparian replanting and fencing covers 100% of the river corridor, and extensive instream work has been done in this reach (Cantara Fay Lane Project 1996).

Tailings

The reach is in the tailings outside of Callahan, from below Sugar Creek to below the mouth of wildcat Creek.

Pools

The reach from Horn Lane to Fay Lane had a large percentage of pools greater than 3 feet deep. Pool cover complexity was medium quality, primarily roots and boulders. However, the percent pool covered is low. The tailings reach (Sugar Creek to the vicinity of Red Bridge) showed 47% of pools with depth greater than 3 feet, and 34% pools by length. Pool cover was primarily aquatic vegetation.

Spawning

Gravels in both reaches were suitable for Chinook spawning (gravel and small cobble). Suitability of gravels for spawning appears to increase above the mouth of French Creek. The entire reach from Horn Lane to above Fay Lane supports chinook spawning, and has heavy spawning activity annually. In many years Chinook do not typically have access to the tailing reach, as it can dry out in late summer.

Overall habitat quality

Water temperature data collected in both reaches is outside the preferred range for salmonid summer rearing. Riparian cover in this stretch of the river is 0%, and flood prone channel is filled with cobble/gravel which reflect back a large amount of heat. The deep pools offer some thermal refugia, but little instream cover. In the fall, during the Chinook spawning period, the cooler, shorter nights have generally brought water temperatures down to a suitable range.

Mainstem Scott River Canyon

A total of 24 miles of the Scott River Canyon were surveyed in the summer of 2002 and 2003. This reach was from the confluence with the Klamath River to Meamber Gulch (below Fort Jones). Channel type was B from the confluence to the USGS gage (RM 21). From there to the mouth of Meamber Gulch Creek the channel type was F. Pools in the B channel were all greater than 3 feet in depth, this section of the river is boulder dominated. This section of the river has several major tributaries (Kelsey, Canyon, Thompkins, Boulder). Exact flow volumes in this reach are unknown, but the reach is a gaining reach until the mouth. The F channel section is above the USGS gage, and has no major tributaries contributing flow. Flow is significantly less than that downstream. Fifty percent (50%) of pools had a depth greater than 3 feet.

Pools
The lower canyon (B channel) has deep pools, which likely provide thermal refugia. However, in this section of the Scott River, cover is dominated by boulders. In the F channel, only 50% of pools had a depth greater than 3 feet, however, cover was primarily undercut bank.

Spawning
Chinook salmon are know to spawn the entire reach of the Scott River mainstem from the mouth to Fay Lane, if flow conditions allow. Some sand is present in the canyon, but overall spawning gravels are not heavily embedded.

Overall habitat quality
Overall, the mainstem has deep pools, and a relatively high frequency of pools. However, pool cover complexity, and percent cover, are low. Summer rearing habitat in this section is not optimal, water temperatures are also high. However, the mainstem provides consistent habitat for adult Chinook spawning, and potentially for adult coho as well.

Habitat type data was collected in the Scott canyon in 1989 by the USFS. A comparison should be made, focusing on the # of pools, pool depth, and substrate.

Recommendations

Future Habitat Assessment and Inventory

Tributaries
Shackleford-Mill (above and below the confluence with Shackleford Cr.) should be added as a water quality monitoring location; specifically year-round temperature and macroinvertebrates. Given the relatively high quality of habitat, and the fish use, it is important that conditions be documented.

It is also recommended that a water quality site be added on Miners Creek. In addition, a V* site should be added in lower French Creek, in addition to the existing site above the confluence of Miners Creek.

Mainstem
The reach between Scott 3 and the upper tailings was not surveyed in 2003(above Fay Lane to Sugar Creek). It is recommended that this reach be a high priority for future habitat inventory and water quality data collection. FLIR data collected by the SWRCB in 2003 indicated the presence of seeps/springs throughout the tailings. These may provide localized regions of rearing habitat. Of particular interest is the westside channel. This channel is currently disconnected from the rest of the mainstem, but maintains year round flows.

6. FISHERIES – ADDENDUM 06/25/2004

Fish Habitat Utilization Studies

It is suggested that French Creek Reach #4, Sugar Creek Reach # 1, French Creek Reach # 2, Mill Creek, and Shackleford-Mill be included in a pilot project to study actual summer and winter habitat usage by juvenile salmonids. It is also recommended that French Creek Reach # 2 be included as an index reach for Adult Coho Spawning, and that the effort is made to include the unsurveyed reach of Sugar Creek in future Adult Coho Spawning Ground Surveys.

It is also suggested that the stretch of mainstem from Fay lane through the tailings be investigated for potential winter and summer rearing.

Continued Restoration Efforts

Riparian replanting efforts should be continued in the Scott River mainstem, and the lower alluvial reaches of the tributaries. The National Riparian Service Team visited the Scott River in April 2004, and toured selected locations in the Scott River mainstem and tributaries. The team made the following recommendations;

Tributaries

1. Restoration activities in tributaries of the Scott River watershed needs to address regrowth of riparian vegetation and replacement of the large wood that has been lost. The streams will begin to function properly when riparian vegetation and large wood can again trap sediment, infiltrate water, aid in floodplain development, and dissipate energy. Restoration of tributary streams is important to salmon recovery in the mainstem because of their influence on water and sediment delivery.

    1. *Improve riparian zones*

       A program to assess riparian zones and then develop management and monitoring strategies designed specifically for each reach needs to be implemented. Each reach of stream has differences in elevation, soils, landform, runoff patterns, and many other attributes that must be assessed separately. Recovery efforts must be tailored to the potential of that stream reach based on its unique attributes.

       - *Grazing management to encourage riparian recovery*

         Grazing management in riparian areas needs to focus on recovery of riparian vegetation. Techniques are currently available that will allow livestock grazing to continue while putting riparian vegetation in a recovery mode.

       - *Road management*

         A coordinated road management program for Scott River watershed is needed. A comprehensive inventory of road condition, use, ownership and affects on tributaries should be implemented to prioritize potential areas of work.

         Decommissioning, relocation, and road maintenance will improve overall tributary and floodplain function.

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Scott River
The restoration of the mainstem Scott River needs to address recovery of the channel elevation, expanding the riparian corridor and determining the effects of the dredger tailings on the river's function.

1. Tailings
A study to determine the effects of dredger tailings on the Scott River floodplain function should be initiated. The goal of the study will be to determine what treatments may be needed and might be effective in improving upper valley stream function.

2. Riparian zones
The restoration of riparian habitat along the length of the river should continue. Evaluation of riparian restoration techniques should continue. Adaptive management should be employed to eliminate those techniques that are marginal or unsuccessful and improve on those that have promise. Monitoring of techniques and success/failure rates should be incorporated into any watershed restoration efforts.

Wherever possible the riparian zone along the river should be managed to provide greater root strength for holding banks and retaining water in the floodplains. Landowners should be encouraged to grow more riparian vegetation along the banks of the river to add to the overall stability of the system. A greater mass of vertical and horizontal structure will serve to stabilize the river during peak flow events.
Efforts should be initiated to research the ecological and economic feasibility of growing commercial cottonwood plantations along the river adjacent to a wide fully protected natural buffer. This could provide a wider zone of root strength needed to stabilize the floodplain.

3. Scott Channel Improvement
Efforts should be initiated to model reconfiguration of the Scott River channel from Young's Dam to the outlet of Scott Valley. The objective of this effort would be to determine the feasibility of raising the bed level of the river to improve floodplain water retention.

4. Floodplain Water Storage Capacity
A study to determine the extent of the potential underground water storage capacity should be initiated.

In addition, continued effort should be made to identify and address the potential sediment issues in Sugar Creek and French Creek, and other tributaries. Data collected by the State Water Resources Control Board for the development of the Scott River sediment TMDL should provide useful data on road related sediment throughout the watershed.

It is recommended that immediate habitat improvement projects focus on the tributaries for the following reasons: tributaries surveyed in the Scott River in 2003 already provide some areas of adequate spawning and rearing habitat for salmonids, and would likely respond quickly to restoration efforts.

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History

CALIFORNIA DEVISION OF FISH AND GAME – STREAM SURVEY, June 1934

Reaches surveyed:

1. From mouth to Klamath National Forest boundary:
    - 100 yards above mouth
    - 1 mile below Tompkins Creek
    - Klamath National Forest boundary
2. From Klamath National Forest Boundary to 34 miles South to Callahan:
    - Meamber Creek 2 miles West of Shackleford Creek
    - 1 mile South of Fort Jones, at highway crossing bridge
    - 100 feet below mouth of Wildcat Creek
3. Entire East Fork:
    - 800 feet above mouth of Mule Creek
    - 100 feet above Grouse Creek Road bridge

7. Summary of Limiting Factors

The SRWC is in the process of developing a Limiting Factors Analysis (LFA) to identify the various factors limiting the production of anadromous salmonids. The initial phase of the SAP will incorporate the analyses at the time data becomes available. Limiting factors for topics other than fisheries will be developed as more information is collected through studies and future phases of the SAP. For a sample of the discussions in progress, refer to Appendix O for a table of Limiting Factors for coho salmon and other species by life stage.

Definition of LFA:

The LFA is a process that seeks to find out what we know and don't know about how anadromous productivity is attained in the Scott watershed. Through the creation of appropriate studies, the LFA seeks to provide answers to critical missing information. The LFA is an iterative process to understand what conditions, either natural or management related, limit anadromous production (bottlenecks). Selected and prioritized restoration processes are then directed at removing identified management related bottlenecks in a collaborative, systematic, and efficient approach. As new knowledge (study results) becomes available or conditions change (restoration), the LFA is updated to reflect this new understanding.

Approach:

This section describes the process used in the current efforts to define limiting factors for anadromous salmonids within the Scott River watershed.

The purpose of using an iterative process of hypothesis development, testing, and refinement is to provide the most adaptive and effective mechanism possible for restoration planning and implementation in the Scott River basin. The approach may be viewed as a model for longer-term adaptive management by stakeholders, who will prioritize, monitor, and refine watershed restoration actions over time.

Step 1: **Assemble and Review Available Information.** We will start by assembling existing information on the requirements of steelhead, coho and Chinook at each stage of their life cycle. We will attempt to find data on Scott River fish whenever possible, but we will also include relevant information on these species from other watersheds. At the same time, we will assemble the existing information on the attributes of the Scott River Watershed as they relate to the requirements of the fish.

Step 2: **Generate Hypotheses for Prioritized Key Questions and Work Plan for Studies.** Once Step 1 is complete, we will review the assembled information and piece together a picture of what is known about the needs and condition of steelhead, coho and Chinook in our watershed. We will follow each species through each life stage, comparing its requirements with the conditions that it is experiencing in our watershed. As we do this, we will identify gaps in our knowledge, and we will come up with hypotheses on what factors we think are limiting the populations of steelhead, coho and Chinook. We will prioritize these hypotheses by how important we think they are in limiting populations. Then we will design studies to collect field data and test the most important hypotheses.

Step 3: **Design and conduct Studies or obtain more detailed analysis of existing information.**

- Design studies to begin testing the prioritized hypotheses.
- Assess the extent of application and the uncertainty associated with study results.
- Studies may involve the collection of new data (fish population numbers, preferred habitat use, life history clarification, habitat quantification, etc.) or a more detailed analysis of existing information.
- Conduct studies.
- As study results indicate, initiate additional studies to further address hypotheses.

Step 4: **Identify Limiting Factors and Possible Means of Removing Them.**

- Analyze study results and existing information. Integrate findings as necessary.
- Evaluate and prioritize the factors most likely to be limiting populations of the three analysis species under current conditions.
- Identify possible means to address limiting factors.

Step 5: **Integrate with Strategic Action Plan.** During the process of developing the SAP we identified restoration actions and priorities for future studies that were specific to the goals and objectives of the SAP. Our intent is to enhance or increase the number actions within the SAP using information derived from the limiting factors analysis. The proposed studies included in the SAP that are linked to limiting factors will be summarized in table format.

LIFE STAGE ANALYSIS/GUIDING QUESTIONS:

The following key questions will be addressed at every life stage.

- What are optimal conditions for this life stage, and when are they needed?
- Where do optimal conditions exist in the watershed at the time needed? And, what conditions currently exist?
- Is habitat with these conditions accessible?
- Where are the fish at this life stage actually found?
- What are the sources of mortality at this life stage that is putting the population at risk?
- How can we;
  - Improve access to optimal habitat?
  - Improve habitat conditions in areas currently used?
  - Reduce mortality?

7. SUMMARY OF LIMITING FACTORS

LIFE STAGES TO BE STUDIED FOR POTENTIAL LIMITING FACTORS:

The following information is provided as a guideline to seek literature and data based on observations and understanding of each life stage. The bullet points indicate potential factors limiting the production of coho salmon and other anadromous salmonid species. These potential factors are defined by the factor limiting population with a sub-set of elements contributing to the factor.

Emphasis in the LFA process will focus on anadromous life stages conducted in the Scott watershed but information in sufficient detail to understand the entire anadromous process outside of the watershed (Klamath River, Ocean) will also be provided. Emphasis on the Scott watershed will highlight restoration to be conducted locally, while knowledge of processes outside of the watershed will help identify restoration or changes in management operations that need to be conducted elsewhere.

I. Adult Migration

A. Estuary

- High water temperature
- Flows – low flow barriers at the mouth
- Disease
- Harvest
- Predation

B. Klamath River

- High water temperature
- Disease
- Harvest
- Flow

C. Scott River

- Flows (attraction, valley access)
- High water temperature
- Low flow barriers
    - i. Mortality
    - ii. Predation
    - iii. Disease
    - iv. Passage
- Lack of habitat (holding habitat and connectivity)

II. Spawning (November – January)

- Poor water quality
    - temperature out of preferred range
    - pollutants/turbidity masking navigational cues

- Degradation of historical population structure
    - loss of some cohorts (2 of 3 brood years)
    - genetic dilution from hatchery-reared fish

- Insufficient number of viable adults
    - inability for pairs to find each other
    - inadequate genetic diversity

- Lack of access to spawning habitat
    - barriers to mainstem habitat
    - lack of access to tributaries
    - altered flow regime

- Inadequate spawning habitat
    - inadequate gravel
    - embedded gravel
    - gravel susceptible to scour
    - insufficient cover near gravel

- Insufficient spawning habitat for population
    - superimposition of redds

- Spawning in diversion ditches

III. Egg Incubation and Alevins in Gravel (December – May)

- Sedimentation of redd
    - inadequate inter-gravel flow through redd

- Disturbance of redd

- Water temperature too low for proper development
    - lack of riparian vegetation
    - insufficient upwelling of groundwater
    - insufficient channel complexity
    - anchor ice

- Redd scouring
    - increased peak flows

- Redd dewatering/ inadequate flow
  - Drought
  - diversions

- Poor water quality
  - pollutants affecting embryos and alevins

IV. Juvenile rearing

A. Spring (March 22 – June 21)

- Water quality
  - turbidity injuring fry and reducing feeding opportunities

- Predation
  - insufficient instream cover (including substrate)

- Food availability/supply
  - low nutrients (few adult carcasses)
  - insufficient riparian vegetation
  - species competition

- Inadequate off-channel habitat (shelter from high flows)
  - loss of side channels, backwaters, and beaver ponds
  - loss of connection between channel and flood plain

- Inadequate instream habitat
  - inadequate pool frequency
  - lack of large woody debris/cover
  - drying of portions of streams
  - insufficient channel complexity
  - distance from emergence habitat to rearing habitat too great

- Displacement and mortality caused by high flows
  - altered flow regime (increased peak flow)

- Stranding
  - drought
  - diversions
  - groundwater use
  - channel aggradation

- Open diversions/non-functioning fish screens

7. SUMMARY OF LIMITING FACTORS

B. Summer (June 22- September 21)

- Temperature out of preferred range
    - insufficient intergravel flow
    - low surface flow
    - insufficient shading
    - channel degradation
    - tail water
    - ground water use

- Water quality
    - pollutants and eutrophic conditions
    - suction dredging
    - algae growth

- Food availability/supply
    - Eutrophication
    - insufficient riparian vegetation
    - species competition

- Predation
    - concentration of juveniles in small areas
    - insufficient cover

- Displacement by low flows
    - Diversions
    - drought
    - ground water use
    - loss of pool volume
    - channel aggradation

- Inadequate habitat (quality and quantity)
    - inadequate pool frequency
    - lack of large woody debris/cover
    - drying of portions of streams
    - insufficient channel complexity
    - lack of cold water refugia
    - distance from spring to summer rearing habitat too great
    - insufficient riparian vegetation

- Stranding
    - diversions
    - drought
    - ground water use
    - channel aggradation

- Fish passage barriers (human-built structures)

C. Fall (September 22 – December 21)

- Inadequate habitat (quality and quantity)
    - inadequate pool frequency
    - lack of large woody debris/cover
    - loss of connectivity
    - insufficient channel complexity
    - lack of cold water refugia
    - distance from summer habitat to fall habitat too great

- Food availability/supply
    - Eutrophication
    - insufficient riparian vegetation
    - species competition

- Displacement by low flows
    - Diversions
    - drought
    - ground water use
    - loss of pool volume
    - channel aggradation

- Predation
    - concentration of juveniles in small areas
    - insufficient cover

D. Winter (December 22 – March 21)

- Inadequate instream habitat
    - inadequate pool frequency
    - lack of large woody debris/cover
    - insufficient channel complexity
    - distance from fall to winter habitat too great

- Low temperatures
    - lack of riparian vegetation
    - insufficient upwelling of groundwater
    - insufficient channel complexity
    - anchor ice

- Water quality
    - turbidity injuring fry and reducing feeding opportunities

- Food availability/supply
    - low nutrients (few adult carcasses)
    - insufficient riparian vegetation
    - species competition

- Predation
    - insufficient instream cover (including substrate)

- Displacement and mortality caused by high flows
    - altered flow regime (increased peak flow)

- Inadequate off-channel habitat (shelter from high flows)
    - loss of side channels, backwaters, and beaver ponds
    - loss of connection between channel and flood plain

- Open diversions/non-functioning fish screens

V. Juvenile out migration
(common problems = habitat, predation, and food supply)

A. Scott River
- Flow
- Temperature
- Connectivity and stranding
- Fish rescue and relocation

B. Klamath River
- Flow
- Temperature
- Connectivity and stranding
- Fish rescue and relocation
- Competition (hatcheries)

C. Estuary
- Reduced habitat (sedimentation)
- Water quality and flows

VII. Ocean Rearing
- Harvest (commercial and non-commercial)
- Food availability

ADDENDUM
06/25/2004

Section 7: Summary of Limiting Factors

Description of Current Conditions and Issues

Major Limiting Factors by Life Stage

This section is formatted as follows:

Life Stage
1. Major Limiting Factor
a) Issues
Factors Affecting Issue
Studies to Address Issue
Projects to Ameliorate Issue

SPAWNING AND INCUBATION

1) Increased sediment degrades quantity and quality of spawning gravels

a) Incubation habitat is potentially degraded during periods of high winter flow: Adult coho choose areas of appropriately sized gravel, suitable water velocity and inter-gravel flow for spawning. Redd formation aids in the removal of fine sediments, further increasing the inter-gravel flow and the essential delivery of dO to the developing embryos and alevin. The alluvial stream channels that are characteristically used for spawning are areas of sediment transport and deposition. The period of coho incubation (January – March/April) coincides with some of the seasonal high flows for the Scott River. Winter freshets can degrade established redds by delivering sediment that infiltrates the redd's interstitial space. This increased sedimentation would impede inter-gravel flow and could physically block fry emergence. Additionally, high water velocities can scour the substrate of the redd destroying the incubation habitat.

Factors affecting issue: An increase in fine bed load sediment, stream bank erosion, and "upslope" sediment delivery would increase the amount of sediment that could be deposited on the redd. Altered fluvial processes and hydrologic regime (increased winter peak flows) could increase the deposition of sediment and/or increase the scouring of sediment. Areas of stream channel alteration (e.g. tailing piles, artificially sorted gravels) could have increased rates of bed load movement and redd scour.
Studies to address issue: A biological study to determine fry emergence (redd cap) would give a value for emergence from individual redd locations.

Studies to assess the current bed load composition would indicate areas that have undesirable amounts of fine sediment. A reproducible protocol and a determination of study sites is necessary to pursue this study.

A geomorphology survey would indicate the processes that are shaping the bed load and hydraulic regime, potentially indicating areas that restoration would return to dynamic equilibrium.

Study rate of scour in areas perceived to be susceptible to scour (tailing piles, etc.) using scour chains.

Projects to ameliorate issue: Identify processes (e.g. increased sediment delivery, alteration of hydrologic regime) that are causing habitat degradation and restore process.

b) High percentages of fine sediment in the bed load degrade spawning gravel/ area of suitable spawning habitat is limited by fine sediment:
Adult coho choose areas of appropriately sized gravel, suitable water velocity and intergravel flow for spawning. Large amounts of fine sediment can entrench coarser gravels, reducing intergravel flow and a fish's ability to produce a desirable redd. Highly entrenched bedloads could decrease the amount of available spawning habitat and indicate areas with lower fry emergence (see above).

Factors affecting issue: The composition of a stream channel's bedload is the result of stream processes (influenced by flow, gradient, sediment delivery, sediment load, and geomorphology). Low gradient alluvial streams are often "depositional" areas that collect sediment delivered from higher energy channels. Increased sediment delivery will generally increase the volume of bedload (aggradation) in alluvial streams. An increase in delivery of fine sediments can increase the percent of fines in the bedload.

Studies to address issue: A sediment budget would show areas that are likely to accumulate large percentages of fine sediment. The sediment budget would also demonstrate the "sources" of this accumulation, allowing process restoration to return stream function to dynamic equilibrium.

A geomorphology survey, sediment survey, and upslope sediment source survey would survey individual components controlling stream function. These would all be components of the sediment budget.

A survey for suitable spawning habitat would determine locations and areas of usable spawning habitat. Spawning habitat could be estimated by determining suitable area within bank full or performing a more rigorous IFIM study.

Projects to ameliorate issue: Reduce sediment sources and restore hydrologic processes to return alluvial streams to dynamic equilibrium.

2) Impaired water quality and quantity adversely affects access to spawning grounds and the development and survival of embryos and alevins:

a) Low flow barriers can impede the migration of adult fish to the desired spawning grounds: During periods of drought and in years of late fall precipitation barriers to adult coho migration in the main stem Scott and tributaries can persist past the time that adults enter the river. These migration barriers cause fish to be held longer in warm water, increasing the possibility of a disease outbreak and decreasing the viability of the eggs.

Factors Affecting Issue: In periods of drought and late fall precipitation the low flow regime can persist into Late November/ Early December – potentially generating low flow barriers to migrating adult coho. This flow/passage problem is exacerbated by: alteration of hydrologic regime, aggradation of tributaries, and reduced groundwater storage.

Studies to address issue: Determine timing of adult coho movement throughout the system. Document areas that present passage problems. Determine barriers that have been formed by impaired hydrologic processes.

Perform stream cross section measurements at locations believed to impede adult migration – use measurements to determine minimum flow to allow passage.

Perform water budget – determine affects of water use on flow regime during period of adult migration.

Projects to ameliorate issue: Determine practices to increase instream flows during period of adult migration.

Restore watershed processes to remove barriers formed by impaired geomorphology.

b) Abnormally low winter temperatures can slow embryo/alevin development and facilitate formation of anchor ice: Colder water temperatures slow the development of the embryo and alevin, thus altering the timing of fry emergence. Embryos and alevin are capable of surviving temperatures approaching freezing, but anchor ice can prove lethal due to its ability to block inter-gravel flow and dissolved oxygen delivery to the redd.

Factors Affecting Issue: Lack of thermal cover (riparian corridor), alteration of hydrologic regime (reduced local flows), and impaired inter-gravel flow and groundwater influence alter the stream's mechanism of thermal buffering.

Studies to address issue: Determine winter water temperature regime in known areas of adult spawning. Continue to monitor presence of anchor ice throughout Scott watershed (landowners and survey crews).

Projects to ameliorate issue: Restore riparian corridors in "essential" reaches with impaired cover.

Restore watershed processes to restore hydrologic regime and bed load composition.

c) Embryo and alevin stages adversely affected by pollutants: Various pollutants (fertilizers, pesticides, petroleum products, and persistent heavy metals) could adversely effect the development and survival of coho developing in redds.

Factors Affecting Issue: Many historic and present land use practices (mining, timber, and agriculture) use potential pollutants that can enter the stream and affect the development of incubating coho. Different pollutants have a unique environmental persistence and biological effect. Further research is necessary to prioritize pollutants for potential effects.

Studies to address issue: Research effects of pollutants on incubating coho.

Determine pollutants that have been historically used and are currently used. Determine timing of use.

Projects to ameliorate issue: Promote program to decrease delivery of pollutants to waterways.

3) Physical disturbance of redd and surrounding channel causes direct mortality:

a) Coho embryos and alevin are susceptible to vibrations and compression. Physical disturbance of stream channels used for spawning could directly cause mortality during incubation. Some alevins probably remain in the redd as late as April, increasing the period of potential redd disturbance.

Factors Affecting Issue: Any activity within the stream channel creating compression of the substrate and vibrations could adversely affect survival of incubating coho. Coho could persist in redds later than is widely perceived, increasing the period that stream channel disturbance could affect alevins.

Studies to address issue: Determine timing of fry emergence.

Inventory areas with in channel activity during time of coho incubation.

Projects to ameliorate issue: Educate public on effects of disturbance on incubating coho and timing of incubation.

Reduce all in channel activity during coho incubation (e.g. exclusion fencing).

7. SUMMARY OF LIMITING FACTORS – ADDENDUM 06/25/2004

4) Current population structure impedes adult pairing and could generate loss of genetic diversity:

a) The Scott River exhibits extremely depressed adult coho populations in 2 out of 3 brood years. In these years with low adult escapement, adults could fail to produce spawning pairs due to spatial isolation. The low numbers of "wild" fish could spawn with a relatively high number of straying hatchery fish, causing genetic dilution from the hatchery fish. The depressed population could create a lack of genetic diversity (via inbreeding), causing the loss of specific environmental adaptations. The relatively strict compliance with a three year life cycle exhibited by coho salmon, impedes the population's ability to repopulate these depressed brood years.

> **Factors Affecting Issue:** Historical events have drastically reduced the population of 2 brood years relative to the third year. Straying hatchery fish (Iron Gate Hatchery, Trinity River Hatchery, etc.) could exhibit a larger genetic effect on these depressed populations. A breeding population that is depressed below a certain population will exhibit loss of genetic diversity due to inbreeding effects.
>
> **Studies to address issue:** Assess spatial distribution of adult spawners; e.g. continue adult spawning surveys. Determine proportion of wild and hatchery origin adults in Scott escapement.
>
> Determine genetic structure of Scott coho population – e.g. analyze already collected genetic samples.
>
> **Projects to ameliorate issue:** Protect existing population.

WINTER REARING

1. Lack of in stream and off channel habitat that offers refugia from displacement and mortality caused by periodic high winter flows

a) Coho require particular types of winter habitat (backwaters, dammed pools, alcoves and low velocity off channel habitats) that offer cover and refuge from high velocity. These types of habitat are believed to be in short supply because of a legacy of stream alteration, loss of flood plain connectivity, and decrease of instream cover. Lack of sufficient winter habitat can cause density dependent mortality (lack of sufficient winter carrying capacity) and can exacerbate density independent mortality (potentially caused by increased winter peak flows and decreased water temperatures).

> **Factors affecting issue:** stream channel alteration has removed flood plain connectivity in many of the alluvial reaches of the Scott watershed, a decrease in the frequency and quality of in stream pools and cover reduces the volume of available in stream habitat.

Studies to address issue: an initial study to assess the locations and amounts of available winter habitat is necessary. An integrated approach of aerial photo analysis (to identify areas offering potential winter habitat e.g. side channels) combined with ground truthing could locate reaches within the watershed offering potential winter habitat.

Qualitative habitat typing during winter could generate a carrying capacity for winter rearing in a system – a protocol that would identify winter habitat at different flow levels would need to be developed.

Assess coho population before and after winter to enumerate survival through this life stage.

Study utilization of main channel and tributaries during winter.

Study utilization of individual habitat types by coho over winter – could identify habitats with the greatest carrying capacity.

Investigate areas that offer refugia (low velocities) during extreme high flows.

Investigate possibility of using conservation easements to protect critical areas of winter rearing habitat.

Investigate possibility of using ditches as winter rearing habitat.

Projects to ameliorate issue: Introduce coarse woody debris to the system to increase cover and velocity refugia.

Perform stream restoration that would increase the volume of suitable winter rearing habitat – e.g. dammed pools and artificial off channel habitats.

2. Increased peak winter flows

a) Increased upslope hydrologic connectivity and lack of flood plain connectivity can alter the timing and magnitude of peak winter flows. These increased peak flows can overwhelm the velocity refugia used for winter rearing leading to density independent mortality. Increased peak flows could also lead to abnormally high levels of turbidity potentially affecting fish behavior and growth.

Factors affecting issue: altered upslope processes (e.g. decrease in infiltration rate and increase in hydrological connectivity) can alter the timing and magnitude of flow delivery to the stream channel. Loss of flood plain connectivity and stream bank armoring can confine these flows in one channel increasing local water velocities.

Studies to address issue: Cumulative watershed effects (CWE) can be used to identify watersheds with a high and low possibility of altered peak flows.

A continuation of tributary flow monitoring into the winter would identify magnitude and duration of peak flows.

Measurement of velocities in suspected winter habitat during peak flows would determine habitats ability to maintain velocity refuge during peak flows.

Projects to ameliorate issue: Restore upland processes to decrease occurrence and magnitude of peak winter flows.

Restore flood plain connectivity to dissipate peak flows.

Implement habitat restoration that would produce suitable refugia from peak flows.

3. Low temperatures increase density independent mortality/ insufficient winter habitat that offers temperature refugia

a) Very low water temperatures decrease a fish's swimming ability, feeding opportunity and ability to maintain position in preferred habitat. Off channel habitats with groundwater influx can maintain temperatures higher than in channel habitats – offering fish an opportunity for feeding and growth.

Factors affecting issue: winter temperature regime altered by lack of riparian corridor and increased surface area leading to increased cooling of water. Off channel habitats lost due to channel alteration precluding availability of this potential winter thermal refuge.

Studies to address issue: Continue and broaden temperature monitoring over winter months in tributaries believed to be essential for winter rearing.

Determine if off channel habitats offer a milder temperature regime than in channel habitat.

Determine actual over winter temperatures within known winter rearing habitat.

<u>SUMMER REARING</u>

1. Poor water quantity and quality.

a) Reduced summer low flows. Reduces amount of available habitat, causes loss of connectivity between potential habitats, direct mortality from stranding, and exacerbates water quality issues.

Factors affecting issue: diversions, ground water pumping, channel alteration and aggradation, loss of pool volume by sedimentation.

Studies to address issue: develop a water budget that includes a valid understanding of ground water inter-connectivity to the Scott.

Perform a flow/habitat model (e.g. Instream Flow Incremental Methodology – IFIM) to identify critical flow levels to maintain coho habitat.

Projects to ameliorate issue: study feasibility of small impoundments for groundwater recharge and storage.

Pursue willing participants for conservation easement of diversion water.

b) Water temperatures out of preferred range. Limits ability of coho to utlilize habitat, decreases condition of coho.

Factors affecting issue: increased width/depth ratio of channels, loss of channel complexity (occurrence of pools), loss of riparian shading, decreased flow volume and velocity, loss of ground water inner connectivity and inter gravel flow.

Studies to address issue: Perform aerial photo analysis to identify locations of channel degradation and poor riparian shading.

Identify areas of thermal refugia via a basin wide temperature monitoring protocol (e.g. Forward Looking Infra-Red – FLIR).

Develop a model that correlates temperature regimes with flow throughout basin.

Projects to ameliorate issue: Implement riparian planting and fencing to increase stream shade.

Pursue feasibility of stream alteration to restore historic character to channel.

2. Increased bed load of sediment:

a) Increased sediment reduces volume and quality of available habitat. Direct loss of pool volume (habitat volume), degrades benthic production, exacerbates water quality and quantity issues (increased sub-surface flow and lack of inter-gravel flow).

Factors affecting issue: increased sediment delivery form anthropogenic sources, alteration of sediment transport and storage.

Studies to address issue: Expand scope of Sommarstrom granitic study to develop a sediment budget for the anadromous watersheds of the Scott River.

Coordinate with USFS to develop Cumulative Watershed Effects (CWE) for anadromous watersheds of the Scott River.

Projects to ameliorate issue: Pursue feasibility of coordinated effort to reduce sediment sources in a key watershed (e.g. French Creek Watershed Assessment Group).

Pursue habitat restoration techniques that can aid in "sorting' the bed load in essential reaches .

3. Historic channel alteration:

a) Historic channel alteration (beaver removal, mining, channelization, and bank armoring) have removed many natural features of an alluvial river that create coho habitat. Areas of historic rearing habitat have been degraded or extirpated through a series of channel alteration culminating in the present state of an armored single channel.

Factors affecting issue: Economic development of region, flood and erosion control.

Studies to address issue: Identify areas where historic complexity exists and where complexity can be restored without serious loss of economic benefit.

4. Lack of suitable habitat for summer rearing:

a) Volume of suitable summer habitat is potential density dependent bottleneck on Scott River coho production. Coho demonstrate a high preference for pools with large amounts of cover for summer rearing. Water quality and food availability controls the growth rate of coho. This preferred habitat has been greatly reduced through a cumulative effect of the above mentioned factors.

Factors affecting issue: alteration of channel and riparian corridor, lack of large woody debris, poor water quality and quantity, aggradation and pool filling by excessive bed load.
Studies to address issue: Continue habitat typing program to address essential watersheds that have not been characterized – Tributaries of East Fork Scott, South Fork Scott, Johnson, Crystal and Big Slough, Kidder and Kidder Slough, Tompkins and Moffett Cr.

Use aerial photo analysis to locate potential areas of good and poor habitat (look at stream alteration and riparian shading.

Study habitat utilization by coho in the Scott River. Determine fully seeded and under-seeded areas.

Projects to ameliorate issue: Increase water quantity and quality in areas that contain good physical habitat.

Increase access to suitable habitat through removal of barriers or increased flow.

Perform instream and riparian restoration to increase the frequency and quality of ideal habitat.

5. Alteration of the stream channel, riparian corridor, and coarse wood recruitment impedes the formation of suitable habitat.

a) **The process that controls the formation of suitable salmon rearing habitat are driven by the overall state of the watershed**. Alterations in the land base or channel of the water shed can greatly alter these processes leading to a lack of habitat formation.

Factors affecting issue: upslope impacts have altered sediment delivery, large wood recruitment and flow regime of the watershed. Channel alteration and riparian clearing have altered the channel profile in the low gradient portions of the watershed. Lack of wood recruitment, increased sediment delivery, and channel degradation decrease the potential for future pool formation.

Studies to address issue: A sediment budget, determination of CWEs, determination of large woody debris recruitment, and riparian surveys would all be applicable.

Projects to ameliorate issue: Any restoration program that would restore the processes of the watershed (e.g. reduction of sediment delivery through upslope road restoration)

7. SUMMARY OF LIMITING FACTORS – ADDENDUM 06/25/2004

Summary of Findings

The federal and state listing of coho salmon (*Oncorynchus kisutch*) has created the impetus to identify, protect and enhance critical habitats essential for the freshwater life stages of salmon. Studies throughout the Pacific Northwest indicate that coho utilize a variety of habitats throughout their freshwater residence: sorted gravel for spawning, protected stream margins for emerged fry, deep pools with cover for summer rearing, and low velocity pools with cover and side channel habitats for winter rearing. Little work has been performed on the Scott River to identify the specific habitats that are being utilized by coho salmon throughout their fresh water residence. We propose a series of studies to determine the distribution of coho salmon throughout the Scott River and to quantify the types of habitats that are being utilized at each life stage. A knowledge of the specific habitats utilized throughout coho salmon's residence in the Scott River will allow us to quantify the available rearing habitat for coho in the Scott River, and hopefully, determine habitats that create density dependent "bottle necks" to smolt production These studies will allow managers to identify essential habitats in which protection and enhancement will increase the overall coho smolt production of the Scott River.

Several methods exist to assess the carrying capacity for anadromous fish in a stream (G. Reeves, et al., 1989 and Nickelson. 1998). These protocols utilize a quantified knowledge of the available habitats in the basin (volume of habitat) and the carrying capacity of these habitats for each life stage (fish per volume of habitat). A comprehensive knowledge of these two factors allows for the identification of habitats that are limiting smolt production in a basin – *i.e*., identification of the life stage in which the available carrying capacity limits smolt production. There is a limited body of information for the Scott River pertaining to the information – available habitat for all life stages and actual utilization of individual habitats – needed to identify density dependent "bottle necks" in the Scott River's coho production. Habitat availability and utilization has been previously studied during spawning and summer rearing (cooperative adult coho spawning surveys and low flow habitat typing) but information pertaining to the other life stages is largely absent. A suite of on the ground surveys tracking the density of habitat utilization throughout all life stages of a cohort of coho salmon will allow the identification of individual habitat's carrying capacity. This information can then be combined with knowledge of the available volumes of habitat to create a model indicating habitats that limit the basin's overall production.

Current biological studies of coho salmon in the Scott River (Out migrant trapping, electro-fishing in French Cr., and adult coho surveys) indicate the populations of two out of the three brood years of coho salmon are extremely depressed. The "strong" cohort of adult coho salmon is expected to spawn in the Scott River during the winter of 2004/2005. This creates a limited window of opportunity to study the distribution and habitat utilization of coho salmon in the Scott River during a period the basin is relatively well seeded. The fish committee has proposed a prioritization and timeline for a series of studies to track and assess the distribution and habitat utilization of the cohort of coho salmon expected to emerge in the Scott River in the spring (March/April) of 2005. The committee felt it imperative to initially address the question of what habitat types were being utilized in the Scott River. This Scott specific information can then be utilized to assess the occurrence of essential habitats for coho salmon.

7. SUMMARY OF LIMITING FACTORS – ADDENDUM 06/25/2004

The order of the key questions of coho habitat utilization:

1) What types of habitats are being utilized by the different life stages of coho salmon in the Scott River?
2) What is the density of habitat utilization for all life stages of coho salmon in the Scott River?
3) What is the location and volume of preferred habitats in the Scott River?

Timeline for coho studies in Scott River

Late November 2004 – Perform cooperative dive in Mainstem Scott to directly observe adult coho population – modeled after the cooperative dive on the Salmon River to assess the population of spring Chinook.
December 2004 – January 2005 – Perform cooperative adult coho spawning ground surveys – SRCD already has adequate funding to perform their part. Mark and Recapture adult coho carcasses in key tributaries (e.g. French Cr. and Shackleford-Mill Cr.) to develop estimate of spawner population. Expanded coverage of adult surveys will allow the determination of relative spawner abundance throughout the basin. This information will be used to direct the location of reaches for the future surveys.
March 2005 – May 2005 – Perform study determining timing of fry emergence and density of utilization of habitats. Utilize spatial information from spawning surveys to define reaches for fry emergence studies. Quantify volume of available habitats in reaches.
July 2005 – September 2005 – Perform summer rearing habitat utilization surveys. Quantify density of coho in different habitat types and available volume of habitat types.
October 2005 – January 2006 – Radio tag sample of rearing coho and track via radio telemetry to identify coho movement from summer rearing habitats to winter rearing habitats.
November 2005 – May 2006 – Operate out migrant traps on key tributaries to determine timing of migration from tributaries to the Mainstem. Determine what portion of fish is rearing during winter in the tributaries versus the Mainstem. Study the condition of the fish and apply marks and or tags for future recapture by downstream trapping efforts.
January 2006 – Early March 2006 – Perform winter rearing habitat utilization surveys. Use information from radio telemetry study and out-migrant trapping study to define areas of rearing and develop study reaches. Quantify density of coho in different habitat types and available volume of habitat types.
February 2006 – July 2006 – Utilize out migrant trapping program to sample timing and condition of out migrating coho smolts. Perform mark and recapture trials to determine trapping efficiency and overall smolt production of Scott basin.

7. SUMMARY OF LIMITING FACTORS – ADDENDUM 06/25/2004

Table of recommended projects/proposals:

Proposal Description	Life Stages Affected	Type	Comments
Aerial Photograph Analysis	Winter Rearing, Summer Rearing,	study	May need to seek funding for expansion of project if cannot be fully funded; project is currently being pursued
Riparian Restoration, Rehabilitation and Revegetation	Winter Rearing, Summer Rearing, Spawning	restoration project(s)	SWRC is currently getting feedback from a professional about sucesses and failures of past projects; discuss possibilities of pursuing funding after results from this assessment are in; possibilty of incorporating nursery component to get roots established into a future proposal
Create a map of potential winter rearing habitat, including channel alteration	winter rearing	study	aerial photo analysis + ground survey to verify; could add pilot project to proposal to have better chances of funding
Create a map of potential summer rearing habitat, including channel alteration	summer rearing	study	aerial photo analysis + ground survey to verify; could add pilot project to proposal to have better chances of funding
Conduct winter rearing habitat utilization surveys (including main stem utilization)	Winter Rearing	study	Could use G. Reeves methodology; could be 2nd phase to project 4; might want to wait until strong cohort year (2005-2006); Becca Quinones can help with data analysis and methods but not field work
Expand Scott River Water Balance to model Spawner Passage	Spawning	study	get funding to add component into existing water balance that the RCD is currently working on; might need a spatial model component to result in identification of potential spawning habitat that uses water balance data as input
Comprehensive habitat utilization surveys / population assessment / tracking	winter rearing, summer rearing, spawning, incubation	studies	would be ideal to conduct these surveys that correspond with the upcoming good cohort year; research possibilities (Lisa Chandler as resource, for example)
Emergence success study (including monitoring, fry trapping, edge habitat surveys, and trapping at trib mouths)	incubation / emergence	study	would be ideal to conduct these surveys that correspond with the upcoming good cohort year; research possibilities (Lisa Chandler as resource, for example)
Summer rearing habitat utilization survey	summer rearing	study	Have more information already than for winter rearing; should have funding for this coming summer; combine with project 5 as phase 2; can incorporate FLIR data that is currently planned to be collected; may need to include storage of large data files (would also apply to projects 4,5,6)
IFIM	spawning	study	would need to incorporate a spatial component; investigate Tom Shaw's work on the Scott and seek funding to expand
Developing off-channel winter habitat	winter rearing	restoration project(s)	aerial photo analysis should be done first

8. WILDLIFE

8. Wildlife

<u>This section will not be completed during the initial phase.</u> However listings and resources are being identified to provide information that will be useful in future phases.

Table 8-a. Species found in the Scott River Hydrologic Area that are currently protected under the State and/or Federal Endangered Species Act.

Common Name	Scientific Name	Federal Listing	State Listing
Siskiyou Mountains salamander	*Plethodon stormi*	None	Threatened
Bald Eagle	*Haliaeetus luecocephalus*	Proposed for delisting	Endangered
Greater Sandhill Crane?????	*Grus canadensis tabida*	Species of Concern	Threatened
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	None
Bank Swallow	*Riparia riparia*	None	Threatened
not in Rarefind			

Table 8-b. Federal and State Listed Plant Species in the Scott River Watershed

Common Name	Species Name	Federal Status	State Status
Klamath Manzanita	*Arctostaphylos Klamathensis*	Species of Concern	Not listed
Siskiyou Mariposa Lily	*Calochortus Persistens*	Species of Concern	Rare
Mt. Eddy Draba	*Draba Carnosula*	Species of Concern	Not listed
Trinity Buckwheat	*Eriogonum Alpinum*	Species of Concern	Endangered
Pickering's Ivesia	*Ivesia Pickeringii*	Species of Concern	Not listed
Scott Valley Phacelia	*Phacelia Greenei*	Species of Concern	Not listed
Showy Raillardella	*Raillardella Pringlei*	Species of Concern	Not listed

RESOURCES:

Sportsman's Association
Siskiyou County
US Forest Service, Klamath National Forest
US Fish and Wildlife Service
Audubon Society

History

Description of Current Conditions and Issues

Summary of Findings

Reference to Past and Current Projects

Goals, Objectives, and Strategic Actions

9. Vegetation & Habitat Restoration

The initial phase of the SAP uses this section to describe habitat restoration for fish populations only. The information regarding vegetation implies the potential impact of riparian and upslope vegetation as it relates to fisheries. Future phases of the SAP will identify information needed to complete studies that will incorporate other wildlife habitat and vegetation issues.

History

Located within the geologically complex Klamath region, the vegetation of the Scott watershed reflects an unusual diversity of species that have evolved here (Johnston, 1994). In a one square mile area of the granitic Russian Peak, in the headwaters of French Creek, 17 species of conifer trees can be found – the most concentrated assortment of conifers in the world. Over 450 other species of plants also occur in this zone, many found nowhere else.

Areas along the Scott River were cleared of riparian vegetation in the mid to late 1800s, during settlement by farmers, ranchers, gold miners and trappers of European descent. The communities of Fort Jones, Etna, and Callahan were established about that time as well. Periodic flooding has resulted in riparian vegetation loss as well. A panoramic photo, in the Siskiyou County Museum, of the Scott River, at Horn Lane, reveals a swath of riparian woodland and swales of marshy plants in about 1908. In the 1920s, large cottonwoods along the banks of the river were removed for firewood, fuel for steam tractors, and because of disease, according to old-timers. In June 1934, the Scott River, between Fort Jones and Shackleford Creek, was described in a state stream survey as having dense willows along the shore and good for excellent pools and shelter (CDFG, 1934).

Following a serious flood in the winter of 1937-38, Siskiyou County requested the U.S. Army Corps of Engineers to "clear the rivers throughout Scott Valley of debris from flooding". This work began in August 1938, and included constructing flood levees along the middle channel near Black Bridge (Etna *Western Sentinel*, 8/10/38). The Corps' "debris clearing" also removed much of the remaining riparian vegetation through the middle of the valley (Lewis, personal communication). Aerial photos of the river from 1944 reveal little or no vegetation along the Scott River's banks.

Stream bank soil losses have been arrested and reversed in some areas through bank stabilization and riparian planting projects undertaken cooperatively by farmers, the NRCS, and the RCD. Between 1957 and 1994, over 170 bank stabilization projects were done on the mainstem of the Scott.

9. VEGETATION & HABITAT RESTORATION

Description of Current Conditions and Issues

In-stream structures: When in-stream habitat is deficient, one strategy is to provide habitat structure artificially, instead of waiting for it to recover naturally. The use of large rock riprap was recommended as essential in the Scott River to stabilize sites for the establishment of permanent riparian vegetation (Lewis, 1992). Fish habitat benefits were documented on the older style, more vertical riprap projects, with established riparian vegetation along the Scott River. Deeper water, more shade and more cover were found, especially when 5 to 6 foot large rocks had rolled into the stream (Patterson, 1976 - TBO). Modifications of riprap, including in-stream fish structures, are presently being tried by the CDFG (Harral, 1993 - TBO).

Geomorphology (Channel Conditions): One type of promising "fish friendly" channel work is called geomorphic restoration. In this work, the present and natural hydrological conditions are evaluated by specially trained geologists and compatible channel alterations are designed and constructed (Rosgen, 1994 - TBO). The intent is to understand and recreate habitat based on the "big picture," by working with the river's forces. Since the state-of-the-art for this method is still quite young, a few "geomorphic-type" bank stabilization projects along the Scott are planned to demonstrate the applicability and viability of this technique.

Habitat Evaluation: Habitat typing is the standard evaluation method presently used to identify physical habitat limitations (McCain et al, 1990 - TBO). A stream habitat condition inventory, in the Scott River drainage, needs to be completed; since only habitat within the canyon section and lower Shackleford Creek has been systematically evaluated to date (West).

To help compensate for poor quality spawning habitat, in the mainstem of the Scott River, the Kelsey Creek Spawning and Rearing Channel was built in 1985, by the USFS and CDFG. It was designed to provide "near ideal" spawning conditions for 70-80 pair of Chinook spawners, which should produce a maximum of 400 adult fish. While Chinook, coho and steelhead have created redds in the channel, it does not yet support a self-sustaining return of any of these stocks (USFS, 1992 - TBO).

Riparian Re-vegetation: As part of past fencing and riprap projects, large un-rooted cuttings of poplar and willow have been planted (Lewis, 1992). Riparian woodland re-vegetation projects have been done at several riparian and floodplain sites along the Scott River, planting rooted cottonwood, willows, and ponderosa pine. Table 9-b indicates the riparian project accomplishments by providing the total results as of year end 2002. Regular summer watering and weeding are found to be essential, along with seedling protectors for protection against deer, rodent, and beaver browse.

An inventory and evaluation of the Scott River riparian zone was performed for the Siskiyou RCD (Lewis, 1992). As a result, the following information is known about the qualitative condition of the 373 sites evaluated along the mainstem in Scott Valley below the dredger tailings to the end of the valley just below Meamber Gulch:

9. VEGETATION & HABITAT RESTORATION

Table 9-a. Inventory Summary of Scott River Riparian Zone (Lewis, 1992)[1/]

1992 CONDITION (% of sites)

Nearly Pristine	Good	Disturbed	Degraded	Severely Degraded
1	54	35	10	0

TREND (% of sites)[2/]

Recovering	Stable	Degrading	Severely Degraded
35	37	28	0

1/ <u>many</u> additional improvement projects have been completed since 1992 while flood damage in 1995 and 1997 has also occurred. As a result, conditions have changed since this survey.

2/ All but 2 degrading sites are either disturbed or degraded already. All but 2 good sites are stable or recovering.

Table 9-b: Siskiyou RCD/SRWC Riparian Project Accomplishments, December 2002.

Type of Project	Accomplishment Totals
Fencing	95% privately owned portions of mainstem Scott River
	40% privately owned portions of tributaries
Planting	187 riparian acres, density range from 160-260 trees
Instream	313+ instream structures
	17,150 feet of stream channel enhancements

9. VEGETATION & HABITAT RESTORATION

Summary of Findings

In the Scott River Watershed, water quality, streamside vegetation and in-stream habitat conditions remain a concern. Minimizing the impacts to riparian areas from past and future disturbances, including damage from future wildfires, is also a concern. Federal managers have placed the riparian corridor into Riparian Reserve designation. The concept of Riparian Reserves was established under former President Clinton's Forest Plan and is currently the guiding force in riparian management on National Forest lands. Riparian Reserve management is designed to maximize the quality of riparian areas. USFS, which manages most of the land bordering the Lower Canyon area of the Scott River and most of the headwater tributaries throughout the Scott River watershed, is committed to protecting riparian habitat through adherence to the Riparian Reserve management strategy.

9. VEGETATION & HABITAT RESTORATION

Reference to Past and Current Projects

The following actions have been taken to promote effective riparian revegetation and maintain habitat.

1. Implemented instream habitat improvement projects as appropriate, including placement of large woody debris.
2. Developed riparian restoration projects in fenced sites and with species reflecting the natural vegetative composition.
3. Planted trees for specified acreage.
4. Continue to complete the fencing of stream corridors to control livestock access. (Complete fencing projects on mainstem, and proceed with fencing projects on tributaries).
5. Exploring conservation easements as management opportunities for flood-prone areas.

Specific projects that have been implemented for vegetation and habitat restoration include:

- Stream Bank Protection Scott River, 1992 (RCD #rcd17)
- Upper Ruffey Lake Habitat Improvement, 1992 (RCD #rcd13)
- Scott River Riparian Zone Inventory and Evaluation, 1992 (RCD #rcd14)
- Canyon Creek Spawning Gravel Development, 1995 (RCD #gravel)
- Kidder Creek Restoration and Education Project, 1993 (RCD #KCRP1)
- Kidder Creek Restoration Project, 1994 (RCD #KCRP2)
- Kidder Creek Restoration Project, 1995 (RCD #KCRP3)
- Kidder Creek Restoration Project, 1998 (RCD #KCRP4)
- Scott River Riparian Woodland Revegetation Demonstration Project 1, 1994 (RCD #84old)
- Scott River Riparian Restoration/Revegetation, 1992-2000(RCD #rcd16, rcd21, 60, 61poh, 63, 81, 82, 90 and 91)
- Scott River Riparian Woodland Revegetation, 1994 (RCD #95II)
- Improve Stock Watering Systems (includes fencing), 1996 (RCD #85II)
- Scott River Corridor Enhancement Project, 1996 (RCD #87)
- Scott River Corridor Habitat Improvement Project, 1997 (RCD #64)
- Scott River Landowner Riparian Program, 1999, 2000, 2002 (RCD #80, 80II, and 80III)
- Shackleford Creek Restoration Project, 1999 (RCD #58II)
- Fay Lane Restoration Project, 1999 (RCD #63II)
- Improve Stock Watering Systems, Riparian and Water Quality Conditions in Scott River, 1999 (RCD #85VI)
- Fowle Maintenance Project, 2000 (RCD #47)
- East Fork Scott River Habitat Improvement, 2000 (RCD #83)
- Lower Kidder Creek Enhancement Project, 2002 (RCD #37)
- French Creek Riparian Protection and Enhancement, 2002 (RCD #46)
- Patterson Creek Enhancement Project, 2002 (RCD #84)
- Shackleford Creek Demonstration Project, 2002 (RCD #36)
- Diversion Improvement Program (Weirs), 2002 (RCD #41)

Goals, Objectives, and Strategic Actions

F2) **GOAL** (originating committee = Fish Committee):
Improve and maintain fish habitat conditions for native anadromous populations.

The Objectives for this goal have been further categorized by Instream and Riparian. The following table describes the objectives using category indicators.

Objective F2-A	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Instream: Identify factors limiting spawning, migration, and rearing (e.g. timing and distribution) within the Scott River watershed.		F-2-A.a 5 year	Qualify factors limiting spawning, migration, and rearing that are affecting stream systems.
Objective F2-B	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Instream: Evaluate effectiveness of existing fish passage structures and barriers in the Scott drainage watershed and pursue any necessary improvements.		F-2-B.a 2 year	Review completed records of projects to identify existing fish passage structures and their locations. (includes diversion impoundments)
		F-2-B.b 5 year	Evaluate success of fish passage structures having been reviewed under action F-2-B.a.
		F-2-B.c 5 year	Perform barrier inventories of each stream with anadromous habitat.
Objective F2-C	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Instream: Improve channel conditions where historic side channels/braids/wetlands can be reconnected or restored.		F-2-C.a 5 year	Evaluate locations where channel can connect to floodplain without negatively impacting existing land uses, and work to implement feasible projects.
		F-2-C.b 5 year	Establish artificial beaver dams (activity) where appropriate. (see Water Supply actions W-1-B.c)

Objective F2-D	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Riparian: Inventory and evaluate riparian conditions as they affect fish habitat.		F-2-D.a 2 year	Use aerial photos and photo-points to evaluate the relationship of riparian condition to fish habitat on the mainstem Scott River.
		F-2-D.b 5 year	Review existing and conduct new riparian inventories on significant tributaries to assess the quality and quantity of riparian conditions and determine priorities for habitat restoration.
Objective F2-E	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Riparian: Design and complete projects to promote effective riparian revegetation and maintain riparian habitat.		F-2-E.a 2 year	Evaluate riparian planting projects and make recommendations to improve planting program. Include in the evaluation an assessment of why projects failed and modify accordingly.
Objective F2-F	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Experiment with alternative fish-friendly methods to stabilize streambanks.		F-2-F.a 2 year	Evaluate the geomorphology of the mainstem Scott River channel to identify potential demonstration projects.
		F-2-F.b 5 year	Evaluate existing and planned 'geomorphic'; modified rip-rap, and other experimental projects, and develop recommendations for appropriate bank stabilization techniques.
		F-2-F.c 2 year	Learn more about fish-friendly bank stabilization and geomorphic processes through workshops and field trips to other watersheds.
Objective F2-G	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Protect areas with cool water habitat conditions (thermal refugia) in anadromous streams.		F-2-G.a 2 year	Identify locations of thermal refugia.
		F-2-G.b 5 year	Evaluate and recommend enhancements to expand thermal refugia.

10. Geology & Soils

This section primarily describes the geological condition of the Scott River watershed for the purpose of providing information to the impact on fisheries as required for the initial phase of the SAP. The geology and soils of the watershed greatly influence the hydrology and biology of the watershed. Another way to view it is: the hydrology flows over the geology, and the biology lives in the hydrology (Mattole Restoration Council, 1995). Understanding the physical conditions – past and present – of the Scott River watershed is important in order to identify their contribution (from upstream and upslope) towards the possible causes of the downstream fisheries symptoms (instream habitat and populations). Hydrology is discussed in Section 11, and Fishery conditions are described in Section 6. Restoration of the river system has many ecological issues that will be discussed in detail as more studies are completed and will be incorporated into the SAP through annual updates.

History

Historic Changes

Upslope Changes:

Hill slope processes have been altered over the past century by the effects of hydraulic mining, roads, skid trails, and vegetation removal through fires, grazing, and timber harvest. Roads were not extensively constructed in the steeper regions until the 1950s by the Klamath National Forest, but the miles increased rapidly during the following decades as timber harvesting increased on public and private lands. The steep mountainous terrain areas are naturally susceptible to landslides, but the size and frequency appears to have increased due to impacts from the combination of severe fires, intensive timber harvest, and roads on steeper slopes (USFS 2000). The upper slopes and main channel of Tompkins Creek have been destabilized since the 1997 flood due to these disturbances, and the Klamath National Forest says it will take several decades for them to reach equilibrium.

The watershed's decomposed granitic (DG) soils are particularly susceptible to land use disturbances. Known as the "hemophiliac" of soils, DG bleeds profusely once the vegetative and duff layers are disturbed. By 1989, 66% of the private timberlands (since 1974) and 34% of the public timberlands (since 1958) on DG soils were harvested in the Scott Valley watershed (Sommarstrom, Kellogg, and Kellogg 1990). At that time, 288 miles (or 1,428 acres) of roads had been built on granitic soils, with the highest density in Wildcat, Crystal, and Johnson watersheds. In addition, 191 miles (232 acres) of skid trails had been constructed on granitic terrain, with the highest density in French, Sugar, Boulder, and East Fork watersheds. Road erosion comes from road cutslopes, fillslopes, and road surfaces as well as road failures. The 1990 Scott River Basin Granitic Sediment Study concluded that about 60% of the average annual sediment yield from granitic soils in the watershed was due to management activities, with the balance being the natural background level.

Stream Channel Changes:

Channel alterations began in the watershed in the 1830s with the removal of most of the beaver population in Scott Valley and the East Fork (Sommarstrom, et al, 1990). Placer and hydraulic mining removed many tons of soil from alluvial deposits and hill slopes in the late 1800s in the South Fork, Shackleford-Mill, and lower Scott areas. The mainstem of the Scott River, from

Callahan to approximately 6 miles downstream, was intensively placer dredged for gold from the 1934 to the 1951 .The dredge mining activity left large scale tailing piles for a distance of approximately 6 miles (9.7 km).

These features dominate the hydraulic nature of the river in this impacted reach and for miles below. This, along with the Army Corps of Engineers levee work in the mid-Scott in 1937-38, significantly altered the hydrologic properties of this river system at both the landscape and local level. By 1944, aerial photographs reveal large sections of the river with little or no riparian vegetation. The severe flooding that occurred in 1955, 1964, and 1974 eroded the Scott River's streambanks, further contributing to the channel becoming wide and shallow.

Many tributary streams are still recovering from the record 1964 flood, as it had a profound effect on upslope and channel conditions in much of the Scott River watershed. The January 1997 flood, a 25-year event, also had a considerable affect on the lower watershed and contributed large amounts of sediment into area streams due to landslides, plugged culverts, and road failure from poor road design and recent forest fires. Most significantly affected were Tompkins, Kelsey, and Middle/Deep Creeks, of which 8,790 acres were burned in 1987 (delaFuente, 2000; USFS-KNF, 2000).

Some of the Scott River and the lower reaches of its tributaries, within the valleys channels, have been straightened and their banks have been stabilized by riprap to prevent erosion. The US Army Corps of Engineers began this channelization work for flood control purposes in the late 1930's. Rock riprap has been placed for stream bank stabilization by the SRCD and landowners for the past 50 years.

10. GEOLOGY & SOILS

Description of Current Conditions and Issues

Located within the eastern portion of the Klamath Mountains, the geology of the Scott River watershed is a complex of several geologic terrains and many identified formations and rock types (USFS 1997). Glaciers in the last ice age scoured bowls of exposed bedrock, lush alpine valleys, and high mountain lakes. Midslope areas are composed of mountain sideslopes, dormant earthflows, and inner gorges. Scott Valley, in middle of the watershed, consists of mixed alluvium washed down from the slopes above. The complex geology can be simplified into three basic rock types: granitic, ultramafic, and metamorphic rocks.

The watershed's bedrock consists of metasedimentary and metavolcanic rocks of Late Jurassic and possible early Cretaceous Age. The alluvial fill in Scott Valley contains unconsolidated Pleistocene and Recent deposits. An extensive area of granodioritic rock, intrusive into schists and greenstone, is exposed in the mountains paralleling the west and south sides of Scott Valley. Every gradation between granite and quartz diorite occurs here. (Sommarstrom, Kellogg, and Kellogg 1990). In the frequent shear zones, the granodiorite is "extremely friable and crumbles to the touch" (Mack 1958). In July 1996, a summer thunderstorm triggered a debris torrent in Paynes Creek, a tributary of French Creek, when several inches of rain fell in a few hours on the granitic Russian Wilderness (USFS 1997). However, granitic terrain typically has fewer landslides than occur in the metamorphic rocks. Landslide deposits are common in the lower Scott (USFS 2000).

Scott Valley Geology

A line extending northward, from the east side of the low hills that rise from the alluvium about one mile northeast of Etna, to the northeastern corner of Chapparal Hill marks the approximate western limit of the alluvium deposited by Scott River in the area between Etna and Fort Jones. This line corresponds also with what was the western boundary of Scott Valley during much of its early physiographic history when the Scott River was an active, downcutting stream. During the recent epoch the eastern margin of the valley floor appears to have remained in its present position, whereas the western valley margin has been shifted about 3 miles westward by erosion (Mack, 1958)

The trend of Scott Valley westward from Fort Jones is probably controlled by the nearly east-west orientation of marked fault and fracture systems. Between Etna and Fort Jones, however, it appears that the initial course of the Scott River was determined chiefly by the relative softness of the underlying bedrock. Thus, along the east side of the valley between Hamlin Gulch and the vicinity of Etna serpentine is intrusive into the Abrams mica schist and generally has a sill-like relationship with the enclosing beds, the overall effect resembling lit-par-lit injection on a regional basis. If the outcrops of the serpentine are projected toward the valley, it is seen that serpentine can probably be inferred to underlie the alluvium in much of the reach of the valley. Inasmuch as the serpentine is generally highly sheared it is therefore readily susceptible to erosion. Moreover, the Abrams along this reach of the valley is highly micaceous and contains many limestone beds. Hence it is much less resistant and more susceptible to erosion than the more massive quartzitic members exposed along the margins of the northern part of the valley (Mack, 1958).

Throughout much of its early history the Scott River was an actively degrading stream, cutting down in response to regional uplift. The uplift was apparently intermittent because at several localities along the valley margins there are remnants of highly dissected fans and terraces which probably were formed in Pleistocene time during pauses in the uplift. With the passage of time the dividing ridges between the western tributaries that had once abutted well out into the main valley area were reduced and slowly worn back by erosion toward the present western mountain front. The regimen of the Scott River and its tributaries gradually changed, and they eventually began to aggrade their courses. The aggradation process was not uniform throughout the valley area, for in the wide part of Scott Valley between Etna and Greenview the depth of bedrock, and consequently the thickness of the alluvial fill, appears to be much greater than it is farther downstream (Mack, 1958).

Stream Channel Characteristics- Scott River Mainstem

The morphological characteristics of the mainstem channel of the Scott River, from Callahan to the lower end of Scott Valley, include alluvial deposits from the lower end of numerous tributaries. Some of the larger tributaries are French Creek, Etna Creek, & Kidder Creek. The stream channels are generally unconfined and contain streambed gradients of less than 2%. General landform processes have created a wide, flat floodplain and a sinuous channel pattern where bars, islands, side and/or off-channel habitats are common. A significant reach of the Scott River, through Scott Valley, is very flat (0.08 %) and is a sand-dominated channel, while the northern and southern ends of the Scott Valley possess spawning-sized gravels due to increased gradient (0.7%) and other factors (Sommarstrom, Kellogg, and Kellogg, 1990).

Due to geomorphic variability of the Scott River watershed, further discussion of the watershed's geomorphology can be found under *Sub-Watershed Characteristics* found in Chapter 4 *Scott River Watershed.*

Soil Characteristics

The soils of Scott River Watershed have developed on flood plains, alluvial fans, and mountain slopes. (Cite Source for the following information, USDA 1983)

Flood Plain Soils

The soils are very deep, nearly level and gently sloping, poorly drained and somewhat poorly drained loams. The soils have a high water table or are subject to flooding, or both, because of the high rainfall and snowmelt in winter and spring. They formed in medium textured to moderately fine textured alluvium derived from mixed rock sources.

Settlemeyer Soil occurs on flood plains south of Fort Jones and has slopes of 0 to 5 percent and is poorly drained. Typically, the profile has stratified loam, fine sandy loam, silt loam and sandy clay loam.

Diyou Soil occurs mainly on flood plains south of Fort Jones and has slopes of 0 to 2 percent and is somewhat poorly drained. Typically, the profile has stratified loam, sandy loam, silt loam and clay loam.

Of minor extent in the flood plain are the poorly drained Copsey, Odas, pit, and Settlemeyer Variant soils along small streams on the higher positions on the landscape. Esro soils are in low areas. Riverwash soil is variable in texture and occurs along the river and streams.

Alluvial Fan Soils

The soils are very deep, nearly level to strongly sloping, well drained, gravelly sandy loams and loams and are found along the streams that drain into Scott Valley. They formed in moderately course textured to medium textured alluvium derived from mixed rock sources.

Stoner Soil occurs mainly on alluvial fans and has slopes of 0 to 15 percent and is well drained. Typically, the profile has gravelly sandy loam surface layer with a gravelly sandy loam and very gravelly loam subsoil.

Of minor extent in alluvial fans is the somewhat excessively drained Atter soil that has many rock fragments on the surface and throughout the profile. Duzel, Kinkel, and Kindig soils are well drained and occur on the upper slopes of the fans. Bonnet soil occurs mainly in the upper Moffett Creek area and has loam or gravelly loam surface layer and a gravelly sandy loam and very gravelly loam subsoil with lime accumulation.

Klamath Mountain Range Soils

The soils are very shallow to very deep and are well drained to excessively drained and have medium textured to moderately course textures. Soils derived from granitic parent material are noncohesive and usually highly erodible. About 56,900 acres of granitic soils are found in the Scott River watershed, mainly on the south and west sides of Scott Valley (Sommarstrom, Kellogg, and Kellogg 1990).

Duzel Soil occurs on the east side of Scott Valley and is moderately deep, well drained with slopes ranging from 5 to 50 percent. Typically, the profile has gravelly loam surface layer with gravelly loam and very gravelly clay loam subsoil and underlain by metamorphic rock.

Jilson Soil occurs on the east side of Scott Valley and is shallow, well drained with slopes ranging from 5 to 65 percent. Typically, the profile has gravelly loam surface layer with gravelly loam subsoil and underlain by metasedimentary rock.

Of minor extent is a deep Facey soil, a very shallow soil and Rock Outcrops.

Marpa Soil occurs west and north of Scott Valley and is moderately deep, well drained with slopes ranging from 5 to 50 percent. Typically, the profile has gravelly loam surface layer with very gravelly sandy clay loam subsoil and underlain by fractured metasedimentary rock.

Kinkel Soil occurs west and north of Scott Valley and is very deep, well drained with slopes ranging from 2 to 50 percent. Typically, the profile has very gravelly loam surface layer with very gravelly loam subsoil and underlain by fractured metasedimentary rock.

Boomer Soil occurs west and north of Scott Valley, is deep and well drained with slopes ranging from 5 to 70 percent. Typically, the profile has gravelly loam surface layer with gravelly clay loam and gravelly sandy clay loam subsoil and underlain by metamorphosed basic igneous rock.

Dubakella, Ipish, and Weitchpec Variant soils formed in residuum derived from serpentinitic rock, Kindig-Neuns soils and Rock Outcrop mainly from metasedimentary sources.

Kindig Soil occurs on the west side of Scott Valley and is deep, well drained with slopes ranging from 15 to 80 percent. Typically, the profile has gravelly loam surface layer with gravelly loam and very gravelly loam subsoil and underlain by weathered schist.

Neuns Soil occurs on the west side of Scott Valley and is moderately deep, well drained with slopes ranging from 15 to 80 percent. Typically, the profile has gravelly loam surface layer with very gravelly loam subsoil and underlain by metamorphosed siltstone.

Chaix and **Chawanakee** soils having gravelly coarse sandy loam profiles, somewhat excessively drained and formed in material derived from granite. These soils are very erodible and are found on the western slopes of Scott Valley between South Fork and Kidder creeks.

Asta soil on terraces, Atter soil is somewhat excessively drained, Marpa-Kinkle-Boomer soils, and Rock Outcrop mainly from metasedimentary sources.

Issues:

- High rates of erosion from decomposed granitic (DG) soil areas when disturbed, especially by roads, and the impacts of sand-sized sediment on fish habitat.
- Effects of intense fires, roads, and timber harvest in steep, susceptible terrain on landslide frequency and size, particularly in the lower Scott
- The riprap and levee work from the past 30 years has affected the functions of the river channel but the level of impact is unknown.
- The dredger tailings left along the upper Scott River channel and the floodplain and their impact on groundwater storage, streamflow, fish access, and flooding.

10. GEOLOGY & SOILS

Summary of Findings

Sedimentation of spawning gravels and rearing pools was identified as a serious problem in the Scott River in 1980s (CH2M-Hill, 1985). As a result, the Klamath River Fisheries Task Force and others have funded several assessments of erosion sources, impacts, and solutions. Granitic sediment production, as noted by excessive sand deposits in spawning gravels and pools, was the focus of the first investigation (Sommarstrom, Kellogg, and Kellogg, 1990).

Evaluating the 57,000 acres of granitic soils contributing to the Scott Valley portion of the Scott sub-watershed, the study identified the following sources of granitic soil erosion: road cuts – 40%, streambanks – 23%, road fills – 21%, skid trails – 13%, and the balance from road surfaces, landslides, and sheet & rill erosion. Roads as one source contribute 63% of the total. An average yield of 71,500 tons of decomposed granitic sediment was predicted to be delivered to the Scott River each year (21% of the amount eroded); 60% of the sediment was attributed to management sources based on 1989 data. Sand-sized and finer sediment levels impaired the quality of the Scott River's spawning gravels, especially in the middle of the valley (Sommarstrom et al., 1990). When re-measured in 2000, the mid-valley reaches of the Scott River revealed significant (35-56%) reduction of fine sediment (<0.85 mm) levels in spawning gravels; 10 of the 12 original sites showed reduced fine sediment levels. The highest percentage of fine sediment in 1989 was 20-22% at 3 sites, while in 2000 the highest site was 17% with the other sites ranging from 4 to 14%.

In the 1990 granitic study, the French Creek watershed was identified as the largest contributor of sediment to the Scott River, representing 23% of the total. As one result, the multi-stakeholder French Creek Watershed Advisory Group was formed in late 1990, sponsored by the California Board of Forestry and facilitated by UC Davis. To reduce the sediment yield in the drainage, the French Creek Watershed Road Management Plan and Monitoring Plan were prepared and adopted by the group in late 1992. Much effort was spent on improving the existing road systems on all ownerships in the watershed during the next few years, such as out-sloping, rocking 34 miles of unsurfaced roads, and correcting drainage problems. Monitoring results – such as the amount of fine sediment in pools – began to show immediate improvement in stream habitat quality and sediment levels lowered to within natural background levels by 1995. In 1996, the French Creek group received the CF Industries / Conservation Fund National Watershed Award for voluntary initiatives due to its documented collaborative success. After the 1997 flood, sediment levels in pools increased somewhat but returned to pre-flood, background levels by 1999 and have been sustained since then.

As described in the Water Quality section, the Scott River system was declared impaired for excessive sediment levels by the state and the federal governments in 1997. Sediment sources – especially roads – have continued to be the focus of attention by the SRWC and SRCD, as noted in the list of past and current projects below. They will continue to be targeted in the future also.

*Additional information about sediment effects on water quality can be found in Section 12, Water Quality.

10. GEOLOGY & SOILS

Reference to Past and Current Projects

Specific projects related to geology and soils and their effects that have been implemented by or for various entities include:

- Scott River Basin Granitic Sediment Study (1990) by Sommarstrom, Kellogg and Kellogg, prepared for SRCD and USFWS.
- French Creek Watershed Road Management Plan (1992) by the French Creek Watershed Advisory Group (SRCD a member), and implementation by landowners.
- SHN Consulting Engineers. Road Erosion Inventory – Shackleford and Mill Creek Watersheds. Prepared for SRCD and Fruit Growers Supply Company. Redding. 1999
- SHN Consulting Engineers. Moffett Creek Upland Gross Assessment. Final Draft. Prepared for SRCD. Redding, CA. 2002.
- Scott River cross-sections (1996-97) by SRCD staff
- Scott River Monitoring Plan – Sediment Sampling and Analysis – 2000 (2001) by Sommarstrom. Prepared for SRCD, SRWC, and CDFG.
- Aerial photo analysis started on July 25, 2003 by the NCWQCB for the TMDL process. This analysis is expected to include landslide information.
- County Road Maintenance Manual for Water Quality and Habitat Protection completed (Sommarstrom)
- Road Erosion Study (TMDL, McFadin)
- Road Survey – Scott Bar Mill, Mill Creek, Etna Creek, French Creek completed (Resource Management, Timber Products)
- Road Inventory (Henley, CDF)

Goals, Objectives, and Strategic Actions

Although the SRWC has not provided specific goals and objectives for this section, the Water and Land Committees have discussed the need for regional studies that will indicate the fluvial geomorphology of the mainstem of the Scott River. Further studies will provide more pieces to the sediment storage and transport part of the sediment budget, as identified in the 1990 Scott River Basin Granitic Sediment Study (page 3-36), including:

- More cross-sections to better describe the varying widths and depths of the channel, based on aerial photo analysis to identify representative sub-reaches.
- Sediment samples of uniform parts of point bars and pools, using Wolman pebble counts for each site and reach, to better characterize the channel bed surface grain size.
- Characterization of each reach into % riffle, pool, bar, based on large-scale aerial photos.
- Approximate cross-sections at the riffle sample sites.
- Use of scour chains or other indicator of depth of bed movement during peak runoff.

Note: More information regarding sediment can be found in Section 12, Water Quality.

11. Hydrology/Water Supply

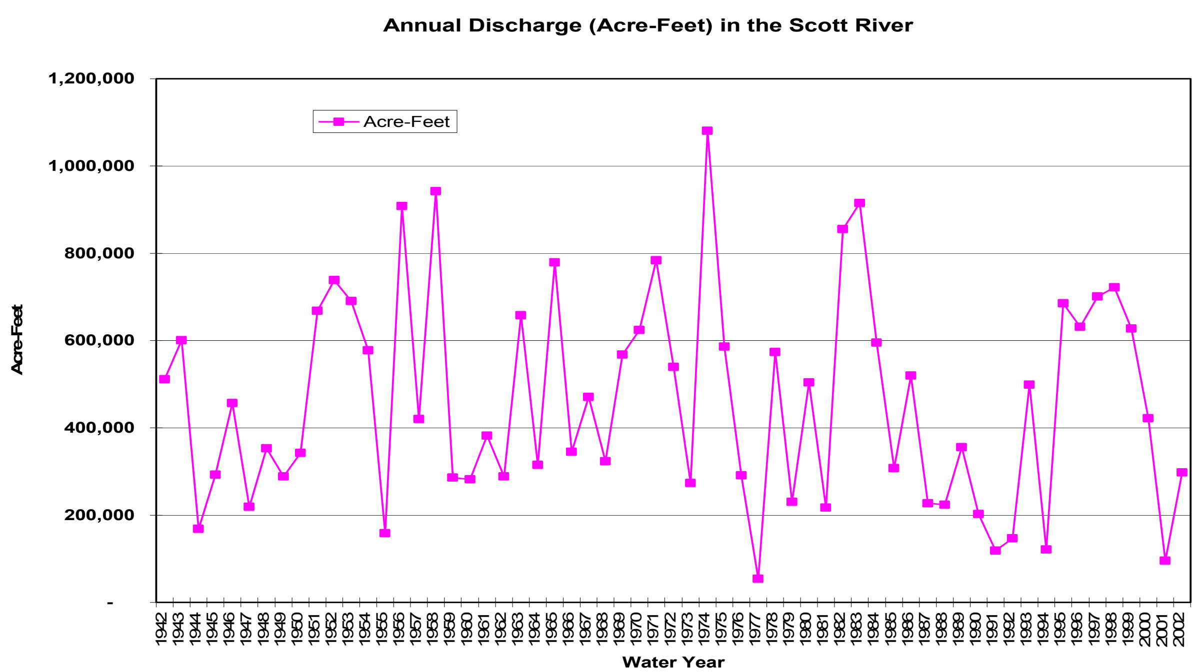
The water supply produced by the Scott River watershed is used for economical as well as ecological resources. The continuing dilemma over identifying the required amount of water needed for a healthy ecological system remains the primary question for landowners in the watershed. The information contained in this section reports the estimated water supply that is currently available but does not address quantities that are needed to sustain the economy nor fish populations and habitat. The initial phase of the SAP will provide the SRWC with information about the potential implication of water supply as it relates to fisheries.

Hydrology

Flows vary tremendously in the mainstem of the Scott River and the major tributaries with lower flows during the months of June to October. During periods of drought, large portions of the mainstem Scott River are dry and many thousands of juvenile salmon and steelhead are stranded in portions of the Scott River watershed. For more details about stranding, refer to Fish Rescue in Section 7, pages 6 and 7.

The Scott River is a large watershed (819 $miles^2$) with complex and diverse topography. Average annual precipitation for the entire Scott River watershed, including high and low elevation areas, is 36 inches (91 cm). Fort Jones, located at the northern end of Scott Valley, averages 21.8 inches (55.7 cm). Our understanding of the overall hydrology of the Scott River is limited. Not enough flow gages exist within the watershed, therefore we have limited flow data with the use of only one year-round USGS gage located downstream of the valley. Figure 11-1 shows the total annual runoff for the Scott River, as measured at this USGS gage near Fort Jones for the period of record, 1942-2002.

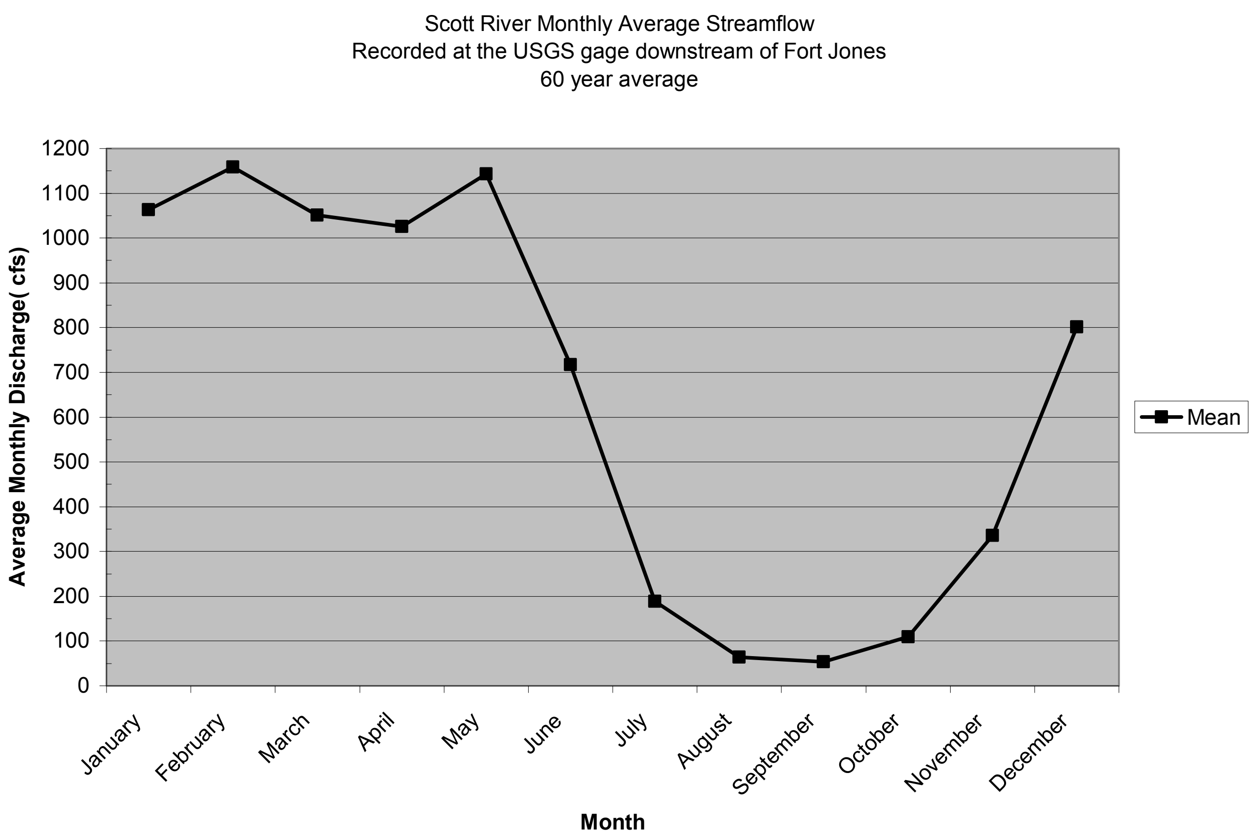
Figure 11-1. Annual Discharge in the Scott River. The runoff has ranged from a peak of 1,081,013 acre-feet in water year 1974 to a low of 54,106 acre-feet in water year 1977 for the period from 1942 to 2002.



11. HYDROLOGY/WATER SUPPLY

The typical yearly runoff pattern for the Scott River is shown in Figure 11-2 as measured at the USGS gage. There is no large-scale surface storage that modifies or regulates flows.

Figure 11-2. Period of record (1942-2002) average monthly discharge. The annual pattern illustrates the seasonal variation of surface water flow. Typically, low flows occur during the summer and fall; high flows occur in the winter and spring.



Additional flow gages were installed during 2002 in various parts of the watershed. These gages will collect data during low flow periods only. Locations were selected based on historic sites for data collection or are representative of the main tributaries where access has been permitted. These gages are located at East Fork and South Fork Scott River near Callahan, Kidder Creek, Shackleford Creek above the falls, and Shackleford Creek at Mill Creek. Historic and current gage operations can be found in Table 11-a. Data for these gages is available through the office of the RCD.

11. HYDROLOGY/WATER SUPPLY

Table 11-a. Scott River Streamflow Gages (April 2003)

Location	Operator	Station ID	Data	Period of Operation
Cedar Gulch near Callahan	USGS	11518310	Daily	2/1/1966-9/30/1973
EF Scott near Callahan	DWR		Daily	6/30/2002 -present
E. Fork Above Kangaroo C.	USGS	11517950	Daily	9/1/1970-7/6/1973
E. Fork Scott Below Houston Creek.	USGS	11517900	Daily	8/30/1970-7/6/1973
EF Scott near Callahan	USGS	11518000	Daily	10/1/1959-9/30/74
EF Scott near Callahan	USGS	11518050	Daily	10/1/1910-9/30/1911
Etna Ck. Above Lunch Ck.	USGS	11518400	Peak	2/10/1961-4/27/1973
Kidder Creek	USFWS/RCD		Daily	9/2002-present
Moffett Creek near Fort Jones	USGS	11518600	Daily/peak	10/1/1959-9/30-1967
S Fork Scott near Callahan	DWR		Daily	6/30/2002 -present
S Fork Scott near Callahan	USGS	11518200	Daily	10/1/1958-9/30/60
Scott below Fort Jones	USGS	11519500	Daily/peak	10/1/1941-present
Scott near Scott Bar	USGS	11520000	Daily	10/1/1911-9/30/1913
Shackleford above Falls	USFWS/RCD		Daily	9/2002-present
Shackleford Mill	USFWS/RCD		Daily	9/2002-present
Shackleford near Mugginsville	USGS	11519000	Daily	10/1/1956-9/30/1960
Soap Ck. Near Fort Jones	USGS	11518610	Peak	1/1/1961-1/1/1973
Sugar Creek below Tiger Fork	USGS	11518300	Daily	9/1/57-9/30/60

History

Scott Valley's groundwater aquifer stores an estimated 400,000 acre-feet of water (Mack, 1958). Due to the alluvial characteristics of the valley floor, Scott Valley's groundwater is interconnected with the local perennial, intermittent and ephemeral stream systems (CSWRCB, 1975). The Scott River Adjudication recognizes a zone of interconnected ground and surface waters in its water rights determination in the Scott River watershed below Fay Lane. However, the interconnected zone was designated with limited available information. Because the Scott Valley aquifer is situated in an alluvial valley it is conceivable that any withdrawal affects surface flow. More information is needed to determine the interconnection between groundwater and surface flows.

Until the late 1960's, agricultural water was mainly derived from surface water diversions, from the Scott River and its tributaries; flood irrigation was the primary application method (McCreary-Koretsky, 1967). Most wells were shallow and only used for domestic and stock supplies (Mack, 1958). Gradually much of the surface water use switched to groundwater wells and the irrigation method changed to sprinkler irrigation. State data, on well drilling in the Scott Valley, indicate an increase in the number of new wells each year, during the 1970's. Well drilling peaked after the 1976-77 drought and the number of new wells dropped to lower levels in the 1980's. A small increase again occurred in 1992, during another drought period (CDWR, 1993b).

CDWR estimates that applied water use for agriculture in Scott Valley for Year 2000 is 92,200 acre-feet. Net water use (Evapotranspiration of applied water) is approximately 65,600 acre feet – the difference is losses due to percolation, ditch and run-off. (Cervantes, T.; Water Balance Workshop Handout, 2002).

Water Diversions & Screens

It has been estimated that applied water use for agriculture in Scott Valley is 98,100 acre-feet. Evapotranspiration (ET) is estimated to be 78,000 acre-feet – the difference is losses due to deep percolation, ditch loss and run-off. Most of the irrigation diversions on the Scott River operate from April 1 through October 15 pursuant to the 1980 Scott River Adjudication decree of the Superior Court of Siskiyou County. However, the actual irrigation season may vary depending on weather conditions and irrigation drops off considerably after mid-September. Water has been allocated for irrigation, stock-water and domestic use from the Shackleford/Mill Creek drainage under a 1950 adjudication decree, and from the French Creek drainage in a 1958 adjudication decree. All previous riparian claims prior to 1914, and appropriative water rights, were included in all of the court adjudicated decrees within the Scott watershed.

Diversions from streams for both stock-water and domestic use were also allocated under the referenced court adjudicated decrees. Many domestic users are scattered throughout the valley and foothills of the Scott watershed and utilize groundwater from individual wells. In 1990, the average domestic water use within the cities of Etna and Fort Jones, the two largest municipalities, was 266 gallons/person/day and 170 gallons/person/day, respectively. The City of Etna pipes water directly from Etna Creek while Fort Jones pumps water from the underflow of Moffett Creek and the Scott River. Assuming an average local water demand of 200 gallons/person/day, the total urban (i.e., domestic/residential/municipal) water use in 1990 was estimated at 1,800 acre-feet based on a population estimate of 8,000.

Water-related laws and regulations:

Adjudications: All surface water rights, in the Scott River watershed, above the USGS gage station, are adjudicated. A decree of the Superior Court of Siskiyou County has defined: 1) the amount of water each user is entitled to divert from surface streams or to pump from the interconnected groundwater supplies near the river; 2) the area where such water may be used; 3) the priority of each water right as it relates to other water rights on the same source; 4) the purpose for which the water is used (e.g., irrigation, municipal, domestic, stock water); and 5) the diversion season. Use of groundwater, not considered interconnected with the Scott River, does not currently require state water rights permits and is not adjudicated.

In 1980, the Scott River Adjudication was decreed by the Court. It was based on a legal determination by the Division of Water Rights, of the State Water Resources Control Board. This adjudication applied to all water right holders in Scott Valley, with the exception of those in the Shackleford/Mill Creek and French Creek drainages. Separate adjudications were previously decreed for these two watersheds in 1950 and 1958, respectively. The Scott River Adjudication recognized 680 diversions, which could cumulatively divert 894 cfs from the Scott River and its tributaries (CH2M-Hill, 1985). Riparian, pre-1914 claims, and appropriative rights are included in all of these decrees.

11. HYDROLOGY/WATER SUPPLY

Since 1989, Scott River, French Creek, Kidder Creek, Shackleford Creek, and Mill Creek have been considered “fully appropriated” by the SWRCB. As a result, no new water appropriation permits for additional surface or interconnected water can be issued for the period of April 1, to November 30, except Mill Creek, by order of the State Board. Even though the adjudications specify a right to use a certain amount of water, this amount is not always naturally available, particularly in below-average runoff years.

During the non-irrigation season, defined as "from about October 15 to about April 1" for most water users, water right holders in the 1980 Adjudication are allowed to divert, for domestic and stock watering uses, a "sufficient amount of water, in their priority class, to offset reasonable conveyance losses and to deliver 0.01 cfs at the place of use" (Para. 36). The statement on reasonable diversion and use (Para. 15) states:

> "Nothing herein contained shall be construed to allot to any claimant a right to waste water, or to divert from the Scott River stream system at any time a quantity of water in excess of an amount reasonably necessary for his beneficial use under a reasonable method of use and a reasonable method of diversion, nor to permit him to exercise his right in such a manner as to unreasonably impair the quality of the natural flow" (Scott River Water Decree).

Watermaster Service: To help assure water right holders that the adjudicated amounts are fairly distributed each year, the State Watermaster Service, through the California Dept. of Water Resources (CDWR), is available. The Watermaster helps avoid court litigation and violent conflict, and assists with managing the available water supply. The costs of the service are split evenly between the State general tax fund, one half, and the water right holders in the service area. Watermaster service is presently used for 102 decreed water right holders in French Creek, Oro Fino Creek, Shackleford Creek, Sniktaw Creek, and Wildcat Creek.

In-stream flows: The USFS was allotted minimum flows (in the 1980 adjudication) for the Scott, at the USGS Gage Station, to protect the fishery resource. However, during the period of 1980 to 1995, summer and fall flow minimums have only been met for 3 years, 1982 through 1984 (Power, personal communication). Prolonged drought from 1987 through 1994, excluding 1993, has exacerbated this deficiency. It is not known whether other water users in this reach obtained their adjudicated allowable flows during this period.

Another streamflow requirement comes from Section 5937, of the State Fish and Game Code, which states that the owner of any dam must "allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam." This regulation is applicable to permanent dams as well as seasonal gravel diversion dams in the Scott River and its tributaries.

11. HYDROLOGY/WATER SUPPLY

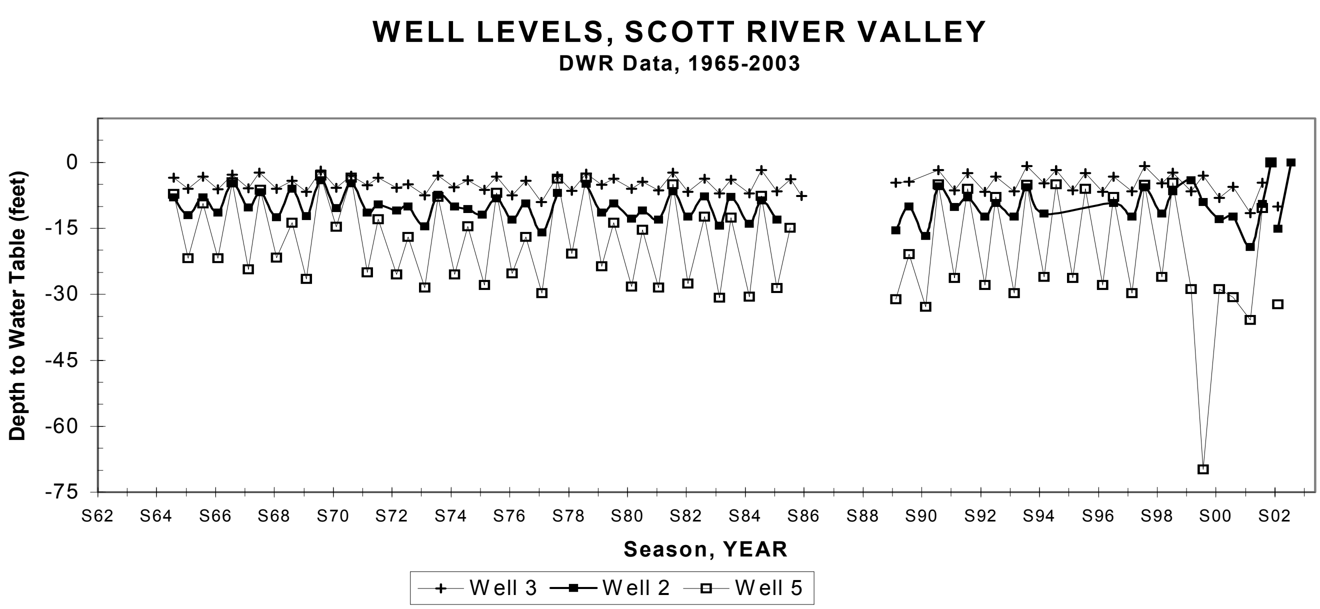
Description of Current Conditions and Issues

Streamflows usually go subsurface in the lower reaches of Etna, Patterson, Kidder (including Big Slough), and Shackleford Creeks each summer through early fall. This is a natural event observed by early settlers (Homesteader, L. Kidder's Diary). Frequency and duration of these events is unknown as well as contributing factor and their importance. Eastside tributaries (Moffett Creek) tend to be ephemeral (Mack, 1958).

Fall flows are primarily determined by precipitation during the prior winter season. Factors such as early season snow melt or more precipitation as rain instead of snow contribute to lower fall flows compared to annual precipitation totals.

Scott Valley's groundwater is interconnected with the local perennial, intermittent and ephemeral stream systems (CSWRCB, 1975). The Scott River Adjudication recognizes a zone of interconnected ground and surface waters in its water rights determination in the Scott River watershed below Fay Lane (see discussion below). Figure 11-3 shows that groundwater levels drop each summer and then recover the following fall/winter, which is typical for this region. While there is an interconnection between groundwater and the Scott River, it is unknown how quickly the interconnection occurs, and thus the impacts of groundwater pumping on streamflow.

Figure 11-3. Fluctuation in water level in wells. Groundwater levels have remained fairly constant over the last 40 years and have recharged for the most part each year for monitoring wells (#1 and #3) near the Scott River, and one well (#5) 1 mile from the river. Well monitoring data are not available prior to the 1950s. The lines in the graph are discontinuous for periods where data are lacking (CDWR, 1999). (S= Spring).



Note: In 2000 the spring level is lower than the fall level. This is due to the fact that the spring measurement was taken in March, and either snowmelt or precipitation (or both) must have brought the well level up after March (Quigley, personal communication).

11. HYDROLOGY/WATER SUPPLY

Water Diversions & Screens

Numerous unscreened diversions have long been perceived as contributing to fish loss in the Scott River watershed. The SRWC, RCD and CDFG have cooperated on a focused effort to install fish screens that meet CDFG/NOAA standards. Cooperatively, over 75 fish screens have been installed and 85% to 90% of operating diversions within known or suspected coho habitat are currently screened. The RCD has funding for an additional 15 fish screens.

Irrigation Studies

A study was conducted by the UC Cooperative Extension (Orloff) to evaluate current irrigation practices by monitoring the soil moisture status of several irrigated pastures and alfalfa fields. The study demonstrated that there was potential for improved water management and water conservation on some ranches. A summary of the findings for this study can be found in Section 13, Land Use.

11. HYDROLOGY/WATER SUPPLY

Summary of Findings

Fall flows (September - November) in the Scott River Watershed are sometimes insufficient to meet the fall needs of spawning chinook salmon (SRWC-CRMP 1999). Lower flows in the Scott River and tributaries have contributed to poor holdover of adult chinook salmon until spawning, blocked access to upstream spawning areas, and reduced availability of spawning sites. Later spawning runs of steelhead and coho salmon have not been as affected by low fall flows, but their life cycle requirement for over-summer habitat has been affected by low streamflows and high water temperatures, particularly during below normal runoff years.

Stock-watering is a beneficial use of diversions during the late fall spawning period, however it is an inefficient process. Due to ditch losses, a large quantity of water must be diverted to deliver the amount of water needed for livestock. While the ditch water loss returns to the groundwater and may eventually return as surface flow, concern is raised over the timing and location of this return flow and the possible impact on spawning conditions. As a result, the SRWC/SRCD has supported the use of stock water alternatives (mainly small pump wells) to the use of ditches. A total of 12 projects have been done since 1994.

More information is needed on the effect of groundwater pumping and surface water diversions and the degree of interconnectivity to asses the effect of these practices on fall and summer flows. A comparison of irrigated acres from 1958 to 2000 (as shown in Figures 11-4 and 11-5) indicates a significant increase in the use of groundwater with a decrease in the use of mixed and surface water. Additional information about irrigation and water use can be found in Land Use, Section 13.

Figure 11-4. ***1958 Irrigated Acres, CDWR***

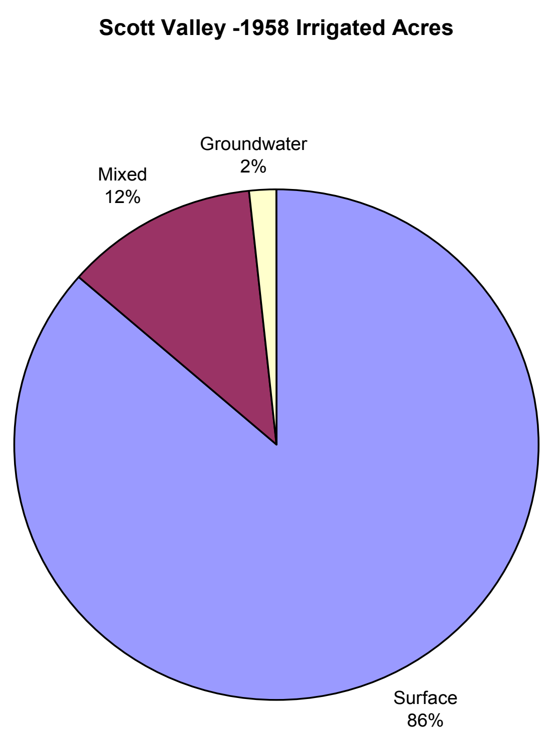
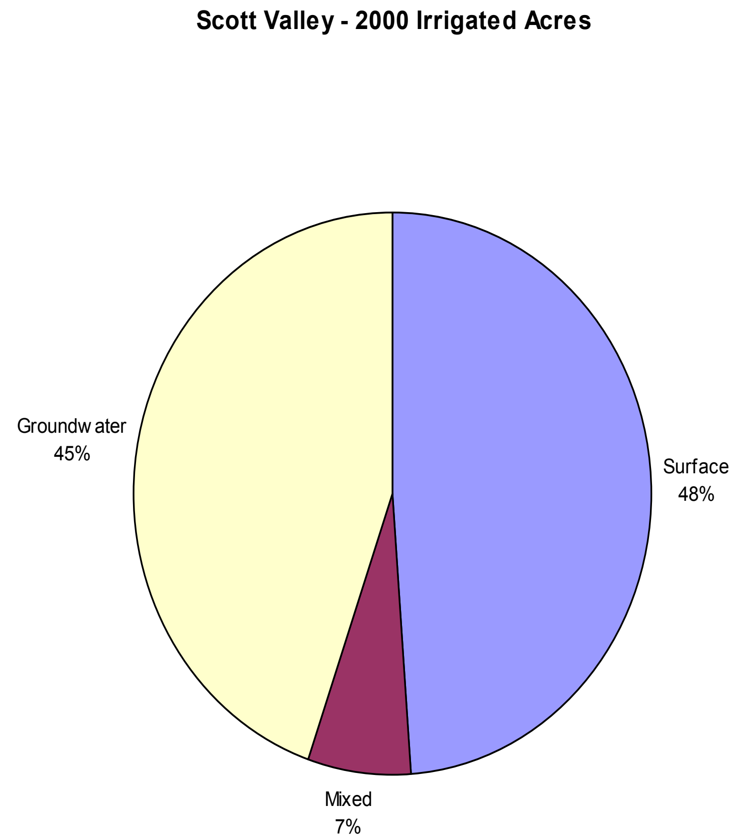


Figure 11-5. ***2000 Irrigated Acres, CDWR***



The SRWC needs to re-establish its goal for adequate flows within the watershed. In 1995, the SRW-CRMP (the Council's predecessor) adopted the goal of: "Work for adequate flows in the Scott River system to protect the migration, spawning, and rearing needs of the salmon and steelhead stocks while also protecting other beneficial uses." They also had a more specific objective of: "Increase fall flows for fall chinook salmon,", since that species was of the most concern during the early 1990s and multiple drought years contributed to inadequate flows during the fall migration period. Much information is still needed, and the results of the Limiting Factors Analysis (LFA) and the Water Balance model will assist with accomplishing this critical need.

Any one effective measure can improve streamflow and meet the SRWC goals and objectives of this section. Actions should strive to increase water supply and to promote efficient water management. Properly implemented actions may benefit landowners and other water users with more efficient water systems while salmon and steelhead may benefit from improved streamflows. Water leasing has been identified as one measure to improve streamflow and is described below.

Studies were conducted over the past few years to evaluate the effectiveness of utilizing small gravel dams to conserve water in the Scott Valley. One project, known as Beaver Dams, was intended to slow the Scott River's flow and allow more water to be stored in the underground aquifer. In theory, this underground source of stored water would be available for release during the primary Chinook spawning period, October through November. Results of well monitoring showed increased sub-surface water elevation, which was measured over 2000 feet from the river. The demonstration project doubled the flow of the Scott River for 17 days. This project did present a challenge, as relatively high-temperature water was discharged below the dams causing problems with fish passage.

A groundwater study is vitally needed to help understand the hydrology of the watershed, particularly Scott Valley. A Water Balance is currently in Phase I – identification of existing data, data gaps, and potential models.

Water Leasing

In July 2002, the SRWC and RCD developed a concept paper for the development of a water leasing program and are currently in phase one of the process. The Scott River Water Trust Fund is to be funded from both public and private (individuals, foundations) funding sources. The long-term intent is to develop a self-sustaining fund, with expenditures deriving from the interest accrued on the principle (similar to the Scott Valley Scholarship Fund).

The goal for this program is "To foster transactions which will provide improved streamflow for salmon and steelhead at critical periods of their habitat needs in the Scott River system by exchanging fair compensation to water right holders for the temporary or permanent instream use of their water allocation and the value foregone of the applied water." Three short-term objectives have been identified in an effort to establish and operate a local, tax-exempt organization to perform short-term leasing and/or purchase of water in Scott Valley, under the three existing water rights adjudications, as a means of improving instream flows for salmon and steelhead. These objectives are:

1) Establish the needed legal, economic, political, social, physical, and biological components.
2) Demonstrate feasibility with several pilot projects on at least one watermastered tributary and on mainstem Scott River.
3) Pursue a variety of funding sources to build up the trust fund principle.

Components & Mechanisms:

1) Legal
   a) Adjudications & short-term leasing options and arrangements
   b) Identification of who "owns" the leased water
   c) Legal priorities for leasing; lease agreement form
   d) Implementation assurance – Watermaster or similar service
   e) CEQA analysis of implementation (*if needed for long-term transfer)*
   f) Institutional legalities of nonprofit water trust
2) Institutional
   a) Local organization [nonprofit 501(c)] as the trust entity
   b) Board of Directors – select local landowners
   c) Articles of Incorporation, Mission Statement, & By-laws
   d) Possible staffing needs

3) Economic & Financial
   a) Valuation of leased water – fair market value appraisal, other methods
   b) Financial arrangement of trust fund
   c) Identify and seek public and private sources of funding
4) Political & Social
   a) Landowner opportunities and support
   b) Agency Support – Memorandum of Agreement & Advisory Committee
5) Physical & Biological
   a) Hydrologic benefit & physical measurement of flow
   b) Fishery benefit, focusing on coho habitat
   c) Setting priority reaches for water leasing

11. HYDROLOGY/WATER SUPPLY

Reference to Past and Current Projects

Scott River Fall Flows Action Plan Accomplishments, 1995 to 2003 (see Appendix L): The Fall Flows Action Plan for the Scott River was adopted by the Watershed CRMP committee in 1995, updated in 1999, and continued by the SRWC in 2000. Impetus for focusing on fall flows for fall chinook began in 1992, when chinook populations in the Klamath River system were very low and the species was being considered for listing as threatened or endangered. In 2003, the SRWC is revising its focus to year-round flow issues for all species of salmon and steelhead through its new SAP, building on the accomplishments and needs of its previous Plan as identified herein.

Current and past members of the CRMP & SRWC Water Committee are to be thanked for their long hours volunteering to develop this strategy. Implementation has occurred primarily through the administration of the RCD but also by agency and landowner partners of the CRMP/SRWC. Appreciation is also given to the public and private funders of the projects and studies, which include:

- California Dept. of Fish & Game - Salmon Recovery & Cantara Trustee Council
- California Dept. of Water Resources
- Dean Witter Foundation
- State Water Resources Control Board
- U.C. Davis – SARP
- U.S. Fish & Wildlife Service – Klamath Fisheries Task Force

Actions taken to increase streamflows when flow is inadequate for fish survivability are:

1. Investigate water leasing/banking.
2. Install stock water systems where diversions are left open for stock water outside the irrigation season.
3. Development of a model that will represent a ‘water balance’ or ‘cycle of water events’.
4. Research cropping systems for reduced water needs and deficit irrigation strategies for alfalfa (underway by UC Cooperative Extension).
5. Investigating the potential of voluntary purchase of water transfer to instream use.
6. Participating landowners have provided pulse flows to aid in the migration of fall Chinook.
7. Exploring water rights implications of conserving water through increased efficiencies.
8. Implementing demonstration projects that will improve the efficiency of all water delivery systems where these practices are cost effective.
9. Working to identify ways to maximize flows in areas with greatest potential for summer rearing.
10. EQIP project by NRCS to improve irrigation efficiency.
11. Well monitoring by CDWR.

Specific projects that have been implemented for improving streamflows are:

- Stock water for Chinook – Scott Valley Irrigation Ditch, 1994 (RCD #rcd20)
- Mill Creek Corridor Restoration, 1998 (RCD #58I)
- Scott River Flow Enhancement Pilot Project, 1995 (RCD #96)

- Preliminary Floodplain Plan for a 1-mile portion of the Scott River degraded by past gold dredging, 1997 (RCD #hess)
- Water Quality in Scott River Watershed (includes conservation), 1998 (RCD #85)
- Improve Stock Watering Systems, 1995-1999 (RCD #85I, 85II, 85V and 85 VI)
- Assessment of Fall Agriculture Irrigation Water Conservation Potential in the Scott Valley, 1995 & 1996 (RCD #orloff1 and orloff2)
- Scott River USGS Station Operation for FY96, 1996 (RCD #59)
- Scott River Water Balance, 1998 (RCD #70)
- Scott River Water Conservation – Irrigation Management, 1999 (RCD #49)
- Assessment of Scott River Flow Enhancement Options, 2002 (RCD #39)
- Scott River Monitoring/Gauging, 2002 (RCD #45)
- Sugar Creek Flow Enhancement Through Diversion Piping, 2002 (RCD #76)
- French Creek Riparian Protection and Enhancement (including stock water system), 2002 (RCD #46)

Goals, Objectives, and Strategic Actions

W1) **GOAL** (originating committee = Water Committee):

Work for adequate water flows in the Scott River system to protect the migration, spawning, and rearing needs of the salmon and steelhead stocks, while also protecting other beneficial uses.

The Objectives for this goal have been further categorized by study (objective A), supply (objective B), and demand (objective C). The following table describes the objectives and indicates the strategic actions that will assist the success of achieving the objective.

Objective W1-A	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Study: Improve our understanding of the hydrology of the Scott River system and the relationship to water use.		W-1-A.a 5 year	Evaluate the ground and surface water recharge effects of irrigation ditches. More information is needed on the return rate, quantity, and location of the ditch seepage to streams.
		W-1-A.b 5 year	Evaluate the potential domestic/urban water use under the Scott Valley Area Plan of the County Land Use Plan and General Plan, its impacts on streamflow and opportunities for water conservation and other mitigation.
		W-1-A.c 5 year	Investigate feasibility and effectiveness of various water recharge methods.

		W-1-A.d 2 year	Conduct a groundwater study including connectivity of groundwater to streams.
Objective W1-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Supply: Increase the in-stream flows in the Scott river and its tributaries during low flow periods, where feasible.		W-1-B.a 5 year	Investigate water storage opportunities.
		W-1-B.b 5 year	Investigate option of recharge to aquifer in winter, spring and early summer months.
		W-1-B.c 2 year	Evaluate the potential use of check dams/beaver ponds in the cooler reaches. (see F-2-C.b)
		W-1-B.d 10 year	Investigate opportunities for upland vegetation management in the watershed to enhance water supply and timing.
		W-1-B.e 10 year	Where feasible, construct water storage on and off channel. (after investigation W-1-B.a)
		W-1-B.f 2 year	Investigate the feasibility and potential level of cooperation to temporarily dedicate water for instream flows during emergency situations. If feasible and acceptable, implement ongoing program.
Objective W1-C	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Demand: Reduce the demand for water by promoting efficient water management practices which are economical, reliable, and practical.		W-1-C.a 5 year	Develop a manual to educate users about potential water conservation practices and why they are needed during low flow years.
		W-1-C.b 5 year	Encourage the community to be aware that water use should not exceed adjudicated amounts through coordinated education with Department of Water Resources.

	W-1-C.c 10 year	Facilitate compliance with water rights as contained in the three adjudications in Scott Valley.

11. HYDROLOGY/WATER SUPPLY – ADDENDUM 10/31/2005

Extensive discussion has occurred in regards to strategic action number W-1-A.d which states "Conduct a groundwater study including connectivity of groundwater to streams". This action does not include enough information to describe the needs and methods for conducting a study. Therefore, in July 2005 the SRWC recommended to modify this action to focus on specific items. In October 2005 the following strategic actions were approved by the Executive Committee, as related to the goal and objective for this section:

W1) **GOAL** (originating committee = Water Committee):
Work for adequate water flows in the Scott River system to protect the migration, spawning, and rearing needs of the salmon and steelhead stocks, while also protecting other beneficial uses.

Objective W1-A	***Priority: High***
Study: Improve our understanding of the hydrology of the Scott River system and the relationship to water use.	

W-1-A.d Revised	~~**Conduct a groundwater study including connectivity of groundwater to streams.**~~ **Develop a process to better understand the Scott River watershed hydrology through the following actions:** a) Identify data gaps through a review of existing data (including 1958 USGS report, 1974 and 1975 SWRCB reports) , upslope and riparian vegetation, and temperature and precipitation data. b) Investigate effects of upland vegetation types on soil infiltration rates and moisture retention. c) Investigate effects of dense riparian canopies on summer and fall stream flow levels. d) Investigate effects of spring flood irrigation on subsequent water table levels. e) Investigate if pumping from deeper aquifers may make water available to contribute to streamflow in the Scott. f) Promote a locally controlled, voluntary network to measure groundwater levels.	July 2005 SRWC meeting – recommendation to modify this action to focus on specific items
W-1-A.e	**Develop prospective projects based on the findings of investigation under action W-1-A.d:** a) Focus on original goal: 'Work for adequate water flows in the Scott River system to protect the migration, spawning, and rearing needs of the salmon and steelhead stocks, while also protecting other	New action

	beneficial uses'. b) Accomplish original objective to 'improve our understanding of the hydrology of the Scott River system and the relationship to water use'. c) Increase our understanding of the Scott River system by testing specific hypotheses related to resource issues that have been developed by community members and technical specialists	
W-1-A.f	**Gain community support to develop and carry out projects (action W-1-A.e) as appropriate.**	New action

12. Water Quality

The initial phase of the SAP has addressed water quality as it relates to fish populations and habitat. Other aspects of water quality "impairment" will be addressed through the efforts of the North Coast Regional Board to complete Total Maximum Daily Load (TMDL) assessments for temperature and water sediment. The results of their assessments can then be incorporated into the SAP. A discussion on the legal authorities that guide water quality on Federal land is provided in Section 13, Land Use.

History

Temperature and sedimentation are two water quality issues falling under a category of "non-point source pollution" (NPS).

Polluted runoff, or NPS pollution, is the leading cause of water quality problems in the state. Non-point sources arise from multiple land uses such as runoff from agriculture and timber harvesting areas, mine drainage, subdivisions, and range and dairy cattle areas. Rainfall, snowmelt, or irrigation water that moves over and through the ground is also contributors to NPS pollution. As the runoff moves, it picks up and carries away natural, animal and human-made pollutants, depositing them into lakes, rivers, wetlands, groundwater, and other inland waters. These discharges threaten the quality of the state's waters.

Federal law requires states to identify all water bodies that do not meet water quality standards. For those "impaired" water bodies failing to meet standards, the states must establish total maximum daily loads, or TMDLs. TMDLs define how much of a specific pollutant a water body can tolerate and still meet relevant water quality standards. All of the combined pollution sources in a watershed may not discharge more than the total limit (CSWRCB, 2001, pages 6-7).

The Scott River watershed's TMDL process began in 2003 and will run for approximately two years. The court-ordered completion date is 2005.

<u>Temperature:</u>
The oldest record of water temperature in the Scott River was taken by CDFG on June 14, 1934, 1 mile south of Fort Jones, where the temperature was 72°F (approx. 22°C), and the survey noted "excellent pools and shelter" with "willows dense along the shore" (CDFG 1934).

The US Geological Survey (USGS) along with the California Department of Water Resources (CDWR) collected water temperatures annually, since the early 1950's, using a variety of field techniques and reported these temperatures by collection station in annual reports (USGS, 1997). The USGS and CDWR also summarized the 1951- 1970 annual reports into a reference guide for many of the monitoring stations (Blodgett, 1970 - TBO).

Historical water temperatures in Northern California watersheds similar to the Scott River watershed indicate that instantaneous water temperatures in the region have exceeded 21°C (70.2°F) since the early 1950's (Table 12-a) (Blodgett, 1970).

Table 12-a. Pre-1964 Flood Maximum Instantaneous Water Temperatures - Regional

USGS Station Name	Maximum (°C)	Maximum (°F)	Water Year
South Fork Salmon River near Forks of Salmon	21	70	1961
North Fork Salmon River near Forks of Salmon	22	72	1961
Salmon River near Somes Bar	24	76	1959
Trinity River Above Coffee Creek	24	76	1960
South Fork Trinity River near Hyampom	25	78	1962
South Fork Trinity River near Salyer	28	83	1962
Shasta River near Yreka	31	88	1961
Klamath River near Seiad Valley	26	79	1961

Historical water temperatures have been documented in the Scott River Watershed at eight separate stations (Blodgett, 1970). Due to the various methods, time periods and total number of measurements, limited information and conclusions can be drawn from historical data in the Scott River watershed. In the Scott River watershed the USGS and CDWR used the "periodic observation" method for collecting water temperatures. This method entailed using a hand held thermometer and directly reading the thermometer temperature. The stations were located far enough downstream of tributary inflow to ensure that waters were well mixed and usually the stations were associated with water flow gauging stations. Blodgett (1970) reported "…the probable inaccuracies resulting from the sum of instrumental and thermometer placement errors should be less than + or – 1.5° F (+ or – 0.8°C) degrees for periodic data collected with hand-held thermometers." Due to these limitations the authors of this report reviewed the historical information cautiously and used the information only in broad watershed observations.

The instantaneous maximum water temperatures of the eight stations located in Scott River (Table 12-b, from Blodgett, 1970) indicate that these portions of the Scott River watershed have exceeded 20°C (68°F). The historical water temperatures reported in Table 12-b was collected prior to the 1964 flood. The 1964 flood had a strong impact on the channel structure. The present day channel is more open and has less vegetation than prior to 1964.

Table 12-b. Pre-1964 Flood Maximum Instantaneous Water Temperatures in Scott River Watershed.

USGS Station Name	Years Data Collected	Maximum (°C)	Maximum (°F)	Water Year
East Fork Scott River at Callahan	1957 to 1968	27	81	1961
South Fork Scott River near Callahan	1957 to 1960	21	70	1959
Sugar Creek near Callahan	1957 to 1968	20	68	1958
Etna Creek near Etna	1957 to 1962	21	70	1959
Moffett Creek near Fort Jones	1957 to 1968	24	76	1958
Shackleford Creek near Mugginsville	1957 to 1960	21	70	1959
Scott River near Fort Jones	1950 to 1968	26	79	1968*
Canyon Creek near Kelsey Creek	1957 to 1960	18	65	1957

* post-1964 flood

Sediment:

Water quality in the Scott River system is strongly affected by its geology and soil conditions, natural events like fires, and past and present management practices. This condition is described in the previous Geology and Soils chapter.

Early records of sediment problems in the stream have been compiled for the Scott River (Sommarstrom, Kellogg, and Kellogg 1990). Mining pollution from placer and hydraulic mining in the late 1800s, followed by gold dredging north of Callahan in the 1930s –1940s, created chronic turbidity and siltation problems. Mining silt impacts were noted in two surveys of the Scott conducted in 1934 due to the dredging activity (CDFG 1934, Taft and Shapovalov 1935). Aquatic bottom food organisms (benthic macroinvertebrates) were measured at riffles above and below sites affected by mining in the upper Scott, and the average number of organisms was always less below mining sites than above.

Excessive sand in the river was not noted by CDFG until about 1948, when field notes began to comment on the "too sandy" nature of the river near Fort Jones, creating very poor spawning area for about 7 miles. A CDFG biologist believed in 1962 that the former bucket dredge operation below Callahan had contributed to the deterioration of suitable spawning habitat in the river, and the effect was still continuing with the winnowing of sand and fines below the dredger site: "Many spawning areas have been displaced by sand". The 1955 flood contributed much sediment also. A 1968 survey in French Creek noted the lower reach to be very sandy and "probably not used to a significant degree by steelhead for spawning." This observation followed the 1964 flood and its impacts.

12. WATER QUALITY

A significant local fisheries problem is excessive sand-sized (<6.3 mm) sediment derived from highly erodible decomposed granitic (DG) soils located on the western slopes above Scott Valley (Lanse, 1972; CH2M Hill, 1985). Excessive fine sediment causes problems for fish because it smothers their eggs and aquatic invertebrates in spawning gravels, eliminates bottom cover, and reduces the size and number of pools for rearing. Scott Valley exemplifies a low gradient river system, dropping 264 feet in 29 miles, and is a natural area for sediment to deposit (Lewis, 1992). Periodic floods tend to move sediment through the system, deposit sediment on the floodplain and the streambed, and also cause stream bank erosion.

A 1990 study identified accelerated DG erosion sources in the Scott to be roads (63% of total), upslope streambanks (23%), and logging skid trails (13%); certain subwatersheds also produced more DG sediment than others (Sommarstrom et al, 1990).

Other Water Quality Issues

State and federal agencies have not identified problems for beneficial uses due to dissolved oxygen (DO), nutrients or pesticides in the Scott River and its tributaries.

12. WATER QUALITY

Description of Current Conditions and Issues

The water quality of the Scott River was listed as "impaired" for sediment and temperature under Section 303(d) of the Clean Water Act by the North Coast Regional Water Quality Control Board and Environmental Protection Agency in 1997**.** It is believed that the water quality has also affected the habitat of anadromous fish populations in the Scott River watershed (CH2M-Hill 1985; KRBFTF 1991).

Temperature:

Maximum summer water temperatures, as high as 77°F were reported in 1985 (CH2M HILL, 1985). Maximum water temperatures of 80°F were reported in the mainstem Scott River, four 4 miles above the Klamath River confluence, in July 2002 (Chesney and Yokel 2003). In 1994, a cooperative effort to collect water temperature data, in the Scott River watershed, was initiated. Those involved included: USFS, Scott River High School, Etna High School, SRCD, Fruit Grower Supply Company and Timber Products Company. Data are collected through the use of continuous recording devices, set to read temperatures several times daily, during the summer months. See Figure 12-1 for the five-year average "Mean Weekly Average Temperatures" resulting from this cooperative effort on 65 monitoring sites throughout the watershed. Our stream temperature data supports the following conclusions on stream temperatures in the Scott River Watershed (Quigley et al, 2001):

- Water Temperatures in the headwaters and primary tributaries draining primarily wilderness areas have a temperature range of 10.9 - 17.8 °C (51.8 – 64.4°F), with most in the range of 14.6 -16.1°C (58.6 – 61.3°F). This can be interpreted as the natural range of water temperatures for Scott River tributaries.
- Influence of tributaries on mainstem water temperatures within the Valley sub-basin appear undetermined due to floodplain or slough (Kidder, Patterson, Mill, Shackleford) conditions which have little or no surface flow and flows presumably continue underground.
- Influence of tributaries on mainstem water temperatures within the Canyon sub-basin appear to temporarily reduce MWAT water temperatures only to see mainstem water temperatures increase back to higher MWAT water temperatures.
- Intergravel flow and inflow from groundwater aquifers below large gravel depositions in the mainstem Scott River may have a significant affect on surface water temperatures, further investigation is warranted.
- Daily average water and air temperatures are highly correlated ($r^2 = 0.800$, $n = 163$), see Figure 12-2.
- MWAT water temperatures recorded between 1997 and 2000 in all geomorphic sub-basins are comparable to the historical range of temperatures recorded in the Scott River watershed since 1951.
- MWAT water temperatures recorded between 1997 and 2000 in the Westside sub-basin (15.8°C, 60.8°F), Canyon sub-basin (16.4°C, 61.8°F) and Westside headwaters (14.0°C, 57.5°F) fall within the natural range of the water temperatures.

12. WATER QUALITY

Figure 12-1. Maximum Weekly Average Temperatures (MWAT) 1995-2000

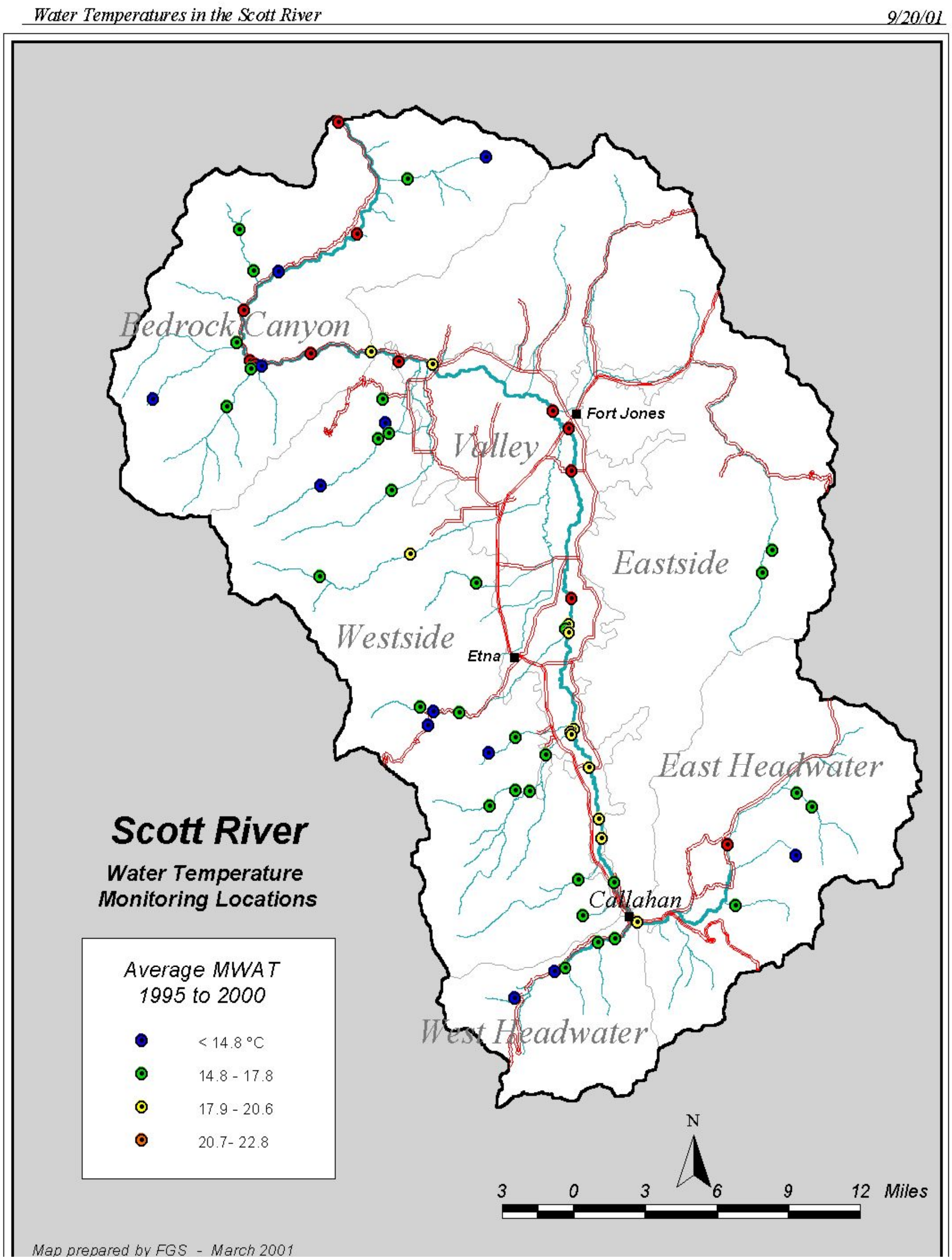
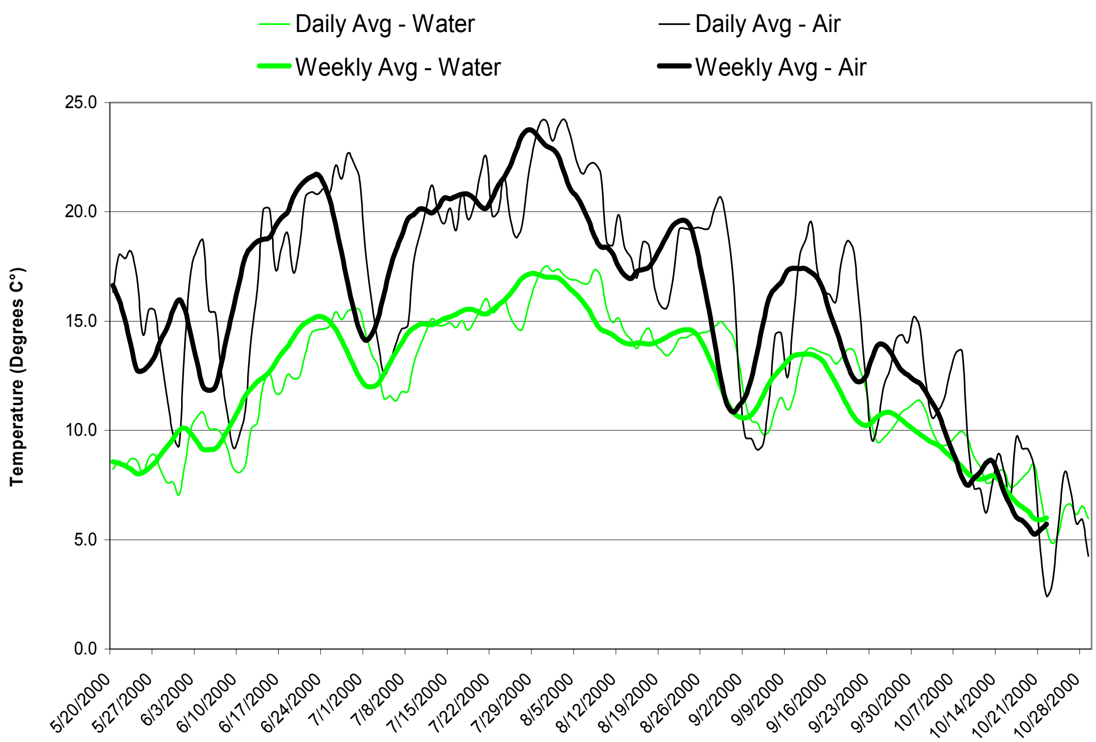


Figure 12-2. Air vs. Water Temperatures in the Scott River Basin (Shackleford Creek, summer 2000)



Sediment:

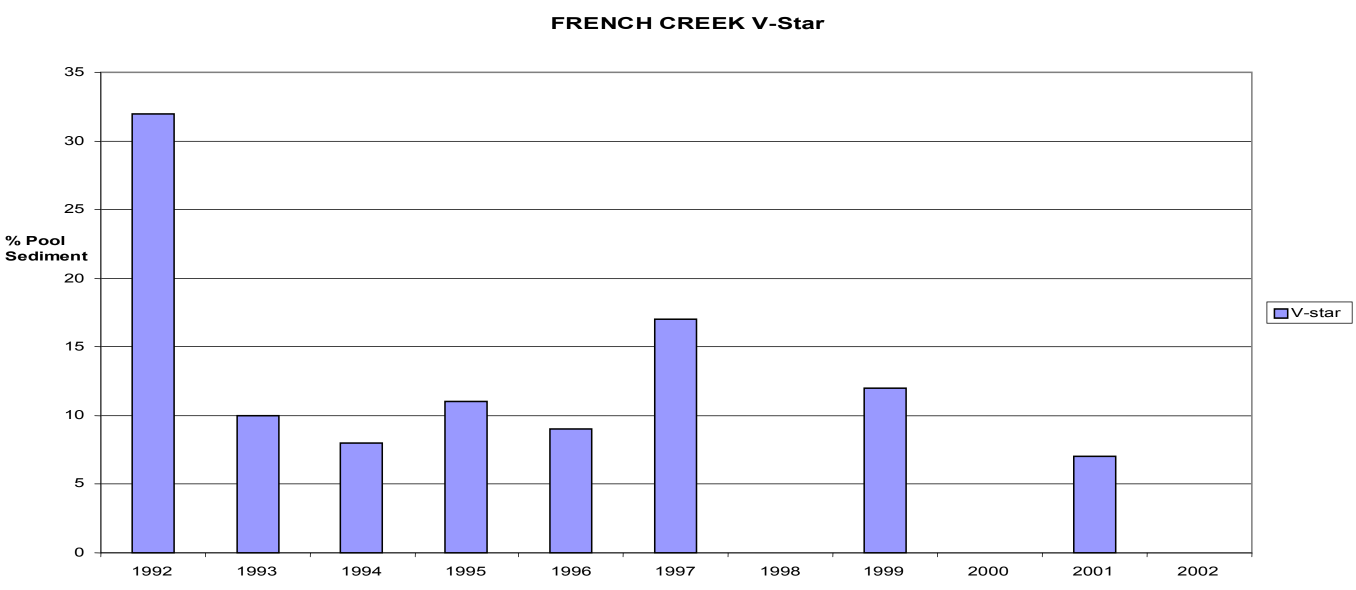
Sediment levels have been measured in spawning gravels (McNeil method) in the Scott River in 1989 and 2000, and in French, Etna and Sugar creeks in 1982, 1989, and 2000 (Sommarstrom et al. 1990, Sommarstrom 2000). Only a few sections of the mainstem (near Fort Jones) currently have fines (<0.85 mm) above the NMFS recommended level of 12%, and these levels have reduced from 20% to 14% between 1989 and 2000. Ten of the 12 mainstem sampling sites decreased in the level of fines <0.85 over the 11 year sampling period. Etna Creek and lower French Creek showed reduced levels also, but upper French and Sugar creek sites showed a slight increase. The mainstem Scott River appears to be getting coarser in its sediment composition, most significantly in the mid-section of the valley below Highway 3. This reduction in fine sediment may reflect the readjustment of the river's gradient after the removal of the small diversion dam near Moffett Creek in 1987-89, and its 30 year accumulation of stored sediment. Effects of the 1997 flood could explain the slight increase in sediment levels at two of the tributary sites.

Elevated sediment levels are more pronounced in lower gradient reaches of the Scott River in the valley. Tailings, from historical mining, may contribute an undetermined percentage of the current sediment contribution.

Levels of sediment in pools is measured through a technique called V-star (V*). V* is a fairly simple technique that measures the relative volume of fine sediment in pools, using the Lisle & Hinton (1991) method developed at the USFS Redwood Sciences Lab in Arcata, CA. The volume of fines in pools relative to the potential pool volume (minus the fines) provides an index of the amount of mobile sediment in the stream system. It has been suggested that a V* of 10% is indicative of undisturbed systems (Dr. Tom Lisle, USFS Redwood Sciences Lab). Figure 12-3 indicates the trend in V* measurements in one reach of French Creek since 1992. In the first year, the 32% level was quite high – indicating about a third of the pool volumes were filled with fine sediment (mostly sand). That was the year that the French Creek Watershed Advisory Group adopted a Road Management Plan and a Monitoring Plan and 1992 was the beginning of their road sediment reduction implementation efforts as well as their joint monitoring efforts. Within one year, the levels had reduced to 10% and have hovered around that level with the exception of 1997, which increased to 17% due to effects of the January flood that year. However, the level had declined to 13% by 1999 and to 7% in 2001. Drought years and flood years all can affect the levels measured. Other reaches in French Creek have not been consistently measured for V*, but its Miner's Creek tributary continues to have higher sediment levels due to meadow down-cutting in its headwaters (Sommarstrom, personal communication).

It should be noted that the Fish Monitoring Program in French Creek has shown sustained juvenile steelhead populations in several reaches since 1990. Juvenile coho became documented for the first time in 1993, and found every 3 years hence until 2000, when they've been observed every year (though in lower numbers) (Maria 2002; see Fisheries Chapter for graph). Adult coho spawners were noted in 2001-02 (Maurer 2002).

Figure 12-3. Trend monitoring results, 1992-2001, measuring levels of fine sediment in pools ("V-star") in one 12-pool reach of lower French Creek (above North Fork). Data collected by USFS- Klamath National Forest - Scott River Ranger District & USFS- Redwood Sciences Lab.- Arcata, in cooperation with the French Creek Watershed Advisory Group.



Similar V* results have been found on Shackleford Creek from 1999 to 2001 as reported by Fruitgrowers Supply Company.

An evaluation was also performed on sediment sources in the metamorphic Moffett Creek drainage on the eastside. The outcome of this assessment suggests that the majority of the past and potential management induced sediment yield to Moffett Creek is associated with bank erosion and incision occurring along tributary stream channels. This type of erosion accounts for approximately 95% of the total management induced sediment contribution to Moffett Creek. (SHN 2003)

Summary of Findings

Temperature: Temperature data are collected through use of continuous recording devices set to read temperatures several times daily during summer months. A summary temperature monitoring report, *Water Temperatures in the Scott River Watershed*, found that, while much of the mainstem of the Scott River has historically had excessive temperature levels, many tributary reaches had temperatures believed acceptable for salmonid rearing over the summer (Quigley et al., 2001).

Many of the historical locations are very close to the same locations as the monitoring sites referenced in the summary temperature monitoring report. The Blodgett (1970) report includes periodic observations from the 1950's and 1960's, prior to any significant land management in these tributaries. Table 12-c compares the maximum recordings from the Blodgett report to the maximum readings from this study as well as to the weekly average of daily maximum temperatures for the hottest seven-day period in the study (MWATmax). It can be seen that temperatures of today are comparable to those of decades ago. This correlation between temperatures 40 years ago, and current temperatures during a time when stream channel and watershed conditions have changed, may indicate that stream heating is primarily a function of local climatic conditions.

Table 12-c. Historical compared to current stream temperatures in the Scott River Watershed.

Location	Historical Blodgett Max (°C)	Current MWATmax (°C)	Current Daily Max (°C)
Scott River near Fort Jones	26	27.2	27.6
Canyon Creek	18	16.7	17.2
Moffett Ck near Fort Jones	24	23.4	24.3
Shackleford Ck. near Mugginsville	21	19.0	19.4
South Fork Scott at Callahan	21	20.0	20.5
East Fork Scott at Callahan	27	26.4	27.1
Sugar Ck near Callahan	20	18.1	18.5

12. WATER QUALITY

The following six recommendations are made for future water temperature monitoring within the Scott River watershed (Quigley et al, 2001).

1. Sediment Deposition - Results indicated that Scott River mainstem deposition areas at Jones Beach, Fort Jones and Callahan supported water temperatures that are higher than what might be expected. Additional investigation into the relationship of fine and coarse gravel deposition, inter-gravel flow and groundwater influences in these reaches would be insightful.
2. The observed annual fluctuation in air and water temperatures in the watershed indicate that a more thorough investigation of historic air temperatures is warranted. Analysis of annual air temperature fluctuations might provide insight into the range of water temperature conditions that has occurred historically and is likely to occur in the future.
3. Tributary effects - An effort should be made to determine the effect of individual tributaries on mainstem temperatures. This includes measurement of flows at each tributary, to determine surface vs. subsurface flows.
4. Groundwater - Groundwater may be a major contributor to maintaining summer flows. Temperature monitoring stations should be established to bracket known inflows of groundwater. The relationship between surface and groundwater should be researched.
5. Riparian Monitoring - Temperature monitoring stations should be established along the mainstem at locations of riparian replanting efforts, and on tributaries which are experiencing natural regeneration. Water temperatures should be monitored as well as rate of riparian growth, in relation to stream shade provided.
6. Temperature monitoring data should be analyzed in relation to the various life stage needs of salmonid species utilizing the stream in question.

Sediment: The unstable granitic soils and past human activities along the western slopes of Scott Valley have contributed excessive fine sediment to the Scott River and certain tributaries (Sommarstrom, Kellogg, and Kellogg 1990). Changes in upland practices and other efforts to reduce road- related, upland sediment sources, in French Creek, Etna Creek, the South Fork of the Scott River, and Shackleford Creek have significantly limited sediment sources and reduced sediment levels in-stream and in the mainstem Scott River (French Creek WAG 1992; Sommarstrom 1994; USFS 1997; SHN 1999; Sommarstrom 2001; Power 2002).

<u>Needed Projects: (recommended in Sommarstrom 2001)</u>

- Repeat McNeil sediment sampling of the Scott River mainstem and at least 3 tributaries in 2004
- Add new McNeil sampling sites in Moffett Creek, Shackleford/Mill, Lower Mill Creek, and Clark Creek.
- Evaluate road erosion sources in Sugar Creek watershed and implement high priority sediment reduction sites.

12. WATER QUALITY

Reference to Past and Current Projects

Actions specific to establishing a well-coordinated water quality monitoring program includes:

1. Implement temperature monitoring program.
2. Implement macroinvertebrate monitoring program.
3. Sediment monitoring through McNeil and V-Star methods.
4. Completion of French Creek V-Star Fine Sediment Monitoring
5. County Road Maintenance Manual for Water Quality and Habitat Protection (5-counties)

Specific projects that have been implemented for water quality include:

- Stream Bank Protection Scott River, 1992 (RCD #rcd17)
- Scott River Riparian Woodland Revegetation Demonstration Project 1, 1994 (RCD #84old)
- Scott River Riparian Restoration/Revegetation, 1992-2000(RCD #rcd16, rcd21, 60, 61poh, 63, 81, 82, 90 and 91)
- Temperature Monitoring on the Scott River. Phase 1. Water Year 1995 Report, 1996 (RCD #99)
- Temperature Monitoring on the Scott River, Phase II, 1996 (RCD #99II)
- Temperature Monitoring on the Scott River, Phase III, 1997 (RCD #99III)
- Scott River Temperature Assessment, Phase IV, 2000 (RCD #99IV)
- Temperature Monitoring Program, 1998 (RCD #51)
- Shackleford/Mill Road Erosion Inventory, 1998 (RCD #55)
- Water Quality in Scott River Watershed, 1998 (RCD #85)
- South Fork Road Erosion Reduction, 1999 (RCD #50)
- Shackleford/Mill Road Erosion Reduction, 1999 (RCD #54)
- Shackleford/Mill Road Corridor Improvement, 1999 (RCD #56)
- Improve Stock Watering Systems, Riparian and Water Quality Conditions in Scott River, 1999 (RCD #85VI)
- Scott River Riparian Woodland Revegetation, 1994 (RCD #95II)
- Scott River Corridor Enhancement Project, 1996 (RCD #87)
- Scott River Corridor Habitat Improvement Project, 1997 (RCD #64)
- Scott River Landowner Riparian Program, 1999, 2000, 2002 (RCD #80, 80II, and 80III)
- Shackleford Creek Restoration Project, 1999 (RCD #58II)
- Fay Lane Restoration Project, 1999 (RCD #63II)
- Fowle Maintenance Project, 2000 (RCD #47)
- East Fork Scott River Habitat Improvement, 2000 (RCD #83)
- Scott River Monitoring Program (1 year of 3), 2000 (RCD #51II)
- Moffett Creek Upland Gross Assessment, 2001 (RCD #62)
- Etna Road Erosion Inventory, 2001 (RCD #73)
- Mill Creek Road Erosion Inventory, 2001 (RCD #78)
- Shackleford/Mill Water Quality Improvement, 2001 (RCD #74)
- Scott River Watershed Planning and Assessment, 2001 (RCD #71)
- Lower Kidder Creek Enhancement Project, 2002 (RCD #37)

- French Creek Riparian Protection and Enhancement, 2002 (RCD #46)
- Patterson Creek Enhancement Project, 2002 (RCD #84)
- French Creek Watershed Road Management Plan (1992) and implementation, by French Creek Watershed Advisory Group (SRCD a member)
- French Creek Watershed Monitoring Plan (1992) by French Creek Watershed Advisory Group (SRCD a member)

Goals, Objectives, and Strategic Actions

W2) **GOAL** (originating committee = Water Committee):
Improve and maintain water quality conditions for native anadromous populations.

Objective W2-A	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Design and complete projects to improve water temperature conditions using prioritized sites having the greatest potential for improvement.		W-2-A.a 2 year	Where possible, identify and remedy conditions that contribute to high water temperatures that may be lethal to salmonids at various life stages.
		W-2-A.b 2 year	Identify location, timing, frequency and duration of possible thermal barriers to migration of adult and juvenile salmonids. Include evaluation after flood event.
		W-2-A.c 5 year	Investigate the contribution of the flow of cool sub-surface water sources and identify locations for potential rearing habitat. Include evaluation after flood event
		W-2-A.d 10 year	Where feasible, install systems that reuse tail or end water or percolate it through the ground to cool it.
Objective W2-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Achieve sediment yields that are beneficial to spawning and rearing for salmon and steelhead.		W-2-B.a 5 years	Continue to review and update studies and literature searches to assist in determining sediment levels that are beneficial to spawning and rearing for salmon and steelhead.
		W-2-B.b 5 years	Educate road users about road-related erosion problems and remedies.

	W-2-B.c 5 years	Identify and correct existing drainage and erosion problems within the road prism, attempting to mitigate those sites with the greatest potential for impacting the stream system.
	W-2-B.d 10 years	Support the development of programs for continuous year-round maintenance of roads and bare slopes.

13. Land Use

This section was developed for the purpose of addressing the potential impacts of land use on fish population and habitat. Studies that relate to the improvement of various land use activities are currently under discussion and will be addressed in future phases of the SAP.

History

Land ownership within Scott Valley is predominantly private, dating back to the Homestead Act acquisitions. Public lands are managed by the Bureau of Land Management (BLM) and United States Forest Service (USFS). There are no state-owned public lands. The BLM manages parcels of land in the eastern mountains of Scott Valley. USFS management predominates in the mountainous areas to the north, west, and south. Valley floor lands are used primarily for agricultural purposes, with limited residential use (KNF, 1994 Community Action Plan, 6).

Public lands surrounding the valley have traditionally provided extractive resources, forage, timber, and mining as well as recreational opportunities for visitors and residents. Timber harvest levels have declined drastically over the last 10-20 years, a result of changes in forest management policies.

Current resource issues focus on declining fish populations, water use, and fire and vegetation changes. The Marble Mountain Wilderness area is a popular destination for hikers, packers, fishermen, and hunters. Use has increased slightly in the last 10 years, but is still low, compared to other areas in California (KNF, 1994 Community Action Plan, 6).

Until the late 1960’s, agricultural water was mainly derived from surface water diversions, from Scott River and its tributaries; flood irrigation was the primary application method (McCreary-Koretsky, 1967). Most wells were shallow and only used for domestic and stock supplies (Mack, 1958). In the 1960’s and 1970’s, well use increased to about half of the total agricultural use (Bennett, personal communication). With the change in water source the application method changed to sprinklers for pasture, alfalfa and grain fields.

Based on historical accounts, much of the vegetation of the Scott River watershed has changed. In general, the tree age of forests has shifted to younger and therefore smaller trees with higher density. Large areas of the watershed are now occupied by brush species and there has been a shift from perennial to annual grasses. The effect of these vegetation shifts on evapotranspiration rates and total water consumption and release patterns for the watershed is not known but could be significant.

13. LAND USE

Description of Current Conditions and Issues

Timber

Logging: When logging on private land in California, the State Board of Forestry rules mandate stream-zone management to protect all beneficial uses of water. This includes water temperature control and streambed and flow modification by utilizing large woody debris (LWD), filtration of organic and inorganic material, upslope stability, bank and channel stabilization, and vegetation structure diversity for fish and wildlife (USFS, BLM, 1994). In the upland and canyon riparian zones, some riparian cover has been disturbed as a result of logging and flooding.

Agriculture

Agricultural crops include pasture, alfalfa, and grain, with limited fruit, vegetable and herb crops. Cattle are raised primarily for meat with some active dairy operations in the valley. Public lands provide an important summer range for local cattle ranchers (KNF, 1994 Community Action Plan).

Stock Water: During the fall and winter months, in Scott Valley, the majority of the diverted water use is for the purpose of livestock watering. Mature cattle need from 10-20 gallons of water per day, with highest demand occurring during hot days and lowest demand during the fall and winter months. The sources of livestock water include both surface water that is diverted into ditches for gravity delivery, and groundwater.

Irrigation: Natural vegetation on about 770 square miles is the largest use of water followed by irrigated agriculture on about 50 square miles. The earliest estimate of irrigated acreage was in 1953, which claimed 15,000 acres irrigated by surface water, 15,000 acres by natural sub-irrigation, and 370 acres by wells, for a total of 30,370 irrigated acres (Mack, 1958). Based on periodic land use surveys, the amount of irrigated farmland in the valley has not changed significantly since 1958 (CDWR, 1993). However, the amount of acreage by crop has changed, with small grains decreasing from over 7,000 acres in 1955 to less than 2,000 acres in 1990, while alfalfa has increased from 10,000 acres to 14,000 acres in the same period (Table 13-a). Acres of pasture have fluctuated during this time period but are about the same now as during the 1950s.

Table 13-a. Scott Valley Irrigated Acreage, 1958-2000 (CDWR data)

Crop	1958	1968	1978	1991	2000
Grain	3,570	5,027	3,681	1,757	2,000
Alfalfa	9,850	9,032	10,405	14,313	13,000
Pasture	16,000	19,294	15,971	16,070	16,500
Other	2,803	446	1,607	303	300
Total	32,223	33,799	31,664	32,443	31,800

13. LAND USE

DISCUSSION OF LEGAL AUTHORITIES FOR WATER QUALITY

This section describes the various legal authorities that guide water quality on Federal land.

Klamath National Forest (KNF) Land Management Plan: The Klamath National Forest Land & Resource Management Plan, 1995 (KLRMP) provides the overall management direction for National Forest lands.

President's Forest Plan: The KNF is a Forest included in the President's Forest Plan for the Pacific Northwest. Of specific concern for watershed management, the Record of Decision for this administrative direction includes the Aquatic Conservation Strategy (ACS). The specific objectives of the ACS are included in the Klamath LRMP.

Clean Water Act / BMPs / Water Quality Objectives: In California, the Environmental Protection Agency (EPA) delegated its authority for regulation of water quality on Federal Lands to the North Coast Regional Water Quality Control Board (NCRWQCB). For management actions on NFS Lands, the USFS entered into a management agency agreement (MAA) with the NCRWQCB requiring the USFS to implement its state certified and EPA approved water quality management program and practices (BMPs) to protect water quality from non-point sources of pollution.

Categorical Waiver for Discharges Related to Timber Operations in the North Coast Region: On December 10, 2002, the NCRWQCB adopted an Order that requires timber operators to apply for an Exemption to waste discharge requirements. Prior to this date, the Management Agency Agreement between the USFS/R5 and NCRWQCB exempted Forest Service operations from applying for a waste discharge permit as long as BMPs were implemented. The Board's exemption from waste discharge requirements expired in 2002 and, consequently, they adopted this interim policy.

Beneficial uses of water: Under the California Water Quality Standards, the objective for maintaining water quality is to assure that the beneficial uses of water are not adversely affected.

Anti-degradation policy: Overall management of water quality on Federal Lands in California is subject to and guided by the State and Regional Water Boards. State Board Resolution No. 68-16, adopted 10/28/1968, provides the basic guidance for assuring that management activities do not produce a change in water quality that would affect water quality to the point that it would adversely affect beneficial uses. Resolution No. 68-16 Statement of Policy with Respect to Maintaining High Quality of Waters in California, states:

> "While requiring the continued maintenance of existing high quality waters, the policy provides conditions under which a change in water quality is allowable. A change must:
> - Be consistent with maximum benefit to the people of the state;
> - Not unreasonable affect present and anticipated beneficial uses of water; and
> - Not result in water quality less than that prescribed in water quality control plans or policies."

13. LAND USE

<u>NCRWQCB 303 (d) list of Water Quality Limited Segments:</u> Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that do not meet water quality standards. Each state must submit an updated list, called the 303(d) List of Impaired Waterbodies, to EPA. In addition to identifying the waterbodies, the List also identifies the pollutant or stressor causing impairment. Placement of a waterbody on the 303(d) List triggered the development of a pollution control plan, called a Total Maximum Daily Load (TMDL), for each water body and associated pollutant/stressor on the List. The TMDL serves as the means to attain and maintain water quality standards for the impaired water body. During each 303(d) listing cycle, the water bodies on the list are prioritized and a schedule is established for completing the TMDLs.

On July 25, 2003, EPA gave final approval to California's list of water quality limited stream segments. The entire Scott River is listed for sediment and temperature. As of late 2003, NCRWQCB staff has begun a background study on stream temperature and sediment sources in the Scott River basin. Their report is scheduled for completion September 2004, and implementation of a TMDL plan for the Scott is scheduled for September 2005. Thus, as of now, there is no legal TMDL guidance from EPA or the NCRWQCB for the Scott River. In the interim, maintenance of water quality on Federal lands is guided by the Basin Plan and the Region 5 USFS BMPs until the TMDL is implemented.

13. LAND USE

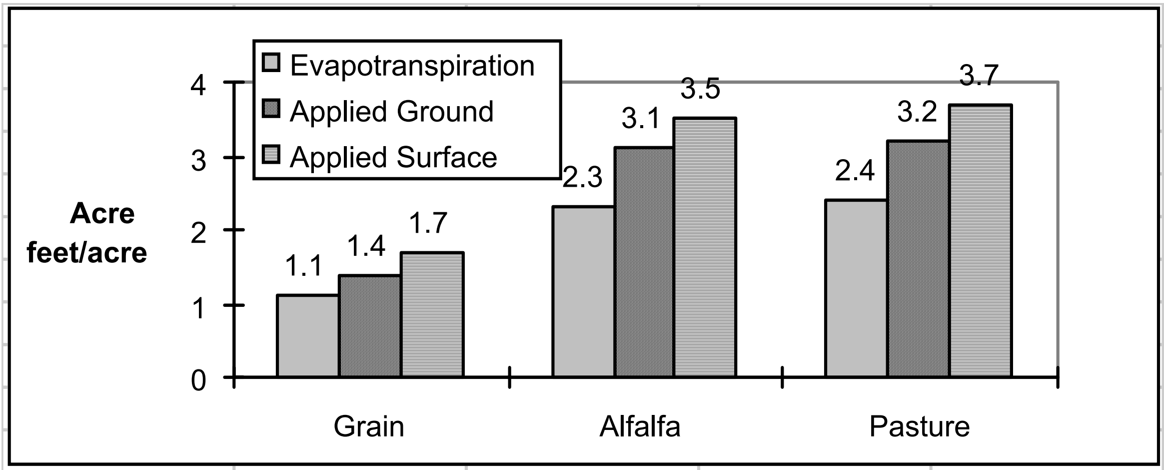
Summary of Findings

Timber: Logging has been included as one of many causes in the decline of anadromous fish populations throughout the west. There are conflicting data, however, and the exact relationship between logging and fish populations is unclear. In some cases logging and associated activities, especially the associated road system, can cause increased sediment inputs into streams if they are improperly maintained. This can affect access to clean spawning gravel, water quality (e.g. turbidity), stream morphology, and water temperature. Improper culvert installation on forest roads commonly created barriers to upstream fish movement. Past logging practices may have also caused increased water temperatures by removing overhead canopy cover thereby increasing the amount of solar radiation that reaches the stream. It was also a common practice in the past for loggers to remove large amount of large woody debris from streams as it was mistakenly thought by biologists and fish and game agencies at the time that this debris was a barrier to fish movement. More information about sediment and temperatures can be found in Section 12, Water Quality. Woody debris is discussed in Section 6, Summary of Limiting Factors.

Agriculture: The crop grown and weather determine the amount of water required. The primary irrigated crops in Scott Valley are alfalfa, pasture, and small grains. Figure 13-1 shows the evapotranspiration (ET) rate for these crops. The amount of applied water was estimated by assuming an irrigation efficiency of 75% for applied groundwater, mostly sprinklers and 65% for applied surface water, primarily flood (CDWR, 1993a). The actual amount of water applied per season can vary considerably, depending on precipitation and is often less than the values stated in Figure 13-1. Data from Table 13-a and Figure 13-1 can be combined to estimate total amounts of 1.) Water applied and 2.) Amount used by crops for each of the reported years. In this estimate it is critical to recognize three important factors. First, when crops are irrigated for the full growing season (typically mid April to mid September) the amount of water used by the plant and lost through evapotranspiration is the same whether the water is applied as surface (flood) or sprinkler. Second, more water is applied as surface irrigation than when pumped from groundwater and applied with sprinklers. Third, surface irrigation, dependent on diversion, are more likely to be limited to partial season irrigation due to the stream sources becoming dry part way through the season. Thus, crops in the 1950s and 1960s that were dependent on surface irrigation were probably often only irrigated for a portion of the growing season. The exception to this is grain, which due to its early maturity was likely fully irrigated. Considering the changes in crops, acreage and the factors above, the amount of water likely used by crops has increased from 1958 to 2000 by between 15 percent (10,000 more acre feet) and 31 percent (20,000 acre feet) depending on the date when surface irrigation stops, i.e. July 15, Aug 1 or Aug 15. Most of the additional water applied occurs later in the growing season from groundwater, and the rapidity of interconnectivity between groundwater and streamflows is uncertain. It is also important to recognize the magnitude of the increased use, on the order of 5 to 20 thousand acre feet compared to groundwater storage capacity of 400,000 acre feet. Other sections also relate the magnitude of increased water use from non-agricultural lands in the watershed for comparative purposes.

The relationship between irrigation and flow for fish remains an issue and more data is needed for determining the impact. Through the efforts to complete the LFA and a Water Balance we hope to gain more knowledge about this relationship and what can be done to improve conditions.

Figure 13-1. Average Annual Water Use per Acre by Crop in Scott Valley (CDWR, 1993a).



- Applied ground = pumps and wells
- Applied surface = ditches

Grazing Management: While many historic causes have degraded the Scott River's riparian zone, concern has been expressed over the continuing effect of livestock on the riparian zone. In a study of Scott Valley's stream bank protection projects, unmanaged browsing of established riparian vegetation can inhibit growth, while browsing of seedlings and saplings can kill the plants (Patterson, 1976 - TBO). It recommended excluding livestock from the riparian zone to allow for adequate riparian plant survival and growth (Lewis, personal communication). Proper grazing management, through stream corridor fencing, can be used to restore and manage the riparian area and water quality, while still intensively grazing adjacent and riparian pastures (Chaney et al, 1993 - TBO).

Irrigation Studies

A study was conducted by the UC Cooperative Extension (Orloff) to evaluate current irrigation practices by monitoring the soil moisture status of several irrigated pastures and alfalfa fields. The study demonstrated that there was potential for improved water management and water conservation on some ranches. There were times when fields were irrigated when the soil moisture levels did not indicate irrigation was needed. The sensors also showed that under-irrigation occurred on other ranches, largely because the irrigation system was inadequate to meet peak crop needs in the mid-summer.

In general, pastures had higher soil moisture levels than alfalfa fields for three likely reasons: 1) First, irrigated pasture is frequently produced on more marginal soil, often sites that have a high water table. The well-drained deep soils are usually reserved for alfalfa. Therefore, the high soil moisture readings in some of the pastures, especially at the deeper depths, is not solely related to irrigation practices but may be accounted for at least in part by the high water table. 2) Growers usually cease irrigating alfalfa after the final cutting in the fall and the alfalfa soon goes dormant until growth resumes in spring. Pasture production practices are different. Pastures are typically grazed rather than cut for hay in the fall. Livestock producers must feed costly hay once pasture growth ceases due to cold weather. Growers wish to prolong pasture growth as long as possible to delay feeding hay. Therefore, pasture is usually irrigated later into the fall than is alfalfa. The water needs of pasture decline significantly in fall compared to summer due to lower temperatures and shorter day length. Irrigation practices should reflect this decline evapotranspiration rate the in fall. 3) Alfalfa in this area is typically cut three to sometimes four times per season. Most of the pastures (especially those showing little fluctuation in soil moisture) were only cut once in the spring or not at all. The irrigated pastures were grazed for most of the year. Growers cannot irrigate for a while prior to cutting to allow the field to dry out enough for haying equipment to enter and to dry out the soil surface to promote hay curing. In addition, growers obviously cannot irrigate while the hay is curing. Therefore, there is typically an 8 to 20 day period when fields are not irrigated. When fields are grazed rather than hayed there is not this long period when fields cannot be irrigated and the irrigation schedule can continue nearly uninterrupted. Hence there is likely greater potential .for water conservation on pastures than alfalfa fields.

An irrigation cut-off experiment was also conducted in the Scott Valley. The date of the last irrigation affected the soil moisture content, but only the earliest cutoff dates had an appreciable effect on alfalfa yield in the years evaluated. Regardless of the irrigation cutoff date, alfalfa in all plots fully recovered by the following season and first and second cutting yields were essentially the same. Soil type may affect these results and a greater impact would likely occur on fields with a lower water-holding capacity. Irrigation after the final alfalfa cutting of the season appeared unnecessary for the soil type evaluated. Late-season irrigation (terminating irrigation in mid September versus late September or early October) had little effect on pasture yield. However, early irrigation termination (early August) resulted in the death of some pasture grasses and reduced yield. Cool-season pasture grasses were less able to withstand drought than was alfalfa.

After seeing the value of soil moisture monitoring, a follow-up 2 year program was conducted with the cooperation of the Siskiyou RCD to encourage growers to use soil moisture sensors. Sprinkler irrigation systems were also evaluated and improvements were suggested where needed.

An increasing number of growers are using soil moisture sensors as a result of these programs, educational events, and a brochure developed on using soil moisture to improve irrigation management. In addition, growers are improving their irrigation system efficiency by installing new uniform nozzles, repairing leaks, and switching to more efficient systems. Over the past decade, there has been a gradual but continual shift to center pivot irrigation from wheel-line irrigation—there were no center pivots 10 years ago while there are now approximately 15 center pivots (need to document exact number). This trend is expected to continue somewhat but field size, shape, and the location of buildings limits the fields that are suitable to this irrigation system. This shift toward center pivots represents a significant improvement in irrigation efficiency, as wheel-lines typically have a distribution uniformity of 75% while center pivots often have a distribution uniformity of greater than 90%.

Additional information about irrigation and water use can be found in Hydrology/Water Supply, Section 11.

Reference to past and current projects

Actions specific to protecting streams from erosion/siltation due to local land uses includes:

1. Continuing road assessment and identify prioritized 'fixes' at the sub-watershed level.
2. Continuing exclusion fencing program for riparian areas.
3. Implementation of alternative livestock watering systems.

Specific projects that have been implemented for land use include:

- Assessment of Fall Agriculture Irrigation Water Conservation Potential in the Scott Valley, 1995 & 1996 (RCD #orloff1 and orloff2)
- Scott River Water Conservation – Irrigation Management, 1999 (RCD #49)
- Shackleford/Mill Road Erosion Inventory, 1998 (RCD #55)
- South Fork Road Erosion Reduction, 1999 (RCD #50)
- Shackleford/Mill Road Erosion Reduction, 1999 (RCD #54)
- Shackleford/Mill Road Corridor Improvement, 1999 (RCD #56)
- Moffett Creek Upland Gross Assessment, 2001 (RCD #62)
- Etna Road Erosion Inventory, 2001 (RCD #73)
- Mill Creek Road Erosion Inventory, 2001 (RCD #78)
- Sugar Creek Flow Enhancement Through Diversion Piping, 2002 (RCD #76)

Goals, Objectives, and Strategic Actions

L2) **GOAL** (originating committee = Land Committee):
Protect streams from accelerated erosion/siltation due to local land uses.

Objective L2-A	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Maintain a road system that does not significantly degrade water quality and wildlife values. *[also see Objective W2-B]*		L-2-A.a 5 year	Implement projects based on road assessment findings and prioritized 'fixes' at the sub-watershed level.
Objective L2-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Promote beneficial grazing strategies		L-2-B.a 5 year	Develop an informational handbook and work with livestock owners and land managers on timing and movement of grazers to minimize stream impacts.

L3) **GOAL** (originating committee = Land Committee):
Protect streams from impacts of agricultural practices and residential areas.

Objective L3-A	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Improve stream protection through incentive driven projects that promote Ag viability.		L-3-A.a 10 year	Identify appropriate incentives for improving stream protection by working with agricultural users.
Objective L3-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Improve stream protection through vegetation management.		L-3-B.a 10 year	Investigate and develop a water consumption model for upland vegetation.
		L-3-B.b 10 year	Develop a program for re-vegetating riparian areas in the residential dominated foothills using native species.
Objective L3-C	***Priority: Not Rated***	***Strategic Action Code And Term***	***Strategic Action Description***
Identify agricultural products, in selected areas, which are less water consumptive.		L-3-C.a 10 year	Find willing agricultural landowners as partners to sample and test agricultural products which are less water consumptive.
		L-3-C.b 5 year	Identify products/goods which are less water intensive (e.g. Orchardgrass), develop handbook, and work with landowners to promote use of products.

L5) **GOAL** (originating committee = Land Committee):
Manage upland vegetation to improve watershed conditions.

Objective L5-A	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Improve range forage conditions and beneficial plant populations		L-5-A.a 10 year	Develop pilot projects to reduce intrusion of brush and juniper.
		L-5-A.b 5 year	Develop and implement a plan for noxious / invasive weed elimination.
		L-5-A.c 5 year	Identify best management practices for handling upland vegetation.

14. Fire

Wild fires remove riparian and upland vegetation which increases water temperatures. Destruction of duff layer increases sedimentation. These conditions have a negative impact on fisheries. This section discusses the attempt to reduce fire hazards in order to improve the health of streams and fish habitat as well as protection for the community and forest.

History

Lightning fires are ignited in the watershed every fire season. The fire regime affects vegetative cover, and potential erosion, depending on severity and frequency. As a state and federal policy, fire suppression has been in effect since at least the 1920's. Most fires are contained quickly and held to a few acres. The largest fire of record, in the area, is the Kidder Creek burn of 1955, when 14,500 acres burned. In 1987, the lower Scott River canyon area had a significant burn of 8,790 acres (Sommarstrom et al., 1990; KNF, 2000).

Description of Current Conditions and Issues

The South Fork of the Scott River and many of the Scott River's west side tributaries, originate in the Trinity Alps, Russian or Marble Mountain Wilderness areas and other lands managed by the USFS. Management policies in wilderness areas and fire suppression activities have resulted in a forested landscape, in which the tree density and fuel loading is quite high. In anticipation of a sediment risk caused by a catastrophic wildfire, the French Creek Watershed Advisory Group (FCWAG) adopted its French Creek Fire and Fuel Management Plan, in 1992, to prevent further erosion in that 21,000 acre granitic watershed. The French Creek Fire Safe Council is currently implementing this plan (Sommarstrom, personal communication). Another Fire Safe Council is forming in the lower Scott River area and possibly another near Etna.

Ted Tsudama, California Department of Forestry discusses a fuels modification project with landowners in the French Creek sub-watershed. This project has been developed for education and demonstration to show the community how a modified fuel zone will help to protect areas in the event of a catastrophic fire. The demonstration project will be completed by the end of 2003.

[photo by Rhonda Muse]

14. FIRE

Summary of Findings

If current drought conditions continue, the possibility of a catastrophic wildfire will increase. A large wildfire event, on the west side of the Scott River Watershed, has the potential to deliver large amounts of fine and coarse sediment to the mainstem and its larger tributaries. The creation of fire safe councils will assist in developing projects to protect the community and the watershed.

14. FIRE

Reference to Past and Current Projects

During the 1930's a fuel break was constructed outside of Etna. Beginning at the south end of the Etna Cemetery at Sawyer's Bar Road, it runs approximately two miles ending at Highway 3 (vicinity of the Matthews property). In 1999, CDF obtained a grant to make improvements and clean up in order to bring it back to fuel break standards. This work was completed during 2000 (Tsudama, personal communication).

In the summer and fall of 2003, the SRWC and RCD implemented a demonstration project (RCD #20) in the French Creek sub-watershed to provide a modified fuel zone within an approximated 6 to 8 acre area. The site will be used for community education and hopefully gain the attention of other landowners living or working in high fuel zone areas. The original intent of the French Creek Fire Safe Council was to construct a modified fuel zone around the entire French Creek watershed. The demonstration area fits well with the original plan and the location provides easy access for expanding the zone to encompass the entire French Creek watershed as originally planned.

Goals, Objectives, and Strategic Actions

L1) **GOAL** (originating committee = Land Committee):
Be a fire safe community.

Objective L1-A	*Priority: Medium*	*Strategic Action Code And Term*	*Strategic Action Description*
Reduce fuel loads in interface areas and near structures.		L-1-A.a 2 year	Integrate available resources with willing landowners (fire crews/mechanical) for the purpose of reducing fuel loads.
		L-1-A.b 2 year	Identify and list available resources for reducing fuel loads in interface areas and near structures.
		L-1-A.c 5 year	Develop local fuels reduction crews to help small 'interface' landowners to accomplish fuels reduction.
		L-1-A.d 2 year	Work with USFS, CDF, timber companies, and landowners in cooperative fuel reduction and burn projects.

	L-1-A.e 2 year	Support local fire safe councils by soliciting funds and partnering in project implementation.
	L-1-A.f 10 year	Convert slash and vegetation to energy source (biomass).

14. FIRE – ADDENDUM 10/31/2005

In 2005, the Siskiyou Resource Conservation District developed a funding proposal to support a Scott Valley Fire Safe Council. Rhonda Muse and Sydney Wright Hoover have agreed to co-coordinate this project and submitted a funding application to the Wildland Urban Interface grant resource. In lieu of funding, the effort is underway with a partnership between the Siskiyou RCD, local fire districts and other fire safe councils within the Scott River watershed. The strategic actions under this section will be addressed by the Scott Valley Fire Safe Council.

15. Community Resources & Socio-Economics

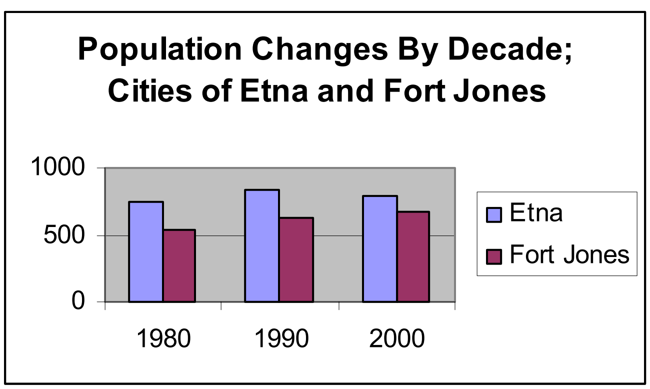
Although the initial phase of the SAP has a primary focus on fisheries, this section discusses the information as it relates to Siskiyou County's Community Action Plan and the revenues provided to the community through project implementation by the SRWC and RCD. Additional economic issues and discussions will be incorporated in future phases. The SRWC currently lacks estimated cost and benefits that would be derived from restoration activities. As we begin to develop the workplan for each strategic action the costs will become more apparent. More information is needed about the potential for increasing viability of past practices that are currently declining due to regulatory requirements.

History

The area's longest standing residents are the Shasta Indians. On December 15, 1983, Federal recognition was restored to the Quartz Valley Indian Community, which includes Shasta, Karuk, and Upper Klamath Tribal members. A total of 275 acres is in trust by Tribal members in the Scott River watershed, this includes 143.37 acres for the Quartz Valley Indian Reservation. Early European settlers included trappers, miners, soldiers and homesteaders. Many settler families date back to the mid 1800s. Today, the largest ethnic group in Scott Valley is Caucasian, with a significant minority of Native Americans and Hispanics (KNF, 1994 Community Action Plan, 7).

While the population of Scott Valley has fluctuated this century, it has roughly increased from 2,900 in 1930 to about 8,000 in 2000 (Etna = 790; Ft. Jones = 670 in 2000 Census).

Figure 15-1. Population Changes by Decade; Cities of Etna and Fort Jones only (Siskiyou County 2002 Economic & Demographic Profile)



Ultimate population build-out, in 2010, is expected to be about 18,000 people based on the Scott Valley Area Plan's projections (Siskiyou County Board of Supervisors, Scott Valley Area Plan and Environmental Impact Report, 32).

In the past decade, school population has declined due to a loss of younger families. Total enrollment for Siskiyou County as reported by the California Department of Education is shown for the 1990-91 school year through the 2000-01 school year. The data represents the number of students enrolled on October 4th of each year. Enrollment figures consist of public school enrollment counts only. Beginning in 1998, California Youth Authority Schools (CYA) were also included in enrollment figures. (Siskiyou County 2002 Economic & Demographic Profile)

Chart 1. Total School Enrollment for Siskiyou County

Year	Enrollment	Percent Change
1990-91	8711	n/a
1991-92	8634	-0.9%
1992-93	8778	1.7%
1993-94	8946	1.9%
1994-95	8910	-0.4%
1995-96	8552	-4.0%
1996-97	8592	0.5%
1997-98	8277	-3.7%
1998-99	7939	-4.1%
1999-00	7586	-8.3%
2000-01	7423	-6.5%

The community's economic base is primarily agriculture and timber products, and small retail businesses. A significant number of residents are employed in Yreka which is located approximately 17 miles northeast of Fort Jones. Local elementary and high schools serve as major employers along with the USFS, California Department of Forestry and Fire Protection, Siskiyou Telephone, California Department of Transportation and Siskiyou County Law Enforcement. Tourism is a small, but growing component of the area economy. Recreational opportunities lie in the wilderness resources and outstanding lakes, rivers, and scenery (KNF, 1994 Community Action Plan, 6).

Transfer payments, in the form of income support and retirement benefits, contribute to the economic base of the area. Local retail establishments include restaurants, hardware stores, video rental, groceries, gas/convenience, beauticians and barbers, real estate, auto parts, automotive repair, building supply, farm equipment, and tire stores. The local economy continues to experience economic distress and instability (KNF, 1994 Community Action Plan, 6).

15. COMMUNITY RESOURCES & SOCIO-ECONOMICS

Description of Current Conditions and Issues

The Economic Development Administration has classified Siskiyou County as being in Long Term Economic Distress (LTED). The 2002 annual average unemployment rate is reported at 9.8 percent. In the 1994 census this figure was reported at 14.3 percent. Median household income for Siskiyou County is $29,530 (US Census Bureau, Siskiyou County, 1999).

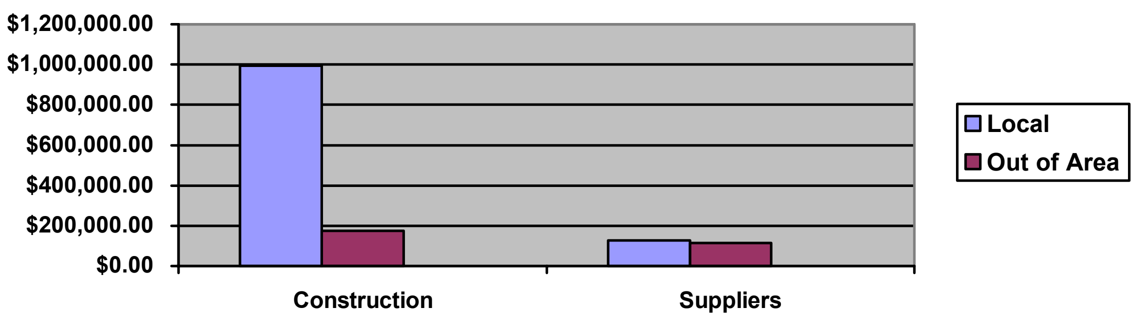
Timber harvest in the Klamath National Forest has declined dramatically, from a high of 240 million board feet (MBF) in the mid 1980's to 50-70 MBF in 1994. The high timber prices of 1974 (Average $474 per MBF, B of Equal Calif. Timber Harvest Statistics) caused many timber owners to harvest their trees. These harvests somewhat buffered the local economy (KNF,1994 Community Action Plan ,7) The price of timber (2002 Average $267 per MBF, B of Equal Calif. Timber Harvest Statistics) and the imposition of a mandatory Timber Harvest Plan with its accompanying fees ($850 for Fish & Game, $125 for Archaeological Fee) and the closing of local mills with the ensuing lack of competitive bidding has made small scale timber harvesting uneconomical. (Dan Larivee personal comment, Registered Forester)

Summary of findings

There is an apparent need for increasing the viability of agriculture and timber practices. The SRWC has made a commitment through their Mission Statement as well as defined goals and objectives to consider the needs of these industries while working towards watershed restoration and conservation. Additional funding is critical for the success of building community trust and participation in the SRWC's efforts to develop programs that address non-fishery related issues within the watershed.

It has been determined that the SRWC and RCD have the potential to contribute to the economic viability of the watershed by utilizing local contractors and suppliers for implementing on-the-ground projects. Chart 2 indicates the dollars put back into the community in comparison to out of area. Other methods have been identified to help organize and facilitate projects that will benefit landowners while seeing that a percent of profits can be returned to the restoration of riparian habitat.

Chart 2: Project dollars spent on construction and supplies from 1998 through 2002



15. COMMUNITY RESOURCES & SOCIO-ECONOMICS

Reference to past and current projects

Actions specific to community resources and socio-economics include:

Ongoing community resource provided by the Scott River Watershed Council, Siskiyou Resource Conservation District, partners, stakeholders, and agencies.

Currently, the SRWC has provided meeting facilitation for landowners to meet and discuss the potential for a value added product study and business plan in regards to beef marketing and other agricultural commodities. As of October 2003, grant funding has been approved to the City of Etna for a feasibility study for this topic. Further participation of the SRWC is dependant on appropriate funding.

Specific projects that have been implemented for community resources and socio-economics include:

- Scott River Watershed Council/CRMP, 1993-current (RCD #89)
- Scott River Watershed Planning and Assessment, 2001 (RCD #71)
- Scott River Subbasin Strategic Action Plan, 2002 (RCD #72)

Goals, Objectives, and Strategic Actions

L4) **GOAL** (originating committee = Land Committee):
Maintain productive and viable agricultural and timber practices.

Objective L4-A	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Improve markets for local agricultural products.		L-4-A.a 5 year	Conduct marketability and value added studies for agricultural products.

16. Community Relations & Education

This section focuses on the efforts of the SRWC to increase community relations for the purpose of providing education about all watershed issues.

History

In 1942, when the RCD was first implemented, originally called the Soil Conservation District, Scott Valley's population included a high percent of agriculture and timber industries. Because these population categories had a vested interest in the watershed, as its continued health directly supported their livelihood, the issues surrounding the watershed were better understood than they are today. Over time, the population categories have changed to include people that do not have an economic interest in the issues of the watershed, therefore they may not understand the magnitude of those issues for both the environment and the community.

Description of Current Conditions and Issues

During the past decade, the SRWC has implemented several formats for improving community relations and education. These include: mailing newsletters, sponsoring workshops, publishing a monthly report using local newspapers, developing an educational brochure, and holding public meetings. During this time, the audience has been primarily the same local group of interested parties. Videos and reports are available in the library located at the RCD office in Etna. Community members are encouraged to utilize the library when seeking to learn more about watershed issues.

Summary of Findings

Watershed restoration cannot succeed without buy-in from the local community. It is desirable to attract the attention of all watershed residents and inform them of current conditions, future plans for the watershed, why it is worthwhile, and how they can play an active role. It has been found that past documentation and presentations are somewhat technical in nature and not easily understood by the general public. Reader friendly documentation and advertisement is a must.

The need for sharing information outside of Scott Valley has been identified as important for restoration success. By getting the word out to areas outside of the immediate vicinity, the SRWC will increase the visibility of the efforts to restore the watershed and bring attention to the continuing need for coordination and funding. Education must be targeted toward agency and elected officials at the state and national levels.

16. COMMUNITY RELATIONS & EDUCATION

Reference to Past and Current Projects

An important objective for the SRWC outreach efforts is to 'build upon community confidence and trust in the watershed council by maintaining and conducting positive and productive meetings'. To achieve this objective, the following actions have been put into place:

1. Provide practical forums to seek solutions and clear understanding.
2. Compile a 'policy binder' to have available at each meeting. Policies to be included are those addressing the procedures for project implementation, rules of conduct, etc.
3. Encourage information and productive meetings by setting an agenda that is structured to address specific issues and provide education.

Specific projects that have been implemented for outreach and education include:

- Scott River Watershed Council/CRMP, 1992-current10 (RCD #89)
- Scott River Subbasin Strategic Action Plan, 2001-current (RCD #72)
- French Creek Watershed Advisory Group (WAG) (RCD #65)
- Kidder Creek Environmental School Fish Field Study Program, 1992 (RCD #rcd15)
- Salmon Education Community Workshop, 1993 (RCD #SalmonEd)
- UC Davis Workshop, 1996 (RCD #62 ED)
- Scott River Landowner Outreach, 1999 (RCD #52)
- Etna Union High School (EUHSD) Watershed Education Program, 1999-2002 (RCD #59)
- Kidder Creek Restoration and Education Project, 1993 (RCD #KCRP1)
- Kidder Creek Restoration Project, 1994 (RCD #KCRP2)
- Kidder Creek Restoration Project, 1995 (RCD #KCRP3)
- Kidder Creek Restoration Project, 1998 (RCD #KCRP4)

Goals, Objectives, and Strategic Actions

O1) **GOAL** (originating committee = Outreach Committee):
Expand communication and education with the local and broader community.

Objective O1-A	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Promote entire community understanding of and involvement in watershed issues		O-1-A.a 2 year	Implement a media campaign through the development of a prioritized media contact list.
		O-1-A.b 2 year	Deliver presentations to local clubs, and regional and state groups.

		O-1-A.c 2 year	Attend regional meetings to gain knowledge.
		O-1-A.d 5 year	Conduct project tours to invited groups, legislators, media, schools, public and other special interest groups.
		O-1-A.e 5 year	Coordinate, inform, and work with Siskiyou County government.
***Objective L4-B**	**Priority: Medium**	**Strategic Action Code**	**Strategic Action Description**
Achieve holistic management through education.		L-4-B.a 10 year	Offer educational workshops on holistic management.

*Please note the last objective is linked to the Land Committee goal L4.

F3) **GOAL** (originating committee = Fish Committee):
Increase local knowledge of factors affecting anadromous salmonids in the Klamath Basin.

Objective F3-A	**Priority: Medium**	**Strategic Action Code And Term**	**Strategic Action Description**
Encourage improved understanding through information exchange on Klamath River Basin topics (such as ocean, estuary, and main Klamath River conditions, role of predations, harvesting, poaching, artificial propagation, and other topics of priority interest).		F-3-A.a 5 year	Develop and contribute to a data repository in order to improve our understanding of factors affecting anadromous salmonids through an information exchange.
		F-3-A.b 10 year	Invite speakers, or have information available, on other important and related subjects that may not be unique to the Klamath River Basin (such as: structural complexity of streams, fluvial processes, habitat connectivity, ecosystem management, geomorphic analysis, and others).
		F-3-A.c 5 year	Develop information exchange (2-way) workshops for local resource users (agriculture, timber, mining, and tribal), including issues of their economic, social, and biological needs and affects.

16. COMMUNITY RELATIONS & EDUCATION

Objective F3-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Establish fish research and education associations with schools		F-3-B.a 5 year	Explore research opportunities with colleges and universities to study local salmonid life history, genetics, and habitat.
		F-3-B.b 10 year	Make Kelsey Creek Spawning Channel a demonstration site for research and education, following agreement on objectives and evaluation methodology.

17. Monitoring Plan

This section is used to summarize the SRWC's Monitoring Plan found in Appendix M.

Background

As part of the Scott River Watershed Council (SRWC) *Strategic Action Plan*, this Monitoring Plan addresses the purpose, goals, objectives, methods, and protocols for monitoring various parameters and projects within the Scott River Watershed. The SRWC has identified several goals and objectives for assessment of current conditions and monitoring of aquatic resources. In addition, the SRWC, with the Siskiyou Resource Conservation District (RCD), identifies and implements restoration projects which also require monitoring for both implementation and effectiveness. Many projects have been in place long enough and were designed such that associated monitoring efforts may contribute to trend analysis.

The water quality of the Scott River was listed as "impaired" for sediment and temperature under Section 303(d) of the Clean Water Act by the North Coast Regional Water Quality Control Board and EPA. As a result, a Total Maximum Daily Load (TMDL) pollutant target and strategy for sediment and temperature must be prepared for the river system by April 2005. Coho salmon in the region were listed as threatened under the federal Endangered Species Act in 1997 by the National Marine Fisheries Service and also the California Fish and Game Commission determined that coho salmon warranted listing in 2002. These listings establish a need for monitoring of various parameters within the watershed to contribute to both the understanding and improvement of resources.

In order to reduce the impacts of these listings on the local economy and culture, and to assure a healthy watershed, the SRWC, with it's sponsor the RCD, has taken a pro-active approach of developing a local knowledge base. This effort will establish baseline information describing current conditions both quantitatively as well as qualitatively so that restoration needs can be identified and projects prioritized to enhance or restore water quality and fish habitat. This data will also provide localized or site specific support information available to landowners and agencies to refer to in the review process of various permit applications.

The French Creek Watershed Monitoring Plan, prepared in December 1992, by the French Creek Watershed Advisory Group was the first such plan developed in the Scott River watershed. This plan was the focus of a concerted effort to explore new approaches for managing watersheds with multiple owners – public and private.

Purpose

The purpose of this Monitoring Plan is to provide definitions, methods, and protocols for various monitoring efforts related to the Scott River Watershed Council *Strategic Action Plan*. It documents why, how, when, and where all monitoring activities related to the *Strategic Action Plan* are conducted.

Goals and Objectives

The goals of the Monitoring Plan are summarized below. Each goal has a series of objectives and strategic actions that will assist the SRWC in achieving the stated goals.

M1) **GOAL** (originating committee = Monitoring Committee):
Evaluate the effects of projects on the health of the river.

Objective M1-A	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Have a reliable record of water data for each project.		M-1-A.a 2 year	Implement project-level water monitoring based on project-specific desired outcomes.
Objective M1-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Develop standardized project evaluation criteria for each type of project.		M-1-B.a 2 year	Improve pre-project evaluation.
		M-1-B.b 2 year	Review and revise the current form so monitoring data can flow compatibly.
		M-1-B.c 5 year	Feed standardized project reporting and data to SRWC through monitoring.
Objective M1-C	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Create and maintain the record of past projects by evaluating projects on an annual basis.		M-1-C.a 2 year	Review project types to design future projects that will be successful.
Objective M1-D	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***

Include pre- and post-project monitoring component in every project proposal as a deliverable product.	M-1-D.a 5 year	Develop a standardized monitoring protocol that can be used by any party.

M2) **GOAL** (originating committee = Monitoring Committee):
Have a watershed-level monitoring program.

Objective M2-A	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Initiate a watershed level monitoring program, developed according to sub-watershed prioritization.		M-2-A.a 2 year	Identify and prioritize parameters to be used in watershed level monitoring program.
		M-2-A.b 2 year	Invite technical specialists to suggest and/or review parameters and prioritization of watershed level monitoring program.
Objective M2-B	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Establish baseline or current condition data for parameters.		M-2-B.a 5 year	Assess existing protocols (being used by different agencies) and data gaps and redundancies. Use to develop common collection standards that can be placed in a common database.
		M-2-B.b 5 year	Write cooperative reports synthesizing data into a ‘big picture’.
Objective M2-C	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Expand photo monitoring as an immediate and viable tool.		M-2-C.a 5 year	Offer photo monitoring seminars (include pre and post photos).
		M-2-C.b 5 year	Establish photo points with landowner permission.
		M-2-C.c 2 year	Evaluate current photo monitoring program for enhancement.

Objective M2-D	***Priority: Medium***	***Strategic Action Code And Term***	***Strategic Action Description***
Implement an annual program report.		M-2-D.a 2 year	Develop format of an annual program report.
		M-2-D.b 2 year	Identify the target audience for annual program report.
Objective M2-E	***Priority: High***	***Strategic Action Code And Term***	***Strategic Action Description***
Encourage landowner participation in monitoring.		M-2-E.a 5 year	Develop a Memorandum Of Understanding with landowners and agencies on data sharing.

Watershed Monitoring

Key steps to designing and implementing a successful water quality monitoring program include: identify the resources at risk and their associated parameters; review of existing data and reports; identify budgetary and personnel constraints; design proper training guides; identify access issues; develop critical questions; agree on established protocols; initiate monitoring activities on a pilot basis; analyze and evaluate data; modify program as necessary to meet objectives, maintain a centralized database of monitoring efforts, and prepare regular standardized reports and recommendations. This includes baseline, trend, and project monitoring.

Current Condition / Baseline Assessment

Within this monitoring program, resources identified as at risk include water quality and fisheries. Existing water quality conditions are characterized to establish a database for planning purposes and/or trend monitoring. The SRWC has developed a Monitoring Program which identifies several objectives for baseline assessment monitoring. The purpose of these is to identify needed restoration projects. Following is a summary of methods established for assessing current conditions of parameters associated with resources at risk in the Scott River Watershed. These methods were developed to address the list of critical questions raised in SRWC Committees and specified in the Study Design by Parameter.

- Fish Habitat – Inventory in-stream and riparian habitat. Determine where and to what extent anadromous salmonids are utilizing rearing habitat by life stage. Map critical low-flow habitat and refugia. Include the use of thermal imaging where appropriate.

- Fish Population – Coordinated, cooperative annual fish surveys either by Overton sampling method and/or at fixed sites.

- Channel Conditions – Bank stability and channel typing.

- Water Temperature – Coordinated, systematic, and long-term stream temperature monitoring throughout the watershed including mainstem and tributaries.

- Flow – Develop Water Balance for the Scott River and its tributaries. This includes the installation and long-term maintenance of strategically located flow gages throughout the system.

- Sediment – Monitor suspended and deposited sediment throughout the lower gradient reaches. Types of monitoring include McNiel, V*, Pebble Count, Pfankuck, Grid Sample, and Turbidity sampling. Other objectives include expanding monitoring efforts to include the Scott River Canyon, and studying quality of spawning gravel and emergence rates.

- Macroinvertebrates – Systematic sampling of macroinvertebrates by the Rapid Bioassessment (DFG) protocol in higher gradient tributaries as a surrogate for water quality parameters including pH, DO, temperature, sediment, and chemical contamination. They are also indicative of riparian quality including LWD and hardwood to conifer ratios.

- Photo-point monitoring of watershed conditions throughout the system. Photo points focus on riparian conditions, and other restoration projects (instream, road work, etc)

Steps to complete Current Condition/Baseline Assessment of each parameter.

Step	Who	Timeline
1.) Review of existing monitoring data, protocols, and reports.	Council	Spring 2005
2.) Determine data gaps and compile needs assessment	Council	Spring 2005
3.)Identify protocols and procedures agreeable to active parties.	Council & other participants	Spring 2005
4.) Seek funding to fill gaps	Council	Ongoing
5.) Establish and carry out QA/QC practices for each project through random selection of data for analysis or peer review.		Annual
6.) Establish monitoring database to input data from active parties.	Staff/other participants	Fall 2005
7.) Report on Current Conditions	Staff/committee	Spring 2006

17. MONITORING PLAN

Trend Monitoring

Much of the baseline monitoring is intended to contribute to long-term trend monitoring.

Project Monitoring

Each restoration/improvement project shall include a standardized monitoring component. This shall include as much pre-project description as feasible, including photo-points, as well as any pertinent measurements for effectiveness monitoring. The monitoring component should define both short-term and long-term efforts. The objectives of each project should specify resources at risk. If the project is large in scope and untested, a pilot should be designed as well.

Implementation monitoring is important to assess whether activities were carried out as planned. Site selection and elimination criteria should be included as part of the implementation standards as are the specifications of the project. Implementation monitoring is intended for immediate feedback to project coordinators and as such is designed for the short-term. It may be very useful in determining the appropriateness of the project activities to accomplish specified objectives.

- Project goals and objectives
- Site selection
- Timeline

Effectiveness monitoring is necessary to evaluate whether the specified project activities had the desired effect or accomplished its objectives. This may include short-term and/or long-term monitoring depending on the term of the expected results. Short-term effectiveness monitoring should include a larger sample of immediate results, while long-term effectiveness monitoring may be limited to a few selected or random sites. Frequency of sampling needs to be specified for each parameter in the effectiveness monitoring component.

- Data management and analysis
- Site selection for project effectiveness monitoring should be consistent with expected responses to the project. The ease of access to a monitoring site, particularly during storm events, can be a controlling factor in selecting the parameters to be monitored.

Reports

In order to keep the SRWC abreast as to the monitoring efforts, the Monitoring Plan establishes standards for a series of reports related to specific monitoring activities as well as the overall monitoring program.

Landowner Participation

Because landowners are directly affected by restoration projects on or near their lands, they are a very important element in the success of a monitoring program, and must be encouraged to participate. Many of the response reaches where monitoring activities occur are on private lands in the valley. Sample distribution or project site selection will often include private lands. It is important to motivate landowners to monitor responses to their management practices.

17. MONITORING PLAN – ADDENDUM 10/31/2005

Summary of Scott River Watershed Monitoring Program Cumulative Report 1995-2005

Report Prepared by Danielle Quigley

Summary Prepared by Rhonda Muse

INTRODUCTION

This report represents a summary of all Scott River Monitoring Program. The report addresses all Water Quality and Fish Habitat and Population Monitoring that the Siskiyou RCD/SRWC have implemented from 1995-2005.

Funding Sources:

Funding for these monitoring activities came from the following grant agencies:

State Water Resources Control Board – Proposition 13
United States Fish and Wildlife Service – Jobs in the Woods.
United States Fish and Wildlife Service – Klamath Basin Task Force
California Dept. of Fish and Game – Fisheries Restoration Grant Program
Pacific Marine Fisheries Council
Siskiyou County Fish and Game Commission

Monitoring Program Partners

The following entities have been cooperators in the Scott River Monitoring Program, either through data collection, and/or by granting access to properties for monitoring activities.

United States Forest Service (USFS), United States Fish and Wildlife Service (USFWS), California Dept of Fish and Game (CDFG), Timber Products Co., FruitGrowers Supply Co., NOAA, Scott River Watershed landowners.

Equipment List

Onset Optic Stowaway
Onset Tidbit
Schwoffer Flow Meter
Price AA Flow Meter with Aquacalc Pro

17. MONITORING PLAN – ADDENDUM 10/31/2005

Through the efforts of the Scott River Strategic Action Plan, a comprehensive Scott River Monitoring Program was developed. Currently the Monitoring Program includes the following activities:

Water Quality and Quantity
Temperature Monitoring
Macroinvertebrate Collection
Sediment Sampling (McNeil)
Streamflow gauging

Fish Habitat and Population
Adult Coho Spawning Ground Surveys
Instream Habitat Typing
Juvenile Habitat Utilization (new 2005)
Juvenile Salmonid Outmigrant Trapping (new 2005)

Other Monitoring Activities which the RCD provides personnel time to include: Adult Chinook Spawning Ground Surveys, French Creek WAG-Juvenile Salmonid Monitoring

MONITORING FREQUENCY

Table 1a.) Monitoring Parameter Frequency - Water Quality

Parameter	**Schedule**	**Period**	**Years completed**	**Next Scheduled**
Water Quality				
Water Temperature	Annual	May – October Year round at selected locations	1995-2005	Ongoing
Sediment –McNeil	Periodic	Low Flow	1989,2000	2006
Macroinvertebrates	Periodic	Spring/Fall	1998, 2000, 2003	2006
Photopoints	Annual/ Event	Low flow	2000-2005(1996-2005 at selected locations)	Ongoing

17. MONITORING PLAN – ADDENDUM 10/31/2005

Table 1b.) Monitoring Parameter Frequency - Fish Habitat & Population

Parameter	Schedule	Period	Years completed	Next Scheduled
Fish Habitat & Population				
Stream Habitat Typing	Periodic	Low Flow	2002,03,04,05 at various locations	unknown
Adult Coho Spawning Ground Surveys	Annual	Spawning Season	2000-2005	2005/2006
Juvenile Salmonid Habitat Utilization	One time	Low Flow	2005	Limited in 2006
Juvenile Salmonid Outmigrant Trapping	One time	October - June	2005-2006	unknown

MONITORING PROGRAM SITES

Table II.) Parameters Sampled by location

Location	River Mile/ID	Temperature	Sediment	Macro invertebrates	Flow
Mainstem					
Scott River at Red Bridge	Rsc57	X	X	X	
Scott River above Fay Lane	Rsc52.5	X			
Scott River above French Cr.	Rsc 50.9	X			
Scott River below French Cr.	Rsc 50.7	X			
Scott River above Etna	Rsc45.2	X			
Scott River below Etna	Rsc45.0	X			
Scott River below Eller Lane	Rsc39	X			
Scott River near Shell Gulch	Rsc38			X	
Scott River at Serpa Lane	Rsc36	X			
Scott River at Hwy 3	Rsc33	X			
Scott River below Kidder			X		
Scott River below Moffet			X		
Scott River below Meamber Bridge		X	X		
Scott River below Meamber Creek		X		X	

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Location	ID	Temperature	Sediment	Macro invertebrates	Flow
Tributary					
South Fork at Blue Jay	Rbj01	X			
South Fork at RM 1	Rsf01	X		X	X (CDWR)
East Fork at Upper Masterson Rd.	Ref02	X			
East Fork at Callahan Guard Station	Ref01	X		X	
Rail Creek	Rrl01	X			
Sugar Cr. Below Hwy 3			X		
Sugar Creek at RM 1	Rsu01	X		X	
French Creek at curved Bridge	FC2			X	
French Creek at Miners Creek Rd	FC1a	X?		X	
French Creek below Hwy 3	Rfr01	X			
Etna Creek below Hwy 3					
Etna Creek at mouth	Ret01	X			
Mill Creek	Mill01	X			

Section I.) Water Quality and Quantity Monitoring

Temperature Monitoring

Water temperature monitoring in the Scott River Watershed has been a cooperative effort since 1995. All data contributors have followed the same protocol (FFFC 1996). Contributors include: United States Forest Service (USFS), Siskiyou RCD, FruitGrowers Supply Co., Timber Products Co., and local schools.

Macroinvertebrates

Macroinvertbrate sampling began on the mainstem Scott River in 1997. Additional tributary sites were added in 2003.

Photopoints

Riparian photopoints were established in 1997 to document the recovery following the Fay Lane Restoration Project implemented in 1996. Additional photopoint sites were added in 2000 to document instream flow and riparian conditions.

Sediment

Sediment sampling follows the scheme outlined in Sommarstrom et al 1991.

17. MONITORING PLAN – ADDENDUM 10/31/2005

RESULTS

This section presents the summary of results collected to date.

Temperature Monitoring:

The following table lists the MWAT temperature for each location for each year sampled.

Table III Temperature Monitoring

Station Number	Location Name	1997 Deg C	1998 Deg C	1999 Deg C	2000 Deg C	2001 Deg C	2002 Deg C	2003 Deg C	2004 Deg C	2005 Deg C	Max	Avg
REF01	Lower Masterson	NDC	14.4	19.4	21.6	21.9	21.8	22.5	21.8		22.5	20.5
Ref02	Upper Masterson Rd	NDC	21	ND	21.4	20.9	21.3	22.7	21.5		22.7	21.5
RET01	Mouth of Etna Cr.	NDC	16.3	ND	ND	ND	22	NDC	NDC	NDC	22	19.2
Rfr01	Mouth of French	20.7	19.7	18.1	21.1	ND	17.1	18.9	Unit Lost		21.1	19.3
Rfr02	French below conf/Miners	NDC	NDC	NDC	NDC	NDC	18.2	18.2	stolen		18.2	18.2
Rrl01	Rail Creek	0	16	15.1	17.3	16.7	17.9	18.3	17.3		18.3	14.8
Rsc29	Scott @ Hwy 3	21.7	21.1	19.9	22.5	Dry	24.2	?	NDC	NDC	24.2	21.9
Rsc36	Serpa Lane	23.1	ND	21	23.6	Dry	ND	23.2	23.3	NDC	23.6	22.8
RSC39	Shell Gulch(Below Black Bridge)	22.1	20.5	19.9	22.5	Dry	22	21.9	Lost Data		22.5	21.5
Rsc45_0	Below mouth of Etna	20.6	20	ND	20.6	Dry	ND	NDC	NDC	NDC	20.6	20.4
Rsc45_2	Above mouth of Etna	20.7	19.7	ND	17.2	Dry	17.6	NDC	NDC	NDC	20.7	18.8
Rsc50_7	below mouth of French	20.9	18.2	18.7	19.1	Dry	19	20.2	Analyis not complete		20.9	19.4
Rsc50_9	above mouth of French	20.8	19.7	18.5	19.8	18	20	20.3	19.9		20.8	19.6
Rsc52_5	Fay Lane	19.6	19.2	ND	20	19.3	ND	20.1	19.7		20.1	19.7
Rsc57	Lower tailings(Middle Tailings)	ND	ND	ND	20.3	Air	Air	20	19.8		20.3	20.0
RSF01	South Fork Scott River	ND	16.3	13.8	17.3	17.8	17.3	17.4	17.2		17.8	16.7
Rbj01	South Fork @ Blue Jay	ND	14.8	13.5	15.4	15.8	15.3	15.9	15.6		15.9	15.2
RSC33	Rattlesnake Creek	21	ND	19.8	ND	ND	24.2	23.3	23.3		24.2	22.3
Rsc27	Scott @ Meamber Cr.	ND	ND	19.8	21.8	21.4	20.7	22.4	21.3		22.4	21.2
Rsc29	Scott @ Meamber Br.	22.8	ND	21.2	ND	ND	21.4	23.3	21.6		23.3	22.1
RSU01	Sugar Creek above Hwy 3	NDC	NDC	NDC	NDC	NDC	16.2	16.9	18.1		18.1	17.1
RSH01	Shackleford below Mill	NDC	NDC	NDC	NDC	NDC	NDC	NDC	16.6	NDC	16.6	16.6
SH02	Mill above confluence with Shackleford	NDC	NDC	NDC	NDC	NDC	NDC	NDC	20.8		20.8	20.8

NDC = No data collected, ND = no data (vandalism, equipment failure)

Photopoints:

The following table summarized photopoint locations, and the purpose of each photopoint.

Table IV. Photopoints

17. MONITORING PLAN – ADDENDUM 10/31/2005

ID	Stream	Description	Type	Object	Dates	Notes
	French	French Creek	Hobo	Channel, veg	1999,2002	
	E. Fork	East Fork behind Callahan Guard Station	Hobo	Channel, veg	2000&2002	US, DS, Transect
	E. Fork	Rail Creek	Hobo	Channel, veg	2000&2002	US, DS, Transect
	Main Scott	Above Faye Lane	Hobo	Channel, veg	2002	US, DS, Transect
	Main Scott	Above French Creek	Hobo	Channel, veg	2002	US, DS, Transect
	Main Scott	Red Bridge	Hobo	Channel, veg	2002	US, DS
	Main Scott	Hwy 3 Fort Jones	Hobo	Channel, veg	1999,2002	US, DS, Transect
	Main Scott	Below French Creek	Hobo	Channel, veg	1999,2002	US, DS, Transect
	South Fork	South Fork At South Fork Rd.	Hobo/flow gage	Channel, veg	200,2002	US, DS, Transect
	South Fork	South Fork at Blue Jay Creek	Hobo	Channel, veg	2000&2002	US, DS, Transect
	Sugar Creek	Sugar creek above Hwy 3	Hobo/Flow gage	Channel, veg	2002	US, DS, Transect
F1	Main Scott	Barnes; east bank; fence corner by pump at southern end of project	Project	Vegetation	1996-2002	Cantara Project 1996
F2	Main Scott	Barnes; east bank; at site of cross-section B (just south of where vegetation begins on east bank)	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F3	Main Scott	Barnes; east bank; 150 yard south of Fay Lane Bridge (river's eastern most point in turn)	Project	rip-rap	1996-2002	Cantara Project 1996
F4	Main Scott	Barnes; west bank; large cottonwooed on point ; downstream~120 yds from fish screen; even with fence and ditch line in field.	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F6b	Main Scott	bank ~150 yds north of Fay Lane Bridge; north end of bar below bridge.	Project	FenceLine, veg	1996-2002	Cantara Project 1996
	Main Scott	Tobias; west bank; willow glade; ~4000' below Fay Lane Bridge; just north of tight turn.	Project	Channel	1996-2002	Cantara Project 1996
F8	Main Scott	Tobias; west bank; cottonwood on bank to be protected with woody debris: by cross fence.	Project	Channel, vege	1996-2002	Cantara Project 1996
F9	Main Scott	Tobias; east bank; close to fish screen: along road in riprap upstream from blackberries.	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F10	Main Scott	Tobias; west bank; field straight east from corrals; left of two sets of brace posts.	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F11	Main Scott	Tobias; east bank; west of sump pond; highest point of riprap; northwest point of riprap.	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F12	Main Scott	Tobias; west bank; ~1/2 mi south of power lines	Project	Rip-rap, chann	1996-2002	Cantara Project 1996
F13	Main Scott	Tobias/Tobias; east bank; big rock just south of power lines; Tobias/Platt property line.	Project	Channel, vege	1996-2002	Cantara Project 1996
F14	Main Scott	Platt: west bank; double-poled power line: bank stabilization spot	Project	Channel, veg	1996-2002	Cantara Project 1996
F15	Main Scott	Platt/Spencer property line; bank stabilization spot	Project	vegetation, rip-	1996-2002	Cantara Project 1996
F16	Main Scott	Tobias; west bank riparian bar next to pasture fence, wooden post; due eat of Jeff Berryhill's house;~ halfway between cross- fencing	Project	Fenceline, veg	1996-2002	Cantara Project 1996
F5	Main Scott	Barnes; west bank at fish screen overflow culvert	Project		1996-2002	Cantara Project 1996
F6	Main Scott	Fay Lane Bridge	Project, Trend	Channel	1976,1996-2002	
EF_L	E. Fork	East Fork at the Confluence with South Fork	Trend	Channel, veg	2000-2002	Upstream, Downstream
EF_2	E. Fork	East Fork at Callahan	Trend	Channel, veg	2000-2002	Upstream, Downstream
KC_H	Kidder	Kidder Creek at Hwy 3 bridge south of Greenview	Trend	Channel, veg	2000-2002	Upstream, Downstream
KC_S	Kidder	Kidder Creek at Serpa Lane	Trend	Channel, veg	2000-2002	Upstream, Downstream
KC_H	Kidder	Kidder Creek at Hwy 3 Fort Jones	Trend	Channel, veg	2000-2002	Upstream, Downstream
SC_M	Main Scott	Scott River at Meamber Bridge	Trend	Channel, veg	2000-2002	Upstream, Downstream
SC_H	Main Scott	Scott River at Hwy 3 bridge near Fort Jones	Trend	Channel, veg	2000-2002	Upstream, Downstream
SC_E	Main Scott	Scott River at Eller Lane Bridge	Trend	Channel, veg	1976, 2000-2002	Upstream, Downstream
SC_S	Main Scott	Scott River at Island Road bridge	Trend	Channel, veg		Upstream, Downstream
SC_H	Main Scott	Scott River at Horn Lane bridge	Trend	Channel, veg	1956,1976, 2000-2002	Upstream, Downstream
MC_S	Moffet	Moffet Creek at the Scott River Road Bridge	Trend	Channel, veg	2000-2002	Upstream, Downstream
SFBr	South Fork	South Fork at River Mile 1	Trend	Channel, veg	2000-2002	Upstream, Downstream
SF_0	South Fork	South Fork at Hwy 3	Trend	Channel, veg	2000-2002	Upstream, Downstream
EF_U	E. Fork	East Fork at upper Masterson Road Bridge	Trend	Channel, veg	2000-2002	Upstream, Downstream
EF_L	E. Fork	East Fork at lower Masterson Road Bridge	Trend	Channel, veg	2000-2002	Upstream, Downstream
ET_H	Etna	Etna Creek at Hwy 3	Trend	Channel, veg	2000-2002	Upstream, Downstream

Table IV. McNeil Samples results 1989 and 2000

Site	6.3 mm		4.75		2.36		0.85	
	1989	2000	1989	2000	1989	2001	1989	2000
Mainstem Scott								
A	26.8	33.7	24.0	29.1	19.2	20.4	8.0	7.4
B	41.0	50.5	35.1	44.3	24.7	31.5	11.1	10.4
C	36.5	36.4	31.9	31.7	23.9	23.5	11.0	11.0
D	92.7	72.2	88.2	62.9	72.7	41.2	20.1	8.9
E	82.4	84.3	76.3	77.7	56.5	53.6	19.9	9.8
F	82.1	75.7	74.7	65.7	52.9	42.6	21.6	14.2
G	56.7	57.6	50.0	50.3	37.0	36.3	17.0	16.8
H	40.1	41.6	35.3	36.1	25.8	25.8	10.5	11.0
I	36.8	40.2	33.4	35.6	26.5	26.4	12.2	11.3
J	28.2	25.8	25.0	21.7	17.9	14.5	7.4	5.8
J2	--	18.3	--	14.7	--	9.5	--	4.0
K	30.6	32.6	27.2	26.3	19.4	17.0	6.4	4.0
Tributaries								
E2	28.3	16.9	25.1	12.6	18.3	7.9	5.1	2.8
F2	42.6	33.9	39.0	28.9	27.6	19.9	8.2	6.9
F3	33.4	46.0	29.2	42.2	17.6	32.4	8.2	10.9
S1	30.8	33.8	26.4	29.6	18.0	21.7	6.3	9.9

Comparison of Cumulative Percentage of Fine Sediments, 1989 & 2000
(percent less than sieve size, based on dry weight in grams)

Section II.) Fish Population and Habitat Monitoring and Assessment

Adult Coho Spawning Ground Surveys
Adult Coho spawning ground surveys began in the Scott River during the winter of 2001/2002 as a small volunteer effort with limited funding provided for coordination and data analysis. Every field season since 2001 has shown an increase in participation as well as stream miles surveyed. During the 2004/2005 season a total of xxx miles were surveyed. Cooperators have included: United States Forest Service (USFS), CA. Dept. of Fish and Game, Siskiyou RCD, FruitGrowers Supply Co., Timber Products Co., and NOAA Fisheries.

Stream Habitat Typing
Stream channel typing and habitat typing were completed using the protocol defined in the California Salmonid Stream Habitat Restoration Manual. (Flosi et al 2005)

Juvenile Salmonid Habitat Utilization Dives
Assessment of actual habitat utilization done through direct observation (snorkel diving). Observed fish are identified by species and age class. The efficacy of direct observation was verified through electro-fishing.

The area/volume of individual habitats was measured and used to determine density of utilization for each habitat during an assessment performed in the summer of 2005. Results are not yet available.

Juvenile Salmonid Outmigrant Trapping
This activity is part of an assessment performed during the summer of 2005. Results are not yet available.

RESULTS

Adult Coho Spawning Ground Surveys

Table IV documents the Redds by stream reach and year for each year since 2000/2001.
See next page.

Stream	Reach	Description	2004 Mileage	2001	2002	2003	2004
Boulder Creek(Scott)		Lower Bridge to Scott	0.20	0	0	0	0
Clarks Creek		TP property	NS	NS	0	NS	NC
Canyon Creek (**INDEX**)	Lower	Lower 1.1 miles	1.10	0	0	0	2
East Fork - 2001 Spot survey		From Bridge	-	5	-	-	-
East Fork -Lower Masterson **(INDEX)**		~ 1 mile above Grouse Cr. To below Grouse	1.40	22	0	NS	23
East Fork Upper Masterson		Above Rail Creek to Kangaroo Creek	5.10	13	0	NA	1
East Fork*	Upper	Gregg Ranch	1.00	NS	NS	NS	0
Emmigrant (trib to Mill)	Lower	Mouth up	0.10	NS	0	0	10
Etna*	Lower	Hwy 3 to mouth	2.25	NS	NS	NS	50
Etna	Middle	Split Reach (**formerly Lower Etna**)	1.00	NS	0	0	7
Etna	Upper	Mill Creek to City Diversion	1.60	1	0	NS	0
French Cr. -2001 Spot survey		From Bridge	-	1	-	-	-
French Creek	Lower	Hwy 3 to mouth	0.70	NS	NS	0	20
French Cr. **(INDEX)**	Mid	From confluence with Miners down	0.80	24	1	1	22
French Creek	Middle	From bottom of Mid-to just above Hwy 3	0.83	NS	NS	NS	27
French Creek	Upper	Upper Bridge to Horse Range	NA	2	NS	NA	NA
French Creek	Upper	Paynes Creek area	0.50	NS	NS	NS	2
French Creek	Upper	Duck Lake area	0.50	NS	NS	NS	0
French Creek		Below N Fork to mouth of Miners	1.00	NS	NS	NS	1
Grouse Creek (trib to East Fork)		Lower	0.60	NS	0	NS	0
Horse Range Creek(trib to French Cr.)			NS	NS	0	NA	NA
Indian Creek	Upper		NS	NS	0	NC	NC
Johnson Creek	Upper		NS	NS	0	NS	NS
Kangaroo	Middle	USFS	0.50	NS	0	0	0
Kangaroo*	Lower		1.00	NS	NS	NS	22
Kelsey Creek		Barrier to mouth	0.60	0	0	0	1
Kelsey Spawning Channel		USFS artificial spawning channel	0.20	0	4	0	28
Kidder Creek	Lower	Below Hwy 3	1.10	NS	0	0	56
Kidder Creek	Middle	Mid Kidder - above Hwy 3	0.80	NS	0	0	7
Kidder Creek	Upper	Upper FGS	0.50	0	NS	NS	0
Mcadams			NS	NS	0	NC	NC
Meamber Gulch	Lower		NS	NS	0	NC	NC
Middle Creek			0.40	0	0	0	0
Mill Creek (Shackleford)	Middle	Above Quartz Valley Road Bridge	1.40	NS	12	1	72

NC= Not connected, NA = No access, NS = Not Surveyed * = New reach in 2004
a = surveyed in 2004 as part of the Upper South Fork = reaches surveyed in 2001-2002

17. MONITORING PLAN – ADDENDUM 10/31/2005

Stream	Reach	Description	Mileage	2001	2002	2003	2004
Mill Creek (Shackleford)	Upper	Lowest FGS to Bridge	0.50	0		0	5
Mill Creek (Shackleford)	Lower a	Lower .6 miles of Mill Creek	0.60	30	0	2	29
Mill Creek (Shackleford)*	Lower b	From Quartz Valley Rd Bridge to top of Lower a	1.00	NS	NS	NS	98
Miners Creek	Lower a	Lowest .3 mi	0.30	14	0	1	24
Miners Creek	Lower b	Upper Phelps to top of Lower a	0.60	NS	NS	1	19
Moffet Creek	Middle	USFS	NS	3	NS	NC	NC
North Fork French			0.70	NS	0	NS	0
Patterson	Lower		1.30	1	0	NS	232
Patterson*	Middle	Lower FGS to Hwy 3	1.60	NS	NS	NS	19
Patterson	Upper	Uppermost FGS from Falls down	0.30	1	0	NS	6
Patterson (Fort Jones)	Lower		NS	NS	0	NC	NC
Rail Creek	Upper	USFS	0.50	NS	NS	0	0
Rattlesnake Creek	Upper		NS	NS	0	NC	NC
Ruffy Gap (trib to Etna		Lowest	0.20	NS	0	NS	Dry
Scott Bar Mill	Lower	Lower	0.40	1	0	0	15
Scott Bar Mill	Upper	Upper	0.70	NS	0	0	0
Shackleford - 2004	Lower	Mile 2 to Lower Bridge	1.67	NS	NS	1	70
Shackleford	Lower	Lower Bridge to Scott	0.50	1	0	0	6
Shackleford	Upper	Below falls	0.50	0	0	NS	1
Thompkins Creek	Lower	Mouth up	1.80	0	0	0	8
Thompkins Creek	Upper	Low water crossing to Potato Patch	1.00	NS	NS	0	0
Sugar Creek (**INDEX)**	Lower	Hwy 3 to mouth	0.70	21	0	0	26
South Fork (**INDEX**)	Lower	USFS	0.40	17	0	0	0
South Fork		Above Fox Creek[a]	-	26	NS	NS	0
South Fork (**INDEX**)	Upper	Above Fox Creek to Boulder Creek	1.90	25	0	0	15
Boulder Creek (trib to South Fork)		Lower mouth section	spot	1		0	0
Sugar Creek	Upper	From Upper FGS bridge to CattleGuard	2.10	2	0	0	14
Scott Canyon		Reach 2	-	1	-	-	-
Scott River Tailings*		Rm 53.45-52.35	1.10	NS	0	0	2
Scott River Talings- 2004		Rm 55-53.45	1.65	NS	NS	NS	19
Wildcat Creek		Lower 2 miles	spot	NS	0	0	1
		Totals	47.20	212	17	7	960

NC= Not connected, NA = No access, NS = Not Surveyed * = New reach in 2004

a = surveyed in 2004 as part of the Upper South Fork = reaches surveyed in 2001-2002

18. Developing Strategic Actions

This section lists 93 strategic actions by term of accomplishments (beginning implementation). Actions are sorted by the *Term of Accomplishment* then *Action#*, alpha/numeric characters.

Immediate-Term (2 year accomplishments – total 33 actions)				
Action#	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***
F-1-A.a	Continue and/or increase efforts to monitor spawner escapements within the watershed. Continue and/or increase efforts to monitor and evaluate juvenile habitat utilization, survival and outmigration.	Improve understanding of basic life history requirements, timing, distribution and habitat preference to better understand and evaluate impacts of land management and resource management activities within the watershed.	Ongoing	Identify habitat criteria, review previous information for locations. Staffing and funding for surveys (carcass and redds). Access.
F-1-E.a	Develop a procedure for monitoring the effectiveness of screened diversions.	Provide a written procedure to guide SRWC in data collection and evaluating condition.	Once	Staffing and funding.
F-1-E.b	Continue program for maintenance and periodic replacement of screens to help maintain proper functioning.	Maintain proper functioning.	Ongoing	Document number, location and life expectancy of screens. Document basic knowledge of maintenance needs.
F-1-E.c	Review inactive and unknown diversions for future and potential screening.	Prevent mortality of fish.	2 years	Obtain adjudication information from Watermaster. Map locations.
F-1-E.d	Continue fish screening program.	Provide screening for unscreened diversions.	Ongoing	Funding. Access.

F-1-F.a	Evaluate results and monitor success of fish rescue program through mark/recapture studies; spawning ground surveys; direct observation dives.	Gain understanding of current conditions.	4 years	Staffing and funding. Access.
F-2-B.a	Review completed records of projects to identify existing fish passage structures and their locations.	Understand volume and location. Produce GIS.	Once	Identify projects that will provide information, request project information from other entities.
F-2-D.a	Use aerial photos and photo-points to evaluate the relationship of riparian condition to fish habitat on the mainstem Scott River.	Provide information to complete report of findings.	Once	Obtain photos and acquire assistance by a geomorphologist (this is part of the Scott River Watershed Assessment referenced in action F-1-B.a.
F-2-E.a	Evaluate riparian planting projects and make recommendations to improve planting program. Include in the evaluation an assessment of why projects failed and modify accordingly.	Increase riparian habitat and efficiency.	Once	Review project notes and visit sites.
F-2-F.a	Evaluate the geomorphology of the mainstem Scott River channel to identify potential demonstration projects.	Identify increased potential for riparian habitat and stream bank conditions while minimizing affects on landowners.	Once	Review existing data and collect new data where necessary.
F-2-F.c	Learn more about fish-friendly bank stabilization and geomorphic processes through workshops and field trips to other watersheds.	Available resources and education.	TBD	TBD

F-2-G.a	Identify locations of thermal refugia.	Identify habitat areas that would benefit from conservation or restoration strategies.	Once	Review TMDL data and other available temperature data.
L-1-A.a	Integrate available resources with willing landowners (fire crews/mechanical) for the purpose of reducing fuel loads.	Coordination of parties, education.	TBD	TBD
L-1-A.b	Identify and list available resources for reducing fuel loads in interface areas and near structures.	Available resources and education.	TBD	TBD
L-1-A.d	Work with USFS, CDF, timber companies, and landowners in cooperative fuel reduction and burn projects.	Cooperative efforts to reduce fire hazards.	TBD	TBD
L-1-A.e	Support local fire safe councils by soliciting funds and partnering in project implementation.	Coordination and assistance with project implementation.	Ongoing	Develop project ideas. Establish a working relationship with fire safe councils. Define MOU's with fire safe councils and/or other organizations. Seek funding.
M-1-A.a	Implement project-level water monitoring based on project-specific desired outcomes.	Improve understanding and trends over time.	TBD	TBD
M-1-B.a	Improve pre-project evaluation.	Improve efficiency.	Once	Identify what is currently being done. List problems and evaluate ways to improve them. Complete written procedure to ensure consistency.

M-1-B.b	Review and revise the current form so monitoring data can flow compatibly.	Improve efficiency.	Once	Review current form and identify problems. Identify solutions and create new form.
M-1-C.a	Review project types to design future projects that will be successful.	Document successful designs for reference in project development.	Once	Identify and obtain assistance by persons having skills in each project type. Funding.
M-2-A.a	Identify and prioritize parameters to be used in watershed level monitoring program.	Provide information to initiate a watershed level monitoring program.	Once	Complete M-2-A.b
M-2-A.b	Invite technical specialists to suggest and/or review parameters and prioritization of watershed level monitoring program.	Increase understanding and educate SRWC and community.	Once	Identify technical specialists for each project type. Funding.
M-2-B.b	Write cooperative reports synthesizing data into a ‘big picture’.	Make data available in a summary format.	Ongoing	Identify recipients and audience of reports. Obtain agreement of analysis and presentation of reports. Staffing and funding.
M-2-C.c	Evaluate current photo monitoring program for enhancement.	Improve current practices.	Once	Review what we have. Identify what we should have. Write protocol/procedure.
M-2-D.a	Develop format of an annual monitoring program report.	Establish a consistent format.	Once	Identify supplies/methods needed such as software, distribution type, and costs. Complete M-2-D.b.
M-2-D.b	Identify the target audience for annual monitoring program report.	List audience and distribute reports.	Ongoing	List potential audiences. Identify types of information and level of technical understanding.

O-1-A.a	Implement a media campaign through the development of a prioritized media contact list.	Utilize media to expand the audience for increasing awareness about watershed issues and activities.	Ongoing	Identify types of media available and possible costs. Establish points of contact for each.
O-1-A.b	Deliver presentations to local clubs, and regional and state groups.	Increase awareness of the community involvement that occurs in the Scott watershed.	Ongoing	Identify audiences. Create presentations that will target the issues of the various audiences. Obtain schedules of events where presentations can be shared.
O-1-A.c	Attend regional meetings to gain knowledge.	Obtain valuable information for watershed wide restoration in order to establish continuity.	Ongoing	None
W-1-A.d	Conduct a groundwater study including connectivity of groundwater to streams.	Better understand hydrology of system.	Once (over several years)	Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding. Access.
W-1-B.f	Investigate the feasibility and potential level of cooperation to temporarily dedicate water for instream flows during emergency situations. If feasible and acceptable, implement ongoing program.	Provide additional water during emergency situations.	Ongoing/as needed	Review success of previous attempts. Further education and landowner cooperation. Define emergency. Funding. Access.
W-2-A.a	Where possible, identify and remedy conditions that contribute to high water temperatures that may be lethal to salmonids at various life stages.	Produce a report of problems and potential remedies.	Once (over time)	Complete Limiting Factors Analysis. Complete surveys for timing and distribution. Understand life cycles.

W-2-A.b	Identify location, timing, frequency and duration of possible thermal barriers to migration of adult and juvenile salmonids. Include evaluation after flood events.	Produce a report of barriers that exist within the Scott watershed.	Ongoing	Complete Limiting Factors Analysis. Understand life cycles.

Short-Term (5 year accomplishments – total 42 actions)				
Action#	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***
F-1-A.b	Support and encourage studies of life history patterns and identify limiting factors for Scott River watershed anadromous salmonid stocks.	Gain better understanding of needs.	Annually	Review current data to identify gaps and develop plan to fill gaps. Compare data to literature. Staffing and funding. Access
F-1-B.a	Support efforts to complete a comprehensive Scott River Watershed Assessment.	Establish cooperative efforts to educate community about the program.	2 years	Communicate and coordinate with CDFG and other parties to keep informed about project developments.
F-1-C.a	Support and encourage the analysis of genetic tissue samples collected from Scott River watershed anadromous salmonids.	Gain understanding to know whether or not we are dealing with unique Scott River watershed fish.	TBD	Regarding tissues already collected; acquire funding and elevate in priority. Regarding future samples; complete studies and collect tissue under objective F-1-A.
F-1-F.b	Determine current stocking of areas under consideration for relocation of rescued fish.	Identify location, current densities, and whether or not survival is optimal in area.	Once	Staffing and funding. Access.
F-2-A.a	Qualify factors limiting spawning, migration, and rearing that are affecting stream systems.	Identify limiting factors to update analysis and section 5 of this document.	3 years	Complete Objectives F-1-A and F-1-B.
F-2-B.b	Evaluate success of fish passage structures having been reviewed under action F-2-B.a.	Increased confidence that action is successful.	Annually	Complete action F-2-B.a.
F-2-B.c	Perform barrier inventories of each stream with anadromous habitat.	Identify barriers and determine if removal is feasible.	Once	List types of barriers that prevent movement of fish. Staffing and funding. Access.

F-2-C.a	Evaluate locations where channel can connect to floodplain without negatively impacting existing land uses, and work to implement feasible projects.	Increase habitat availability.	Once	Understand impact to community. Evaluate areas. Complete W-1-A.d.
F-2-C.b	Establish artificial beaver dams (activity) where appropriate. (see Water Supply actions W-1-B.c)	Increase amount of available fish habitat.	TBD	Understand historic distribution and identify appropriate sites under today's conditions. Complete W-1-A.d.
F-2-D.b	Review existing and conduct new riparian inventories on significant tributaries to assess the quality and quantity of riparian conditions and determine priorities for habitat restoration.	Fill gaps from action F-2-D.a.	Once	Complete action F-2-D.a.
F-2-F.b	Evaluate existing and planned 'geomorphic'; modified rip-rap, and other experimental projects, and develop recommendations for appropriate bank stabilization techniques.	Improve information regarding methods of bank stabilization techniques.	Ongoing	Complete F-2-F.c Evaluate previous projects. Acquire assistance by geomorphologist and hydrologist. Funding. Access.
F-2-G.b	Evaluation and recommend enhancements to expand thermal refugia.	Written report including recommendations.	Once	Identify and quantify locations. Acquire assistance by a hydrologist and geomorphologist to evaluate and recommend enhancements.
F-3-A.a	Develop and contribute to a data repository in order to improve our understanding of factors affecting anadromous salmonids through an information exchange.	Available resources, education, and data sharing.	TBD	TBD

F-3-A.c	Develop information exchange (2-way) workshops for local resource users (agriculture, timber, mining, and tribal), including issues of their economic, social, and biological needs and affects.	Improve communication and education.	TBD	TBD
F-3-B.a	Explore research opportunities with colleges and universities to study local salmonid life history, genetics, and habitat.	Available resources and education.	TBD	TBD
L-1-A.c	Develop local fuels reduction crews to help small 'interface' landowners to accomplish fuels reduction.	Available resources and education.	TBD	TBD
L-2-A.a	Implement projects based on road assessment findings and prioritized 'fixes' at the sub-watershed level.	Provide a strategic method for project implementation.	Ongoing	Identify and collect information from various sources. Compile information. Staffing and funding.
L-2-B.a	Develop an informational handbook and work with livestock owners and land managers on timing and movement of grazers to minimize stream impacts.	Available resources and education.	TBD	TBD
L-3-C.b	Identify products/goods which are less water intensive (e.g. orchard grass), develop handbook, and work with landowners to promote use of products.	Provide educational material to the public.	Once	Research products. Compile material. Identify willing landowners.

L-4-A.a	Conduct marketability and value added studies for agricultural products.	Provide marketing alternatives for agricultural products.	TBD	Obtain participation by willing landowners. Develop and implement feasibility studies. Seek funding.
L-5-A.b	Develop and implement a plan for noxious / invasive weed elimination.	Provide a program for the management of noxious weeds to landowners and other partners.	2 years	Evaluate level of problem by geographic area and type of land use. Identify appropriate management methods. Develop monitoring/maintenance plan. Seek funding.
L-5-A.c	Identify best management practices for handling upland vegetation.	Available resources and education.	TBD	TBD
M-1-B.c	Feed standardized project reporting and data to SRWC through monitoring.	Provide written reports.	Ongoing	Complete M-1-A.a, M-1-B.a, and M-1-B.b Identify audiences. Develop standard report formats. Assign staff member to complete task.
M-1-D.a	Develop a standardized monitoring protocol for each project that can be used by any party.	Provide a consistent policy.	Once	Complete M-2-A.b and M-2-B.a
M-2-B.a	Assess existing protocols (being used by different agencies) and data gaps and redundancies. Use to develop common collection standards that can be placed in a common database.	Provide consistency and make available in electronic format.	Once	Identify protocol sources and collect information. Compile various sources and evaluate. Obtain assistance by technical specialists. Staffing and funding.

M-2-C.a	Offer photo monitoring seminars (include pre and post photos).	Educate community and other interested parties in the effects projects have had on the watershed.	TBD	Identify audience. Develop presentation for target audience.
M-2-C.b	Establish photo points with landowner permission.	Provide photos for use in monitoring activities.	Ongoing	Identify locations. Develop catalogue system for numbering photos and marking locations. Obtain landowner permission. Determine frequency of photos (before, after, length of history, etc) Complete M-2-C.c.
M-2-E.a	Develop and MOU with landowners and agencies on data sharing.	Provide clear definitions and understanding in written form.	Once	Complete Objective M-1-B and action M-2-A.a. Identify data sharing partners. Develop standard format.
O-1-A.d	Conduct project tours to invited groups, legislators, media, schools, public and other special interest groups.	Increased public education regarding watershed issues. Provide useful information to interested parties and show progress of projects. Help SRWC identify and understand issues and problem areas.	Ongoing	Identify audiences. Develop tour agendas based on type of information to be shared with each audience.
O-1-A.e	Coordinate, inform, and work with Siskiyou County government.	Cooperative project implementation and management. Improved sharing of data.	Ongoing	Identify County departments and/or personnel knowledgeable of the issues in the Scott watershed.

W-1-A.a	Evaluate the ground and surface water recharge effects of irrigation ditches. More information is needed on the return rate, quantity, and location of the ditch seepage to streams.	Obtain information to quantify how much ditches leak and where the water goes.	3-5 years	Complete W-1-A.d Identify range of locations based on suspected leakage. Obtain/utilize clear study guide. Acquire assistance by a Hydrologist. Staffing and funding. Access.
W-1-A.b	Evaluate the potential domestic/urban water use under the Scott Valley Area Plan of the County Land Use Plan and General Plan, its impacts on streamflow and opportunities for water conservation and other mitigation.	Identify opportunities for water conservation and other mitigation.	Once	Review County Plans and obtain data. Staffing and funding.
W-1-A.c	Investigate feasibility and effectiveness of various water recharge methods.	Identify methods that are useful to the Scott system.	Once	Complete W-1-A.d
W-1-B.a	Investigate water storage opportunities.	Identify flexibility in water management.	Once	Obtain maps from CDWR. Identify range of location and obtain requirements within wilderness act (federal regulations).
W-1-B.b	Investigate option of recharge to aquifer in winter, spring and early summer months.	Summarize a portion of W-1-A.c	Once	Complete W-1-A.c
W-1-B.c	Evaluate the potential use of check dams/beaver ponds in the cooler reaches. (see F-2-C.b)	Identify potential locations having likelihood of success.	Once	Identify locations of cool water. Consider the impact on hydrology. Staffing and funding. Complete W-1-A.d.

W-1-C.a	Develop a manual to educate users about potential water conservation practices and why they are needed during low flow years.	Provide public with information regarding water conservation practices.	Once	Identify audiences. Identify categories of information. Staffing and funding.
W-1-C.b	Encourage the community to be aware that water use should not exceed adjudicated amounts through coordinated education with Department of Water Resources.	Provide public with information regarding adjudication rights.	Ongoing	Work with CDWR to identify methods for distributing information. Obtain map of adjudications and identify which ones are currently under Watermaster service. Staffing and funding. Access (?).
W-2-A.c	Investigate the contribution of the flow of cool sub-surface water sources and identify locations for potential rearing habitat. Include evaluation after flood event.	Provide a list of locations for potential rearing habitat.	Ongoing	Obtain TMDL data (TIR). Identify other sources of information. Staffing and funding. Possible access.
W-2-B.a	Continue to review and update studies and literature searches to assist in determining sediment levels that are beneficial to spawning and rearing for salmon and steelhead.	Better understand how fish will benefit.	Once	Identify available studies and literature. Obtain existing data. Staffing and funding.
W-2-B.b	Educate road users about road-related erosion problems and remedies.	Posted signs at various locations.	Once	Identify conditions that would require notification to the public. Identify locations. Develop a maintenance plan for signs. Develop a monitoring plan in the event conditions change and would require change or removal of signs. Staffing and funding. Access.

W-2-B.c	Identify and correct existing drainage and erosion problems within the road prism, attempting to mitigate those sites with the greatest potential for impacting the stream system.	Quantify potential erosion delivery to streams	Ongoing	Complete W-2-B.c. Staffing and funding. Access. Monitor after flood events.

Mid-Term (10 year accomplishments - total 18 actions)				
Action#	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***
F-1-B.b	Identify, prioritize and seek funding for fish habitat riparian restoration opportunities as identified in the Scott River Watershed Assessment (see Vegetation and Habitat Restoration section)	Implementation of restoration projects.	Ongoing	Obtain results of Scott River Watershed Assessment.
F-1-D.a	Encourage CDFG to investigate relationship of lake stocking, rainbow to steelhead and native resident trout.	Increase confidence in policy.	Annually	SRWC needs to gain understanding of the fish stocking program and that it complies with policy.
F-1-F.c	Relocate rescued fish to fill rearing capacity in natural streams, if and where feasible.	Provide suitable habitat for fish.	Ongoing	Establish a monitoring plan that will ensure locations remain supportive.
F-1-F.d	Evaluate the feasibility of an alternative rescue operation (e.g. Kidder Creek, Tailing Ponds, Kelsey Channel, etc.).	Provide a short-term solution.	Once	Identify and evaluate potential sites. Resources and access.
F-3-A.b	Invite speakers, or have information available, on other important and related subjects that may not be unique to the Klamath River Basin (such as: structural complexity of streams, fluvial processes, habitat connectivity, ecosystem management, geomorphic analysis, and others).	Available resources and education.	Ongoing	TBD

F-3-B.b	Make Kelsey Creek Spawning Channel a demonstration site for research and education, following agreement on objectives and evaluation methodology.	Provide education and research based on objectives.	Once	Identify objectives for demonstration site. Determine methodologies. Present in writing to SRWC for approval. Staffing and funding.
L-1-A.f	Convert vegetation to energy source (biomass).	Provide alternative sources of energy.	TBD	Identify possible participants. Identify sources of fuel. Obtain technical expertise.
L-3-A.a	Identify appropriate incentives for improving stream protection by working with agricultural users.	Document appropriate incentives.	TBD	Define possible incentives. Hold working group meetings. Develop program. Obtain landowner participation. Seek funding.
L-3-B.a	Investigate and develop a water consumption model for upland vegetation.	Available resource and education in protection of streams.	TBD	TBD
L-3-B.b	Develop a program for re-vegetating riparian areas in the residential dominated foothills using native species.	Provide public education and possible assistance with revegetation program.	TBD	Compile program. Identify priority areas. Obtain landowner cooperation. Seek funding.
L-3-C.a	Find willing agricultural landowners as partners to sample and test agricultural products which are less water consumptive.	Identify successful products.	TBD	Identify potential products. Identify willing landowners. Staffing and funding. Access. Complete L-3-C.b.
L-4-B.a	Offer educational workshops on holistic management.	Landowner education.	TBD	Identify topics and methods. Evaluate what would work in the Scott River watershed. Obtain professional assistance. Identify audience.

L-5-A.a	Develop pilot projects to reduce intrusion of brush and juniper.	Monitor impact of pilot projects for the purpose of obtaining data.	TBD	Identify potential projects. Obtain technical expertise.
W-1-B.d	Investigate opportunities for upland vegetation management in the watershed to enhance water supply and timing.	Better understand effects of upland management.	Once	Identify opportunities for private vs. public. Staffing and funding. Access.
W-1-B.e	Where feasible, construct water storage on and off channel. (after investigation W-1-B.a)	Provide water storage for use in timing instream flows.	TBD	Identify appropriate and economical methods for storage. Complete W-1-B.a Funding. Access.
W-1-C.c	Facilitate compliance with water rights as contained in the three adjudications in Scott Valley.	Ensure compliance.	Ongoing	Obtain and install measuring devices. Complete knowledge or access to decree. Staffing and funding. Access.
W-2-A.d	If needed, install systems that reuse tail or end water or percolate it through the ground to cool it.	Complete on the ground projects to install systems.	TBD	Review existing projects in other watersheds/basins. Complete hydrology evaluation (W-1-A.d) Identify how much tail water exists in Scott system. Staffing and funding. Possible access.
W-2-B.d	Support the development of programs for continuous year-round maintenance of roads and bare slopes.	Defined maintenance program through a written report.	Ongoing	Define and include adaptive maintenance strategy. Staffing and funding.

Long-Term (50 year accomplishments – total 0 actions)
Long-term accomplishments include the sustainability of all previous actions. The SRWC Vision Statement is the goal for long-term accomplishments.

Immediate-Term (2 year accomplishments – total 33 actions)

X = Indicator for high priority discussion
Currently under discussion or being done
Outstanding issue marked for high priority by common consent
Requires previous action or other projects to be completed

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
F-1-A.a	X	Continue and/or increase efforts to monitor spawner escapements within the watershed. Continue and/or increase efforts to monitor and evaluate juvenile habitat utilization, survival and outmigration.	Improve understanding of basic life history requirements, timing, distribution and habitat preference to better understand and evaluate impacts of land management and resource management activities within the watershed.	Ongoing	Identify habitat criteria, review previous information for locations. Staffing and funding for surveys (carcass and redds). Access.	Include NRCS Biologist in discussions
F-1-E.a		Develop a procedure for monitoring the effectiveness of screened diversions.	Provide a written procedure to guide SRWC in data collection and evaluating condition.	Once	Staffing and funding.	
F-1-E.b	Action Met 5-24-2004	Continue program for maintenance and periodic replacement of screens to help maintain proper functioning.	Maintain proper functioning.	Ongoing	Document number, location and life expectancy of screens. Document basic knowledge of maintenance needs.	Continuing process.
F-1-E.c		Review inactive and unknown diversions for future and potential screening.	Prevent mortality of fish.	2 years	Obtain adjudication information from Watermaster. Map locations.	
F-1-E.d	Action Met 5-24-2004	Continue fish screening program.	Provide screening for unscreened diversions.	Ongoing	Funding. Access.	Continuing process.

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
F-1-F.a		Evaluate results and monitor success of fish rescue program through mark/recapture studies; spawning ground surveys; direct observation dives.	Gain understanding of current conditions.	4 years	Staffing and funding. Access.	
F-2-B.a		Review completed records of projects to identify existing fish passage structures and their locations.	Understand volume and location. Produce GIS.	Once	Identify projects that will provide information, request project information from other entities.	
F-2-D.a	**X**	Use aerial photos and photo-points to evaluate the relationship of riparian condition to fish habitat on the mainstem Scott River.	Provide information to complete report of findings.	Once	Obtain photos and acquire assistance by a geomorphologist (this is part of the Scott River Watershed Assessment referenced in action F-1-B.a.	
F-2-E.a	In Process 5-24-2004	Evaluate riparian planting projects and make recommendations to improve planting program. Include in the evaluation an assessment of why projects failed and modify accordingly.	Increase riparian habitat and efficiency.	Once	Review project notes and visit sites.	Received NRST draft report from April 2004 visit
F-2-F.a	**X**	**Evaluate the geomorphology of the mainstem Scott River channel to identify potential demonstration projects.**	Identify increased potential for riparian habitat and stream bank conditions while minimizing affects on landowners.	Once	Review existing data and collect new data where necessary.	Include upslope conditions, per Executive Committee 5-24-04. Sediment TMDL's should be addressed. Need to get data on background erosion sources using technical assistance. Include NRCS-Klamath Team.

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
F-2-F.c	**X**	Learn more about fish-friendly bank stabilization and geomorphic processes through workshops and field trips to other watersheds.	Available resources and education.	*2 years*	TBD	
F-2-G.a	**X**	Identify locations of thermal refugia.	Identify habitat areas that would benefit from conservation or restoration strategies.	Once	Review TMDL data and other available temperature data.	
L-1-A.a		Integrate available resources with willing landowners (fire crews/ mechanical) for the purpose of reducing fuel loads.	Coordination of parties, education.	*Ongoing*	TBD	
L-1-A.b		Identify and list available resources for reducing fuel loads in interface areas and near structures.	Available resources and education.	*Once (with updates as needed)*	TBD	
L-1-A.d	X	Work with USFS, CDF, timber companies, and landowners in cooperative fuel reduction and burn projects.	Cooperative efforts to reduce fire hazards.	*Ongoing*	TBD	
L-1-A.e	Action Met 5-24-2004	Support local fire safe councils by soliciting funds and partnering in project implementation.	Coordination and assistance with project implementation.	Ongoing	Develop project ideas. Establish a working relationship with fire safe councils. Define MOU's with fire safe councils and/or other organizations. Seek funding.	Continuing process.

Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
M-1-A.a		Implement project-level water monitoring based on project-specific desired outcomes.	Improve understanding and trends over time.	*2 years*	TBD	
M-1-B.a		Improve pre-project evaluation.	Improve efficiency.	Once	Identify what is currently being done. List problems and evaluate ways to improve them. Complete written procedure to ensure consistency.	
M-1-B.b		Review and revise the current form so monitoring data can flow compatibly.	Improve efficiency.	Once	Review current form and identify problems. Identify solutions and create new form.	
M-1-C.a		Review project types to design future projects that will be successful.	Document successful designs for reference in project development.	Once	Identify and obtain assistance by persons having skills in each project type. Funding.	
M-2-A.a		Identify and prioritize parameters to be used in watershed level monitoring program.	Provide information to initiate a watershed level monitoring program.	Once	Complete M-2-A.b	
M-2-A.b	**X**	Invite technical specialists to suggest and/or review parameters and prioritization of watershed level monitoring program.	Increase understanding and educate SRWC and community.	Once	Identify technical specialists for each project type. Funding.	Include NRCS-Klamath Team.
M-2-B.b		Write cooperative reports synthesizing data into a 'big picture'.	Make data available in a summary format.	Ongoing	Identify recipients and audience of reports. Obtain agreement of analysis and presentation of reports. Staffing and funding.	

18. DEVELOPING STRATEGIC ACTIONS – ADDENDUM 06/25/2004

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
M-2-C.c		Evaluate current photo monitoring program for enhancement.	Improve current practices.	Once	Review what we have. Identify what we should have. Write protocol/procedure.	
M-2-D.a		Develop format of an annual monitoring program report.	Establish a consistent format.	Once	Identify supplies/methods needed such as software, distribution type, and costs. Complete M-2-D.b.	
M-2-D.b	**X**	Identify the target audience for annual monitoring program report.	List audience and distribute reports.	Ongoing	List potential audiences. Identify types of information and level of technical understanding.	Include NRCS-Klamath Team
O-1-A.a	X	Implement a media campaign through the development of a prioritized media contact list.	Utilize media to expand the audience for increasing awareness about watershed issues and activities.	Ongoing	Identify types of media available and possible costs. Establish points of contact for each.	
O-1-A.b	X	Deliver presentations to local clubs, and regional and state groups.	Increase awareness of the community involvement that occurs in the Scott watershed.	Ongoing	Identify audiences. Create presentations that will target the issues of the various audiences. Obtain schedules of events where presentations can be shared.	
O-1-A.c	**X**	Attend regional meetings to gain knowledge.	Obtain valuable information for watershed wide restoration in order to establish continuity.	Ongoing	None	

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
W-1-A.d	X	Conduct a groundwater study including connectivity of groundwater to streams.	Better understand hydrology of system.	Once (over several years)	Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding. Access.	Include NRCS Hydrologist in discussions.
W-1-B.f		Investigate the feasibility and potential level of cooperation to temporarily dedicate water for instream flows during emergency situations. If feasible and acceptable, implement ongoing program.	Provide additional water during emergency situations.	Ongoing/as needed	Review success of previous attempts. Further education and landowner cooperation. Define emergency. Funding. Access.	
W-2-A.a		Where possible, identify and remedy conditions that contribute to high water temperatures that may be lethal to salmonids at various life stages.	Produce a report of problems and potential remedies.	Once (over time)	Complete Limiting Factors Analysis. Complete surveys for timing and distribution. Understand life cycles.	
W-2-A.b		Identify location, timing, frequency and duration of possible thermal barriers to migration of adult and juvenile salmonids. Include evaluation after flood events.	Produce a report of barriers that exist within the Scott watershed.	Ongoing	Complete Limiting Factors Analysis. Understand life cycles.	

18. DEVELOPING STRATEGIC ACTIONS – ADDENDUM 10/31/2005

Immediate-Term (2 year accomplishments – total 35 actions) AND Short-Term (5-year accomplishments – total 42 actions)

X = Indicator for high priority discussion
Currently under discussion or being done
Outstanding issue marked for high priority by common consent
Requires previous action or other projects to be completed

Immediate-Term (2 year accomplishments – total 35 actions)

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
F-1-A.a	**X**	Continue and/or increase efforts to monitor spawner escapements within the watershed. Continue and/or increase efforts to monitor and evaluate juvenile habitat utilization, survival and outmigration.	Improve understanding of basic life history requirements, timing, distribution and habitat preference to better understand and evaluate impacts of land management and resource management activities within the watershed.	Ongoing	Identify habitat criteria, review previous information for locations. Staffing and funding for surveys (carcass and redds). Access.	Include NRCS Biologist in discussions
F-1-E.a		Develop a procedure for monitoring the effectiveness of screened diversions.	Provide a written procedure to guide SRWC in data collection and evaluating condition.	Once	Staffing and funding.	
F-1-E.b	Action Met 5-24-2004	Continue program for maintenance and periodic replacement of screens to help maintain proper functioning.	Maintain proper functioning.	Ongoing	Document number, location and life expectancy of screens. Document basic knowledge of maintenance needs.	Continuing process.
F-1-E.c	**X**	Review inactive and unknown diversions for future and potential screening.	Prevent mortality of fish.	2 years	Obtain adjudication information from Watermaster. Map locations.	

F-1-E.d	Action Met 5-24-2004	Continue fish screening program.	Provide screening for unscreened diversions.	Ongoing	Funding. Access.	Continuing process.
F-1-F.a		Evaluate results and monitor success of fish rescue program through mark/recapture studies; spawning ground surveys; direct observation dives.	Gain understanding of current conditions.	4 years	Staffing and funding. Access.	
F-2-B.a		Review completed records of projects to identify existing fish passage structures and their locations.	Understand volume and location. Produce GIS.	Once	Identify projects that will provide information, request project information from other entities.	
F-2-D.a	**X**	Use aerial photos and photo-points to evaluate the relationship of riparian condition to fish habitat on the mainstem Scott River.	Provide information to complete report of findings.	Once	Obtain photos and acquire assistance by a geomorphologist (this is part of the Scott River Watershed Assessment referenced in action F-1-B.a.	
F-2-E.a	In Process 5-24-2004	Evaluate riparian planting projects and make recommendations to improve planting program. Include in the evaluation an assessment of why projects failed and modify accordingly.	Increase riparian habitat and efficiency.	Once	Review project notes and visit sites.	Received NRST draft report from April 2004 visit

F-2-F.a	**X**	**Evaluate the geomorphology of the mainstem Scott River channel to identify potential demonstration projects.**	Identify increased potential for riparian habitat and stream bank conditions while minimizing affects on landowners.	Once	Review existing data and collect new data where necessary.	Include upslope conditions, per Executive Committee 5-24-04. Sediment TMDL's should be addressed. Need to get data on background erosion sources using technical assistance. Include NRCS-Klamath Team.
F-2-F.c	**X**	Learn more about fish-friendly bank stabilization and geomorphic processes through workshops and field trips to other watersheds.	Available resources and education.	*2 years*	TBD	
F-2-G.a	**X**	Identify locations of thermal refugia.	Identify habitat areas that would benefit from conservation or restoration strategies.	Once	Review TMDL data and other available temperature data.	
L-1-A.a	X	Integrate available resources with willing landowners (fire crews/ mechanical) for the purpose of reducing fuel loads.	Coordination of parties, education.	*Ongoing*	TBD	Development of Scott Valley Fire Safe Council in 2005
L-1-A.b	X	Identify and list available resources for reducing fuel loads in interface areas and near structures.	Available resources and education.	*Once (with updates as needed)*	TBD	Development of Scott Valley Fire Safe Council in 2005
L-1-A.d	X	Work with USFS, CDF, timber companies, and landowners in cooperative fuel reduction and burn projects.	Cooperative efforts to reduce fire hazards.	*Ongoing*	TBD	Development of Scott Valley Fire Safe Council in 2005

L-1-A.e	Action Met 5-24-2004	Support local fire safe councils by soliciting funds and partnering in project implementation.	Coordination and assistance with project implementation.	Ongoing	Develop project ideas. Establish a working relationship with fire safe councils. Define MOU's with fire safe councils and/or other organizations. Seek funding.	Continuing process. Development of Scott Valley Fire Safe Council in 2005
M-1-A.a		Implement project-level water monitoring based on project-specific desired outcomes.	Improve understanding and trends over time.	*2 years*	TBD	
M-1-B.a		Improve pre-project evaluation.	Improve efficiency.	Once	Identify what is currently being done. List problems and evaluate ways to improve them. Complete written procedure to ensure consistency.	
M-1-B.b		Review and revise the current form so monitoring data can flow compatibly.	Improve efficiency.	Once	Review current form and identify problems. Identify solutions and create new form.	
M-1-C.a		Review project types to design future projects that will be successful.	Document successful designs for reference in project development.	Once	Identify and obtain assistance by persons having skills in each project type. Funding.	
M-2-A.a		Identify and prioritize parameters to be used in watershed level monitoring program.	Provide information to initiate a watershed level monitoring program.	Once	Complete M-2-A.b	

M-2-A.b	**X**	Invite technical specialists to suggest and/or review parameters and prioritization of watershed level monitoring program.	Increase understanding and educate SRWC and community.	Once	Identify technical specialists for each project type. Funding.	Include NRCS-Klamath Team.
M-2-B.b	**X**	Write cooperative reports synthesizing data into a 'big picture'.	Make data available in a summary format.	Ongoing	Identify recipients and audience of reports. Obtain agreement of analysis and presentation of reports. Staffing and funding.	Draft annual report in 2005, summary information available through this report.
M-2-C.c		Evaluate current photo monitoring program for enhancement.	Improve current practices.	Once	Review what we have. Identify what we should have. Write protocol/procedure.	
M-2-D.a		Develop format of an annual monitoring program report.	Establish a consistent format.	Once	Identify supplies/methods needed such as software, distribution type, and costs. Complete M-2-D.b.	Draft annual report in 2005
M-2-D.b		Identify the target audience for annual monitoring program report.	List audience and distribute reports.	Ongoing	List potential audiences. Identify types of information and level of technical understanding.	Include NRCS-Klamath Team. Draft annual report in 2005
O-1-A.a	Action met July 2005	Implement a media campaign through the development of a prioritized media contact list.	Utilize media to expand the audience for increasing awareness about watershed issues and activities.	Ongoing	Identify types of media available and possible costs. Establish points of contact for each.	

O-1-A.b	Action met Ongoing	Deliver presentations to local clubs, and regional and state groups.	Increase awareness of the community involvement that occurs in the Scott watershed.	Ongoing	Identify audiences. Create presentations that will target the issues of the various audiences. Obtain schedules of events where presentations can be shared.	City of Fort Jones; Scott Valley rotary
O-1-A.c	Action met Ongoing	Attend regional meetings to gain knowledge.	Obtain valuable information for watershed wide restoration in order to establish continuity.	Ongoing	None	Klamath River Fisheries Task Force; North Coast Water Quality Control Board – TMDL; Klamath Basin Stakeholders – Chadwick consensus group
W-1-A.d	**Replaced**	~~Conduct a groundwater study including connectivity of groundwater to streams.~~	Better understand hydrology of system.	Once (over several years)	Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding. Access.	Include NRCS Hydrologist in discussions.

W-1-A.d	**X**	**Develop a process to better understand the Scott River watershed hydrology through the following actions:** a) Identify data gaps through a review of existing data (including 1958 USGS report, 1974 and 1975 SWRCB reports) , upslope and riparian vegetation, and temperature and precipitation data. b) Investigate effects of upland vegetation types on soil infiltration rates and moisture retention. c) Investigate effects of dense riparian canopies on summer and fall stream flow levels. d) Investigate effects of spring flood irrigation on subsequent water table levels. e) Investigate if pumping from deeper aquifers may make water available to contribute to streamflow in the Scott. f) Promote a locally controlled, voluntary network to measure groundwater levels.	Better understand hydrology of system.	Once (over several years)	Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding. Access.	

W-1-A.e	**X**	**Develop prospective projects based on the findings of investigation under action W-1-A.d:** a) Focus on original goal: 'Work for adequate water flows in the Scott River system to protect the migration, spawning, and rearing needs of the salmon and steelhead stocks, while also protecting other beneficial uses'. b) Accomplish original objective to 'improve our understanding of the hydrology of the Scott River system and the relationship to water use'. c) Increase our understanding of the Scott River system by testing specific hypotheses related to resource issues that have been developed by community members and technical specialists	Better understand hydrology of system.	Once (over several years)	Complete W-1-A.d Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding. Access.	
W-1-A.f	**X**	**Gain community support to develop and carry out projects (action W-1-A.e) as appropriate.**	Better understand hydrology of system.	Once (over several years)	Complete W-1-A.e Acquire assistance by Hydrologist and possibly an Engineer. Staffing and funding.	

W-1-B.f		Investigate the feasibility and potential level of cooperation to temporarily dedicate water for instream flows during emergency situations. If feasible and acceptable, implement ongoing program.	Provide additional water during emergency situations.	Ongoing/as needed	Review success of previous attempts. Further education and landowner cooperation. Define emergency. Funding. Access.	Scott River Water Trust in Phase II and development of dry year water plan through ITP process.
W-2-A.a		Where possible, identify and remedy conditions that contribute to high water temperatures that may be lethal to salmonids at various life stages.	Produce a report of problems and potential remedies.	Once (over time)	Complete Limiting Factors Analysis. Complete surveys for timing and distribution. Understand life cycles.	
W-2-A.b		Identify location, timing, frequency and duration of possible thermal barriers to migration of adult and juvenile salmonids. Include evaluation after flood events.	Produce a report of barriers that exist within the Scott watershed.	Ongoing	Complete Limiting Factors Analysis. Understand life cycles.	

Short-Term (5 year accomplishments – total 42 actions)						
Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
F-1-A.b		Support and encourage studies of life history patterns and identify limiting factors for Scott River watershed anadromous salmonid stocks.	Gain better understanding of needs.	Annually	Review current data to identify gaps and develop plan to fill gaps. Compare data to literature. Staffing and funding. Access	
F-1-B.a		Support efforts to complete a comprehensive Scott River Watershed Assessment.	Establish cooperative efforts to educate community about the program.	2 years	Communicate and coordinate with CDFG and other parties to keep informed about project developments.	Assessment to be implemented by CDFG.
F-1-C.a		Support and encourage the analysis of genetic tissue samples collected from Scott River watershed anadromous salmonids.	Gain understanding to know whether or not we are dealing with unique Scott River watershed fish.	TBD	Regarding tissues already collected; acquire funding and elevate in priority. Regarding future samples; complete studies and collect tissue under objective F-1-A.	
F-1-F.b		Determine current stocking of areas under consideration for relocation of rescued fish.	Identify location, current densities, and whether or not survival is optimal in area.	Once	Staffing and funding. Access.	
F-2-A.a		Qualify factors limiting spawning, migration, and rearing that are affecting stream systems.	Identify limiting factors to update analysis and section 5 of this document.	3 years	Complete Objectives F-1-A and F-1-B.	
F-2-B.b		Evaluate success of fish passage structures having been reviewed under action F-2-B.a.	Increased confidence that action is successful.	Annually	Complete action F-2-B.a.	

Short-Term (5 year accomplishments – total 42 actions)						
Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
F-2-B.c		Perform barrier inventories of each stream with anadromous habitat.	Identify barriers and determine if removal is feasible.	Once	List types of barriers that prevent movement of fish. Staffing and funding. Access.	
F-2-C.a		Evaluate locations where channel can connect to floodplain without negatively impacting existing land uses, and work to implement feasible projects.	Increase habitat availability.	Once	Understand impact to community. Evaluate areas. Complete W-1-A.d.	
F-2-C.b		Establish artificial beaver dams (activity) where appropriate. (see Water Supply actions W-1-B.c)	Increase amount of available fish habitat.	TBD	Understand historic distribution and identify appropriate sites under today's conditions. Complete W-1-A.d.	
F-2-D.b		Review existing and conduct new riparian inventories on significant tributaries to assess the quality and quantity of riparian conditions and determine priorities for habitat restoration.	Fill gaps from action F-2-D.a.	Once	Complete action F-2-D.a.	
F-2-F.b		Evaluate existing and planned 'geomorphic'; modified rip-rap, and other experimental projects, and develop recommendations for appropriate bank stabilization	Improve information regarding methods of bank stabilization techniques.	Ongoing	Complete F-2-F.c Evaluate previous projects. Acquire assistance by geomorphologist and hydrologist.	

Short-Term (5 year accomplishments – total 42 actions)						
Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
		techniques.			Funding. Access.	
F-2-G.b		Evaluation and recommend enhancements to expand thermal refugia.	Written report including recommendations.	Once	Identify and quantify locations. Acquire assistance by a hydrologist and geomorphologist to evaluate and recommend enhancements.	
F-3-A.a		Develop and contribute to a data repository in order to improve our understanding of factors affecting anadromous salmonids through an information exchange.	Available resources, education, and data sharing.	TBD	TBD	
F-3-A.c		Develop information exchange (2-way) workshops for local resource users (agriculture, timber, mining, and tribal), including issues of their economic, social, and biological needs and affects.	Improve communication and education.	TBD	TBD	
F-3-B.a		Explore research opportunities with colleges and universities to study local salmonid life history, genetics, and habitat.	Available resources and education.	TBD	TBD	
L-1-A.c		Develop local fuels reduction crews to help small 'interface' landowners to accomplish fuels reduction.	Available resources and education.	TBD	TBD	To be implemented through the Scott Valley Fire Safe Council

Short-Term (5 year accomplishments – total 42 actions)

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
L-2-A.a		Implement projects based on road assessment findings and prioritized 'fixes' at the sub-watershed level.	Provide a strategic method for project implementation.	Ongoing	Identify and collect information from various sources. Compile information. Staffing and funding.	
L-2-B.a		Develop an informational handbook and work with livestock owners and land managers on timing and movement of grazers to minimize stream impacts.	Available resources and education.	TBD	TBD	
L-3-C.b		Identify products/goods which are less water intensive (e.g. orchard grass), develop handbook, and work with landowners to promote use of products.	Provide educational material to the public.	Once	Research products. Compile material. Identify willing landowners.	
L-4-A.a		Conduct marketability and value added studies for agricultural products.	Provide marketing alternatives for agricultural products.	TBD	Obtain participation by willing landowners. Develop and implement feasibility studies. Seek funding.	
L-5-A.b		Develop and implement a plan for noxious / invasive weed elimination.	Provide a program for the management of noxious weeds to landowners and other partners.	2 years	Evaluate level of problem by geographic area and type of land use. Identify appropriate management methods. Develop monitoring/maintenance plan.	

Short-Term (5 year accomplishments – total 42 actions)						
Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
					Seek funding.	
L-5-A.c		Identify best management practices for handling upland vegetation.	Available resources and education.	TBD	TBD	
M-1-B.c		Feed standardized project reporting and data to SRWC through monitoring.	Provide written reports.	Ongoing	Complete M-1-A.a, M-1-B.a, and M-1-B.b Identify audiences. Develop standard report formats. Assign staff member to complete task.	
M-1-D.a		Develop a standardized monitoring protocol for each project that can be used by any party.	Provide a consistent policy.	Once	Complete M-2-A.b and M-2-B.a	
M-2-B.a		Assess existing protocols (being used by different agencies) and data gaps and redundancies. Use to develop common collection standards that can be placed in a common database.	Provide consistency and make available in electronic format.	Once	Identify protocol sources and collect information. Compile various sources and evaluate. Obtain assistance by technical specialists. Staffing and funding.	
M-2-C.a		Offer photo monitoring seminars (include pre and post photos).	Educate community and other interested parties in the effects projects have had on the watershed.	TBD	Identify audience. Develop presentation for target audience.	

Short-Term (5 year accomplishments – total 42 actions)

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
M-2-C.b		Establish photo points with landowner permission.	Provide photos for use in monitoring activities.	Ongoing	Identify locations. Develop catalogue system for numbering photos and marking locations. Obtain landowner permission. Determine frequency of photos (before, after, length of history, etc) Complete M-2-C.c.	
M-2-E.a		Develop and MOU with landowners and agencies on data sharing.	Provide clear definitions and understanding in written form.	Once	Complete Objective M-1-B and action M-2-A.a. Identify data sharing partners. Develop standard format.	
O-1-A.d		Conduct project tours to invited groups, legislators, media, schools, public and other special interest groups.	Increased public education regarding watershed issues. Provide useful information to interested parties and show progress of projects. Help SRWC identify and understand issues and problem areas.	Ongoing	Identify audiences. Develop tour agendas based on type of information to be shared with each audience.	
O-1-A.e		Coordinate, inform, and work with Siskiyou County government.	Cooperative project implementation and management. Improved sharing of data.	Ongoing	Identify County departments and/or personnel knowledgeable of the issues in	

Short-Term (5 year accomplishments – total 42 actions)

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
					the Scott watershed.	
W-1-A.a		Evaluate the ground and surface water recharge effects of irrigation ditches. More information is needed on the return rate, quantity, and location of the ditch seepage to streams.	Obtain information to quantify how much ditches leak and where the water goes.	3-5 years	Complete W-1-A.d Identify range of locations based on suspected leakage. Obtain/utilize clear study guide. Acquire assistance by a Hydrologist. Staffing and funding. Access.	
W-1-A.b		Evaluate the potential domestic/urban water use under the Scott Valley Area Plan of the County Land Use Plan and General Plan, its impacts on streamflow and opportunities for water conservation and other mitigation.	Identify opportunities for water conservation and other mitigation.	Once	Review County Plans and obtain data. Staffing and funding.	
W-1-A.c		Investigate feasibility and effectiveness of various water recharge methods.	Identify methods that are useful to the Scott system.	Once	Complete W-1-A.d	
W-1-B.a		Investigate water storage opportunities.	Identify flexibility in water management.	Once	Obtain maps from CDWR. Identify range of location and obtain requirements within wilderness act (federal	

Short-Term (5 year accomplishments – total 42 actions)						
Action#	***Status & Date***	***Description***	***Expected Outcome***	***Duration***	***Pre-Requisites***	***Comments***
					regulations).	
W-1-B.b		Investigate option of recharge to aquifer in winter, spring and early summer months.	Summarize a portion of W-1-A.c	Once	Complete W-1-A.c	
W-1-B.c		Evaluate the potential use of check dams/beaver ponds in the cooler reaches. (see F-2-C.b)	Identify potential locations having likelihood of success.	Once	Identify locations of cool water. Consider the impact on hydrology. Staffing and funding. Complete W-1-A.d.	
W-1-C.a		Develop a manual to educate users about potential water conservation practices and why they are needed during low flow years.	Provide public with information regarding water conservation practices.	Once	Identify audiences. Identify categories of information. Staffing and funding.	
W-1-C.b		Encourage the community to be aware that water use should not exceed adjudicated amounts through coordinated education with Department of Water Resources.	Provide public with information regarding adjudication rights.	Ongoing	Work with CDWR to identify methods for distributing information. Obtain map of adjudications and identify which ones are currently under Watermaster service. Staffing and funding. Access (?).	
W-2-A.c		Investigate the contribution of the flow of cool sub-surface water sources and identify locations for	Provide a list of locations for potential rearing habitat.	Ongoing	Obtain TMDL data (TIR). Identify other sources of information.	

Short-Term (5 year accomplishments – total 42 actions)

Action#	*Status & Date*	*Description*	*Expected Outcome*	*Duration*	*Pre-Requisites*	*Comments*
		potential rearing habitat. Include evaluation after flood event.			Staffing and funding. Possible access.	
W-2-B.a		Continue to review and update studies and literature searches to assist in determining sediment levels that are beneficial to spawning and rearing for salmon and steelhead.	Better understand how fish will benefit.	Once	Identify available studies and literature. Obtain existing data. Staffing and funding.	
W-2-B.b		Educate road users about road-related erosion problems and remedies.	Posted signs at various locations.	Once	Identify conditions that would require notification to the public. Identify locations. Develop a maintenance plan for signs. Develop a monitoring plan in the event conditions change and would require change or removal of signs. Staffing and funding. Access.	
W-2-B.c		Identify and correct existing drainage and erosion problems within the road prism, attempting to mitigate those sites with the greatest potential for impacting the stream system.	Quantify potential erosion delivery to streams	Ongoing	Complete W-2-B.c. Staffing and funding. Access. Monitor after flood events.	

19. Outstanding Issues/Questions

This section provides a place to identify important issues that are not fully addressed within the initial phase of the planning document. The information in this section will be reviewed for priority consideration during the second phase of the SAP.

Channel Conditions

A better understanding of the geomorphology of the river channel, primarily in the valley region, is a critical need in identifying a goal for restoration in this area. A Rosgen-type evaluation of the stability of the channel and its most stable configuration is needed. The Water and Monitoring Committees are currently pursuing the development of studies that will assist with this need. In the next edition of the SAP, It has been recommended to gather geomorphology information together into one new chapter based on the importance of the topic. Some of this information is already in chapters 5 and 10; some information may be gleaned from other sources, such as Rosgen. Other information will be coming as the result of studies. Information on existing and historical geomorphology needs to be provided in adequate detail to promote development of a desired condition for the river and key valley tributaries, especially in low-gradient reaches.

Water

There is an urgent and immediate need to complete a water balance, including groundwater and its connection with the river. This will be addressed in action W-1-A.d and is currently being discussed within the Water Committee.

Land Use

Agriculture and timber have been greatly affected over the years due to regulations and endangered species. The SRWC has identified a few opportunities to assist with the economics of the Scott River watershed and Scott Valley. However, implementing additional programs that will benefit both the landowner and the watershed are needed. This includes, but is not limited to, upslope conditions such as fuels reduction, grazing management, management of noxious weeds and other vegetation. Funding will need to be obtained for the development of these programs.

Wildlife

The SRWC has never pursued programs or projects that will benefit non-aquatic species. Data are needed to provide historical and geographical information for other species that may be threatened or endangered and their location. Without this data, restoration projects in certain locations may cause an impact to these species. Funding will need to be obtained for the development of these programs.

Economics

Cost estimates and identifying the benefits of restoration activities is critical for understanding the economic value. It would be extremely useful for the SRWC to generate these estimates early in the implementation of the SAP.

19. OUTSTANDING ISSUES/QUESTIONS

Fisheries and Limiting Factors
It is recommended that key effects to salmonids are summarized and listed in potential order of impact. Key impacts to salmonids in the Scott watershed are expected from altered sediment regimes, modified river and tributary geomorphology, water flow and water quality issues. Discussion within the SRWC, and results from the LFA, will further refine and prioritize impacts. Prioritization of effects will focus restoration and study needs, and the prioritization process itself, along with proposed restoration, will be amended as new information becomes available.

Based on the identification of key impacts described above, it is recommended that existing and historical conditions for key impacts be developed in sufficient detail to lead to the development of a desired condition for a the given parameter, such as river flow or river structure. The desired condition will result from studies and discussion that reveal how and which physical processes need to operate to produce suitable aquatic habitat (and the desired condition), and, at the same time, address land management needs. The above process will also identify data gaps which the Council will need to identify as to importance and the need for further study.

20. Glossary of Terms

Aggradation	Geologic process in which inorganic materials carried downstream are deposited in streambeds, floodplains, and other water bodies resulting in a rise in elevation in the bottom of the water body.
Alevin	Newly hatched fish, not yet emerged from gravel.
Alluvium	A general term for all deposits resulting, directly or indirectly, from the sediment transport of streams that is deposited in streambeds, floodplains, lakes, and estuaries. The increasing of land area along a shore by deposited sediment or by the recession of water.
Anadromous	A life history strategy of fishes, that includes migration between fresh- and saltwater, in which reproduction and egg deposition occurs in freshwater while rearing to the adult stage occurs in the ocean.
Basin	A topographic area of a watershed or geological land area that slopes toward a common center or depression where all surface and subsurface water drains. For the purpose of this planning document, the basin encompasses the Klamath River basin.
Down cutting	Water erosion that deepens an existing channel or forms a new channel where one did not exist previously.
Erodible	Having the ability to diminish or deteriorate through the process of weathering or wearing away of streambanks and adjacent land slopes by water, ice, wind, or other factors.
Evapotranspiration	Movement of moisture from the earth to the atmosphere as water vapor by the evaporation of surface water and the transpiration of water from plants.
Fry	Small fish, especially young, recently hatched fish.
Geomorphology	How the earth's surfaces develop; in rivers and streams, "fluvial" geomorphology refers to the processes that create the stream channel's physical features.
Granitic	Derived from granite; a common, coarse-grained, light-colored, hard igneous rock consisting chiefly of quartz, orthoclase or microcline, and mica.
Index reach	Measurement of feature of a stream or river that is used as a reference for determining or monitoring change over time.
Macroinvertebrate	An invertebrate animal (without backbone) large enough to be seen without magnification and retained by a 0.595mm (U.S. #30) screen.
Mainstem	Principal, largest, or dominating stream or channel in any given area or drainage system.
Micaceous	Derived from mica; any of a group of chemically and physically related aluminum silicate minerals, common in igneous and metamorphic rocks.
Orographic	Derived from orography; the study of the physical geography of mountains and mountain ranges.
Outmigration	The act of moving out of one region in order to reside in another.

20. GLOSSARY OF TERMS

Parr	A young salmon during its first two years of life, when it lives in fresh water.
Reach	Any specified length of stream.
Redd	Nest excavated in the substrate by fish for spawning where fertilized eggs are deposited and develop until the eggs hatch and larvae emerge from the substrate.
Refugia (refugium)	(1) Habitats that support sustainable populations of organisms that are limited to fragments of their previous historic and geographic range. (2) Habitats that sustain organisms during periods when ecological conditions are not suitable elsewhere. (3) Waters where threatened or endangered fishes are placed for safe-keeping or where a portion of the population is maintained to prevent extinction.
Revegetation	To bear a new cover of vegetation.
Rip rap	Hard materials, such as logs, rock, or boulders (often fastened together) used to protect a bank or another important feature of a stream, lake, reservoir, or other water body.
Riparian	Of, on, or relating to the banks of a natural course of water.
Salmonid	Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish.
Sediment	Fragmented material from weathered rocks and organic material that is suspended in, transported by and eventually deposited by water or air.
Serpentine	(1) Re: Serpentine channel (regular meander channel); A clear repeated meander pattern formed in a simple channel that is well-defined by cutting outside of a bend. (2) Any of a group of greenish, brownish, or spotted minerals, $Mg_3Si_2O_5(OH)_4$.
Siltation	Setting of fine suspended sediments in water where water velocity is reduced.
Smolt	A young salmon at the stage intermediate between the parr and the grilse, when it becomes covered with silvery scales and first migrates from fresh water to the sea.
Spawner	An adult fish that deposits eggs; produces or deposits (spawn).
Sub-basin	Geographic areas representing part or all of a land drainage area, a combination of drainage areas, or a distinct hydrologic feature such as the Klamath River basin. The Scott River watershed is a sub-basin of the Klamath River basin.
Substrate	(1) Mineral and organic material forming the bottom of a waterway or water body. (2) The base or substance upon which an organism is growing.
Sub-watershed	Logical stratifications or subdivisions of a watershed based on geography or a distinctive feature or use. Within the Scott River watershed a sub-watershed is defined as a collection of springs within the same geographic area.
Transpiration	Process in plants where water is released as vapor (primarily through the stomata, or pores, in leaves) into the atmosphere.

20. GLOSSARY OF TERMS

Tributary (tribs)	A stream that flows into a larger stream or other body of water. The Scott River includes 2 headwater tributaries; East Fork and South Fork, and 8 major tributaries; Sugar Creek, French Creek, Kidder/Patterson Creeks, McAdams/Moffett Creeks, Shackleford Creek, Canyon Creek, Kelsey Creek, and Mill Creek at Scott Bar.
Watershed	(1) Region or area drained by surface and groundwater flow in rivers, streams, or other surface channels. A smaller watershed can be wholly contained within a larger watershed (i.e. French Creek watershed can be referred to as a watershed when discussing it as its own region and not a part of the larger Scott River watershed).

21. LIST OF ACRONYMS

21. List of Acronyms

BLM	Bureau of Land Management
CDF	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game [aka: DFG]
CDWR	California Department of Water Resources [aka: DWR]
CESA	California Endangered Species Act [ESA = federal]
CRMP	Coordinated Resource Management Planning
CSU	California State University
DEM	Digital Elevation Model
DOI	Department of the Interior
DOQQ	Digital Orthophoto Quarter Quadrangles
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FCWAG	French Creek Watershed Advisory Group
FEMA	Federal Emergency Management Agency
FGSC	Fruit Growers Supply Company
GIS	Geographic Information System
KMP	Klamath Mountain Province
KNF	Klamath National Forest
KRBFTF	Klamath River Basin Fisheries Task Force
KRIS	Klamath River Information System
NMFS	(see NOAA)
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resource and Conservation Service
RWQCB	Regional Water Quality Control Board
SCS	Soil Conservation Service
RCD	Siskiyou Resource Conservation District
SRWC	Scott River Watershed Council
SVID	Scott Valley Irrigation District
SWRCB	State Water Resources Control Board
TBO	To Be Obtained

21. LIST OF ACRONYMS

TMDL	Total Maximum Daily Load
TPC	Timber Products Company
TWG	Technical Work Group
UCB	University California Berkeley
UCCE	University of California Cooperative Extension
UCD	University of California Davis
UCSC	University California Santa Cruz
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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