UPPER KERN BASIN FISHERY RESOURCE ENHANCEMENT MEASURES IMPLEMENTATION MEMORANDUM OF UNDERSTANDING

BETWEEN

SOUTHERN CALIFORNIA EDISON COMPANY

AND

THE CALIFORNIA DEPARTMENT OF FISH AND GAME

THE U. S. FOREST SERVICE

THE U.S. FISH AND WILDLIFE SERVICE

SEPTEMBER 27, 1995,

AMENDED AS OF NOVEMBER 9, 2005

UPPER KERN BASIN FISHERY RESOURCE
ENHANCEMENT MEASURES IMPLEMENTATION
MEMORANDUM OF UNDERSTANDING

SEPTEMBER 27, 1995
AMENDED AS OF NOVEMBER 9, 2005

This Upper Kern Basin Fishery Resource Enhancement Measures Implementation Memorandum of Understanding (MOU) for the Kern River No.3 Hydroelectric Project is entered into this 27th day of September 1995, and is amended as of November 9, 2005, by and between the Southern California Edison Company (Edison) and each of the state and federal resource agencies with an interest in the Upper Kern Basin. The resource agencies are the California Department of Fish and Game (CDFG), the U.S. Forest Service (USFS), and the U.S. Fish and Wildlife Service (USFWS). Together Edison, CDFG, USFS, and USFWS, are referred to as the "Parties".

WITNESSETH

WHEREAS, each resource agency has separately concluded that greater protection and enhancement of the Upper Kern Basin will result if Edison implements new instream flows and provides funds to enable projects to be undertaken than if Edison is required to perform fish entrainment studies and to provide fish screens. The Parties have negotiated the Upper Kern Basin Fishery Resource Enhancement Settlement Agreement (Settlement Agreement) to require that Edison implement new instream flows and provide funds in lieu of fish entrainment studies and fish screens.

WHEREAS, the Parties desire that an account (Funding Account) be established and Edison has agreed to deposit funds in the Funding Account to enable the resource agencies to implement some of the measures (Measures) contemplated by this MOU;

WHEREAS, the Parties intend that this MOU is to provide guidelines about how the Measures will be implemented;

WHEREAS, the Parties have agreed that Edison will establish an account (Interest Account) wherein interest on the funds in the Funding Account shall be deposited to be distributed to fund proposals by the individual resource agencies which meet the guidelines established in this MOU; and

NOW, THEREFORE, Edison and each resource agency agree as follows:

I. GENERAL

A. Purpose and Scope

1. Edison filed with the Federal Energy Regulatory Commission (FERC) an Application for "New License" for a Major Project-Existing Dam (License Application) for its Kern River No.3 Hydroelectric Project, FERC No. 2290 (project) on December 27, 1991. Edison has consulted with each resource agency regarding the License Application. Each resource agency expressed concern regarding "Current Project License" instream flows and fish entrainment associated with operation of the Project. The new instream flows and the funding set out in the Settlement Agreement and the Measures set out in this MOU are intended to resolve each resource agency's concern by providing for a net benefit to the fishery resources of the Upper Kern Basin. This MOU and the Settlement Agreement will be provided to the FERC as each resource agency's 4(e) or 10(j) proposal, as appropriate, for incorporation into the "New Project License."

2. The purpose of the Settlement Agreement is to establish an arrangement where Edison (i) implements new instream flows; and, (ii) provides funds to assure a net benefit to fishery resources of the Upper Kern Basin by implementing Measures subject to the criteria described in Subsection II(B). The new instream flows and the funds offset all fish losses caused by Project operation. Each resource agency has agreed that the new instream flows and the provision of funds in lieu of requiring entrainment studies and fish screens for a 30-year License term will provide a positive assurance of a net benefit to the fishery resources since they are intended to result in the restoration of diminished native stocks and will provide long term protection and enhancement for the fishery resources of the Upper Kern Basin. The purpose of this MOU is to provide a detailed framework as to how the funds are to be allocated and used.

3. The Funding Account will be utilized to benefit fishery resources of the Upper Kern Basin including programs designed to achieve recovery and/or maintenance goals such as a net gain in population size and viability of the Kern River rainbow trout. The methods to achieve these goals will be proposed by the individual resource agencies and the Parties, subject to Section II.A.1, will vote on whether the proposal should be funded. The methods may include approaches specified in the "Upper Kern Basin Fishery Management Plan" (Plan) or other approaches as may be mutually agreed to by the Parties. The Plan (Exhibit 1) was developed jointly by the California Department of Fish and Game, Sequoia National Forest, and Sequoia and Kings Canyon National Parks. In all cases, the methods shall be directed towards planned improvements that can be quantified and measured.

4. The term "fish entrainment" means the diversion of fish from their riverine habitat and the induction of the fish into Project facilities at any Project point of diversion.

5. The amount of the "new instream flows" set out in this MOU and in the Settlement Agreement are presented in Exhibit 2.

6. The term "New Project License" means the license for the Project requested to be issued by FERC in the Edison December 27, 1991 License Application.

7. The term "Current Project License" means the license for the Project issued by the Federal Power Commission (now FERC) on August 7, 1964.

8. The term "Funding Account" means the account established by the Parties into which Edison will deposit funding pursuant to the Settlement Agreement.

9. The term "Interest Account" means the account established by the Parties into which interest from the Funding Account will be deposited and from which, said interest may be expended or utilized by the Parties, as provided herein.

10. The USFS and the USFWS are not "Parties" to the following provisions of this MOU: Sections I.A.8; I.A.9; I.B.6; III.A.1; and III.A.3.

B. Effective and Termination Dates

1. This MOU shall be effective upon issuance of a final order by the FERC either approving or endorsing the Settlement Agreement and MOU or incorporating the Settlement Agreement and MOU within the "New Project License." Prior to such FERC approval, the Parties may voluntarily implement any terms of this MOU.

2. This MOU shall terminate upon the earlier of (i) the expiration of the "New Project License" to be issued by the FERC; (ii) the date the operation of the Project is terminated by Edison; (iii) the termination of the Settlement Agreement; or, (iv) as to a particular Party only, withdrawal from the MOU by that Party pursuant to Subsection I (C) (3).

3. Any Party may terminate its participation in the MOU upon 60 days written notice to all other Parties.

4. If the MOU is terminated by Edison in accordance with Subsection I(B)(2)(iv), the instream flows shall be returned to "Current Project License" conditions and the funds in the Funding Account and the Interest Account shall be returned to Edison. Edison will promptly inform the FERC Director, Office of Hydropower Licensing (OHL), of the termination of the MOU and Settlement Agreement and the returned funds.

5. Upon termination of the MOU in accordance with Subsection I(B)(2)(i), (ii), or (iii), the Parties agree to continue the use of the Funding Account and the Interest Account for the purposes described in this MOU.

6. The trustee of the Funding Account and Interest Account may be directed by the Parties to transfer those accounts to another trustee or a governmental agency for use in a manner consistent with the purposes of this MOU and the criteria listed under Section II(B)(6).

C. Modifications to the MOU

1. During the term of this MOU and upon the concurrence of all Parties, any Party may petition the FERC for approval to modify the terms of the MOU and/or the "New Project License" accordingly.

2. The Parties will continue to implement this MOU, as unmodified, pending resolution of any request to FERC for amendment of the MOU.

3. This MOU is submitted on the further condition that, in the event the FERC does not by Order or incorporation into the "New Project License" accept or endorse the MOU in its entirety, without material modifications or additions or deletions, then each Party shall have 30 days after the FERC Order issuing the "New Project License" becomes final, to provide notice to the other Parties of its desire to withdraw from the MOU or to accept the MOU as modified by FERC. A failure to provide a notice shall be deemed an acceptance of the MOU. However, nothing in this MOU shall be construed to limit the independent authorities and responsibilities of each Party under applicable federal or state law.

D. Resolution of Disputes

1. Any Party, upon at least twenty (20) days advance written notice to all other Parties, may refer a dispute concerning compliance with this MOU to the FERC Director, Office of Hydropower Licensing (OHL), for dispute resolution. All appeals shall be in accordance with the FERC Rules of Practice and Procedure or such procedure as the FERC Director, OHL, shall determine.

2. If the FERC rules do not provide a procedure for dispute resolution which can be applied to this Subsection I(D), the Parties will propose to the FERC Director, OHL, that the procedure in this Subsection I(D) be adopted. After providing the advance notice required by Subsection I(D)(1), a Party may commence the dispute resolution process by sending a letter ("Dispute Referral") via overnight mail to the FERC Director, OHL, and to all other Parties. Within 30 days of the submittal of the Dispute Referral to the FERC Director, OHL, each Party may file an initial position statement via overnight mail with the FERC Director, OHL, and all other Parties. Any final responsive statements shall be filed with the FERC Director, OHL, and served on all Parties within 50 days of the Dispute Referral submittal date. The FERC Director, OHL, shall set a date for submission of any briefs, affidavits or other written evidence, and, at the discretion of the FERC Director, OHL, a further date for hearing of oral evidence and argument. The Parties shall have the right to obtain depositions prior to any hearing and cross-examine witnesses at any hearing.

3. All decisions under the FERC Dispute Referral described in Subsection I(D)(2) shall be effective upon issuance, pending rehearing, if any. Any Party may petition the Commission for rehearing of any decision issued pursuant to Subsection I(D)(2). All requests for rehearing shall be in accordance with the FERC's Rules of Practice and Procedure.

4. To the extent that any funding decision is not in dispute, the decision shall remain in effect while disputed portions of the decision are resolved under this Subsection I(D). To the extent that any funding decision is in dispute, no Party shall be required to implement the disputed part or portion of the decision until the dispute is resolved under this Subsection I(D).

E. FERC Jurisdiction

The Parties recognize that FERC has jurisdiction over the Federal Power Act license for the Project. As this MOU will be submitted to FERC for approval and incorporation into the "New Project License", the Parties desire that FERC resolve or settle any disputes about the MOU among the Parties. The Parties intend that FERC exercise its authority to the fullest extent allowed by law, over the MOU.

II. STUDIES AND MEASURES

A. Meeting and Voting

1. Each Party shall have one (1) vote on any matter voted on by the Parties. The presence of voting participants representing all Parties shall constitute a quorum, unless all of the Parties otherwise agree in advance. Unless specifically authorized by their respective agency, the USFS and USFWS participants shall not have a vote on proposals that their respective Federal Agency may submit or implement, nor on measures that affect their particular Federal Agency, nor on determinations regarding the choice of, actions of, or directions to the trustee of the Funding Account and the Interest Account. In such situations where a Federal Agency is not voting on a particular measure, then that Federal agency will not be counted toward determination of a quorum.

2. The Parties shall meet semi-annually and/or whenever requested by any of the Parties following a minimum of thirty (30) days advance written public notice, except for meetings called to address emergency situations. Regular semi-annual meetings shall be held in April and in October, or on other dates that a majority of the Parties find appropriate. All meetings shall be open to the public and minutes shall be taken. One of the resource agencies appointed by a majority vote of the Parties shall arrange for (i) public notice of the next meeting in at least two local newspapers, and (ii) the taking of meeting minutes.

3. All decisions of the Parties regarding the use of monies from the Interest Account shall be by a unanimous vote of a quorum. All non-funding decisions shall be by a simple majority vote of a quorum. Decisions of the Parties may be referred by any minority Party for dispute resolution pursuant to Subsection I(D). Any Party may, at any time, elect by written notice not to participate in the voting process. A Party electing to withdraw from participation thereby waives its right to vote upon and appeal decisions made during its absence and shall not be counted as part of a quorum. Only original Parties to this MOU have voting rights. However, the Parties recognize that the National Park Service (NPS) is a stake-holder in the Upper Kern Basin and NPS participation will be encouraged by the Parties.

B. Role of the Parties

1. The Parties shall (i) decide on the use of Interest Account funds for studies and enhancement measures; and (ii) treat the meetings discussed in Subsection (II) (A) as the primary means of consultation and coordination of the conduct of studies and implementation of enhancement Measures discussed below.

2. Each resource agency shall review all proposed studies and Measures. At a meeting of the Parties scheduled pursuant to Subsection II (A) (2), the Parties shall discuss the proposals and vote on studies and Measures for Interest Account Funding pursuant to Subsection II (A) (3). Selected studies and Measures must be determined by the Parties to have results expected to be quantifiable or measurable in a manner that would allow an evaluation of the benefit of the study and Measure. The Parties shall determine the net benefit of all studies and Measures to the fishery resource of the Upper Kern Basin.

3. The Parties may only approve use of Interest Account funds for studies and Measures that are determined by the Parties to directly benefit fishery resources of the portion of the Upper Kern Basin which extends from the headwaters in the Sequoia National Park to the point at which the North Fork Kern River meets Lake Isabella, at an elevation 2,606 feet above mean sea level. Water quality may be included in the studies and Measures.

4. Any Party may arrange for independent peer review of any Measure or study proposal submitted to the Parties as discussed in Subsection II(C) and of any study report prepared for Party review as discussed in Subsection II (D). The cost of any independent peer review shall not be paid from the Interest Account unless a quorum unanimously approves such a cost.

5. In addition to the duties described above, the duties of each Party shall include: (i) review study reports, and progress reports and assess ongoing studies and enhancement Measures relative to the attainment of their stated performance goals; and, (ii) develop funding recommendations for decisions on current year funding that will be made at the next designated meeting. These funding recommendations shall be based on a determination of maximizing fishery benefits with available funds. Each Party will evaluate ongoing activities utilizing information contained in the activity progress reports as discussed in Subsection II(D). One of the resource agencies appointed by a majority vote of the Parties shall prepare a report 30 days after the regular semi-annual meetings documenting their findings on the items discussed above. The report shall be used to prepare an Annual Report, including information described in Subsection II (D)(4).

6. Studies and Measures to be funded from the Interest Account should meet one or more of the following criteria:

(a) Improve the status of the Kern River rainbow trout to avoid any need to list it as a sensitive, endangered or threatened species at either the state or federal level;

(b) Contribute to meeting one or more of the objectives of the "Upper Kern Basin Fishery Management Plan" (Plan). Priority for accomplishing these objectives will be determined by the Parties. The objectives include, but are not limited to:

- Hatchery development, maintenance, operations and staffing specifically for, the production of Kern River rainbow trout;
- Kern River rainbow trout genetic stock determinations and development;
- Habitat improvement for the Kern River rainbow trout;
- Stocking associated with the Kern River rainbow trout;
- Monitoring of Kern River rainbow trout and other native fish species populations; and,
- Monitoring of fish ladder closure impacts on squawfish and trout populations;

(c) Contribute to restoration or improvement of trout habitat in the Upper Kern Basin;

(d) Contribute to the improvement of the quality of the Upper Kern Basin water including the attainment and maintenance of water quality regulatory standards such as fecal coliform levels, and;

(e) Other activities mutually approved by the Parties.

7. All studies and Measures to be funded from the Interest Account must: (i) be consistent with the legal rights, obligations and authority of the Parties; and, (ii) be consistent with the FERC "New Project License" requirements.

8. No Party can proceed with a Measure on USFS lands without USFS approval.

9. No Party can proceed with a Measure on NPS lands without NPS approval.

10. Resource agencies are responsible for compliance with all applicable Federal and/or state regulations such as NEPA and CEQA, that may be associated with a proposed Measure. The cost of environmental assessment compliance associated with a proposed study or Measure may be paid from the Interest Account. The Federal resource agencies will decide which of them will be responsible for federal compliance. CDFG will be responsible for state compliance.

C. **Proposals**

1. Proposals to obtain Interest Account funding may be submitted to each Party by one of the resource agencies participating in the Settlement Agreement or another agency or entity. Proposals for funding must be presented to the Parties at least 60 days prior to a regular meeting.

2. All study proposals for funding must be prepared in writing and must contain: (i) a study approach including a work scope and work tasks; (ii) clearly defined goals; (iii) expected results; (iv) criteria and a methodology for measuring the success of each study goal; (v) a discussion of the benefits of the proposed study, including how the study meets the criteria in Subsection II(B)(6); (vi) a study schedule identifying work task time frames; and (vii) a budget for each work task including labor rates, estimated labor hours, expenses, overhead and administrative costs, and a total estimated not-to-exceed cost.

3. All proposed Measures must be prepared in writing and must contain: (i) a comprehensive description of the proposed Measure including design details; (ii) clearly defined goals and, if applicable, clearly defined environmental assessment time tables; (iii) expected results; (iv) criteria and methodology for measuring the success of each goal; (v) a discussion of the benefits of the proposed Measure including how the Measure meets the criteria in Subsection II(B)(6); (vi) a timeline showing milestone events and measurable, identifiable goals associated with each milestone; and (vii) a budget including material costs, labor rates, labor hours, expenses, overhead and administrative costs, and a total estimated not-to-exceed cost.

D. **Studies and Reports**

1. The Parties shall utilize applicable State and/or Federal contracting procedures in issuing all contracts.

2. Final reports prepared pursuant to this MOU shall be available to all Parties, the FERC, and the public as soon as reasonably possible. Draft reports will be circulated through Party representatives for review and comment. All comments will be addressed in the final report and attached thereto. Final reports will be made available for public review at the office of each Party that is located in or closest to the Upper Kern Basin.

3. All studies shall be conducted following generally accepted techniques and methodologies in use for similar studies.

4. Progress reports on each activity must be prepared by the entity sponsoring the activity for the Parties review at least 30 days prior to each semi-annual regular meeting.

5. One of the resource agencies appointed by a majority vote of the Parties shall prepare a report (Annual Report) by the regular October meeting. The Annual Report shall, at a minimum, include (i) a summary statement of activities that occurred within the prior year; (ii) copies of ongoing study progress reports; (iii) a list of accomplishments in the prior year; (iv) a financial statement showing actual and estimated funding for the prior year activities and an

estimated budget for the current year; (v) a listing of ongoing and new studies and other activities selected for receipt of available funding for the current year; (vi) an evaluation of the performance of each activity; and (vii) an evaluation of the overall progress of all prior, ongoing and current activities in meeting the objectives of the studies.

6. Requirements for reports may be changed by a unanimous vote of the Parties without seeking FERC approval for such changes.

III. FUNDING

A. Establishment and Operation of Funding Account and Interest Account

1. Within 30 days of the FERC Order issuing the "New Project License" becoming final, the Parties shall establish an interest bearing account (Funding Account). Within 30 days of establishing the Funding Account, the Parties shall establish a separate interest bearing account (Interest Account). Funding Account interest payments shall accrue monthly to the Interest Account. By unanimous vote, the Parties shall appoint a Trustee for the Funding Account and Interest Account. The same Trustee may be appointed for both accounts. The Parties may allow the Trustee to combine the Funding Account and Interest Account into one account as long as the principal and net income on the principal are appropriately tracked.

2. Edison shall deposit $2.5 million in the Funding Account within 45 days of the FERC Order issuing the "New Project License" becoming final. If Edison withdraws from this MOU under Subsection I(C)(3), then the obligation to deposit funds into the Funding Account is null and void.

3. The Funding and Interest Accounts shall operate until the termination of this MOU to fund the activities discussed in Subsection II (B), or until such later time as the Parties may decide by written agreement.

B. Payments and Accounts

1. The money in the Funding Account shall be invested by the Funding Account Trustee in accordance with sound business practice. Interest and other earnings of the Funding Account shall be deposited in the Interest Account and become funds available for disbursement in accordance with this MOU. The Funding Account Trustee shall cause the first transfer of accrued interest from the Funding Account to the Interest Account within 90 days of the FERC Order issuing the "New Project License" becoming final. Thereafter, funds will transfer from the Funding Account to the Interest Account at the end of every month. Funds deposited in the Interest Account shall not be considered part of the Funding Account. Reasonable administrative costs of any Trustee and general operating costs such as the cost of public notices, meeting minutes, and contracted administrative costs may be funded from the Interest Account with the approval of the Parties, but neither the Funding Account nor the Interest Account may be used to reimburse the Parties for normal participation in Party activities.

2. The Interest Account Trustee shall make payments from the Interest Account as determined by the Parties to fund studies and Measures authorized by the MOU.

3. Any Trustee shall account for the expenditures from the Funding Account and Interest Account using normal accounting procedures. Any Trustee shall prepare an accounting report for inclusion in the Annual Report as discussed in Subsection II(D)(4).

4. Upon termination, the funds will be dispersed according to Subsection I(B).

C. The Parties

1. Any of the resource agencies or any other entity may provide funding and/or services needed to achieve the Plan objectives, to the extent they cannot be accomplished with the Interest Account.

2. At the end of the FERC "New Project License" term, any of the resource agencies may ask Edison to renew the Funding Account with a similar Interest Account arrangement. Although no obligation to agree exists, Edison shall consider such a request.

IV. OBLIGATIONS

A. Legal Compliance

This MOU does not eliminate any separate legal requirements the Parties may have pursuant to federal, state or local law.

B. The Parties

1. Edison agrees to monitor fish populations in five (5) locations once every five (5) years for the term of the "New Project License." The monitoring shall be 100 meter stations and will be performed using techniques similar to those utilized in studies conducted for Edison's Exhibit E that was prepared for the "New License Application." The final monitoring techniques shall be subject to approval by each resource agency. Each resource agency agrees that all additional monitoring will be funded by Interest Account monies. All techniques including timing, location and methodology for additional monitoring will be determined by the resource agencies.

2. Notwithstanding any other provision of this MOU to the contrary, any Party may participate in any judicial, legislative or administrative proceeding dealing with fishery resource issues, provided that prior to both the termination of this MOU and the termination of the "New Project License", no Party shall advocate or support the imposition of in stream flows and/or fish entrainment measures on Edison that are not in accord with the "New Project License" articles or are different from or in addition to those required by this MOU.

C. Third Party

There are no third-party beneficiaries of this MOU. Nothing contained in this MOU is intended to confer any right or interest on anyone other than the Parties, their respective successors, assigns and legal representatives.

V. REGULATORY APPROVAL

A. Authority

The undersigned representative of each Party certifies that he or she is fully authorized by the Party whom he or she represents to enter into the terms and conditions of this MOU and to legally bind such Party.

B. Action for Noncompliance

Any Party may seek relief arising solely from noncompliance with this MOU by any other Party, provided all requests for specific performance of any provision of this MOU or any other form of relief shall first be referred to dispute resolution pursuant to Subsection I (D).

C. Integrated Agreement

All previous communications between the Parties, either verbal or written, with reference to the subject matter of this MOU and the Settlement Agreement are superseded by the terms and provisions of this MOU and the Settlement Agreement, and, once in effect, this MOU and the Settlement Agreement constitute the entire agreement between the Parties.

D. Choice of Law

This MOU shall be interpreted under the laws of the State of California and applicable federal law.

E. Notices

The Parties shall notify FERC's San Francisco Regional Office (Office) of all official meetings of the Parties and shall also file a copy of the Annual Report prepared under Subsection II (D)(4) with such Office.

Any notice or communication required or permitted under this MOU from one Party to another shall be deemed to have been delivered to the other Parties if (i) in writing and (ii) personally served; or, (iii) sent by registered or certified mail, postage prepaid to the person and address on the following page.

Southern California Edison Company
Manager, Hydro Generation
P.O. Box 800
Rosemead, CA 91770

California Department of Fish and Game, Region 4
Regional Manager
1234 East Shaw Avenue
Fresno, CA 93710

U.S. Forest Service, Sequoia National Forest
Forest Supervisor
900 West Grand Avenue
Porterville, CA 93257

U.S. Fish and Wildlife Service
Field Supervisor
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, CA 95825

F. Assignment

This MOU shall inure to the benefit of, and shall be binding upon the representative successors and assigns of the Parties to this MOU. This MOU may not be transferred or assigned to any other person or agency without approval of all Parties. This MOU is binding on the Parties, and on their successors and assigns.

G. Execution in Counterparts

This MOU may be executed in counterparts. A copy with all original executed signature pages affixed shall constitute the original MOU, and shall be retained by Edison. Edison shall distribute true copies of the MOU with the executed signature pages to all Parties to the MOU.

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IN WITNESS WHEREOF, the Parties have caused this Upper Kern Basin Fishery Resource Enhancement Measures Implementation Memorandum Of Understanding to be executed as of the day and year first above written.

SOUTHERN CALIFORNIA EDISON COMPANY

By: _____

Title: _____

Date: 11/10, 2005

APPROVED
STEPHEN E. PICKETT
Sr. Vice President and
General Counsel
By _____
Attorney
11/10, 2005

CALIFORNIA DEPARTMENT OF FISH AND GAME, in its own capacity and as delegate for the State of California

Date: _____, 2005

By: _____

Title: _____

UNITED STATES FOREST SERVICE, in its own capacity and as delegate for the United States Department of Agriculture

Date: _____, 2005

By: _____

Title: _____

UNITED STATES FISH AND WILDLIFE SERVICE, in its own capacity and as a delegate for the United States Department of Interior

Date: _____, 2005

By: _____

Title: _____

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SOUTHERN CALIFORNIA EDISON COMPANY

By: _____

Date: _____, 2005

Title: _____

CALIFORNIA DEPARTMENT OF FISH AND GAME, in its own capacity and as delegate for the State of California

By: W. E. Loudermilk

Date: 11/17, 2005

Title: Regional Manager

UNITED STATES FOREST SERVICE, in its own capacity and as delegate for the United States Department of Agriculture

By: _____

Date: _____, 2005

Title: _____

UNITED STATES FISH AND WILDLIFE SERVICE, in its own capacity and as a delegate for the United States Department of Interior

By: _____

Date: _____, 2005

Title: _____

U.S. Forest Service, Sequoia National Forest
Forest Supervisor
900 West Grand Avenue
Porterville. CA 93257

U.S. Fish and Wildlife Service
Field Supervisor
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, CA 95825

F. Assignment

This MOU shall inure to the benefit of, and shall be binding upon the representative successors and assigns of the Parties to this MOU. This MOU may not be transferred or assigned to any other person or agency without approval of all Parties. This MOU is binding on the Parties, and on their successors and assigns.

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SOUTHERN CALIFORNIA EDISON COMPANY

By: _____

Date: _____, 2006

Title: _____

CALIFORNIA DEPARTMENT OF FISH AND GAME, in its own capacity and as delegate for the State of California

By: _____

Date: _____, 2006

Title: _____

UNITED STATES FOREST SERVICE, in its own capacity and as delegate for the United States Department of Agriculture

By: Arthur L Gaffney

Date: January 20, 2006

Title: Forest Supervisor

UNITED STATES FISH AND WILDLIFE SERVICE, in its own capacity and as a delegate for the United States Department of Interior

By: _____

Date: _____, 2006

Title: _____

U.S. Forest Service, Sequoia National Forest
Forest Supervisor
900 West Grand Avenue
Porterville, CA 93257

U.S. Fish and Wildlife Service
Field Supervisor
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, CA 95825

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SOUTHERN CALIFORNIA EDISON COMPANY

By: _____

Date: _____, 2005

Title: _____

CALIFORNIA DEPARTMENT OF FISH AND GAME, in its own capacity and as delegate for the State of California

By: _____

Date: _____, 2005

Title: _____

UNITED STATES FOREST SERVICE, in its own capacity and as delegate for the United States Department of Agriculture

By: _____

Date: _____, 2005

Title: _____

UNITED STATES FISH AND WILDLIFE SERVICE, in its own capacity and as a delegate for the United States Department of Interior

By: Steve Thompson

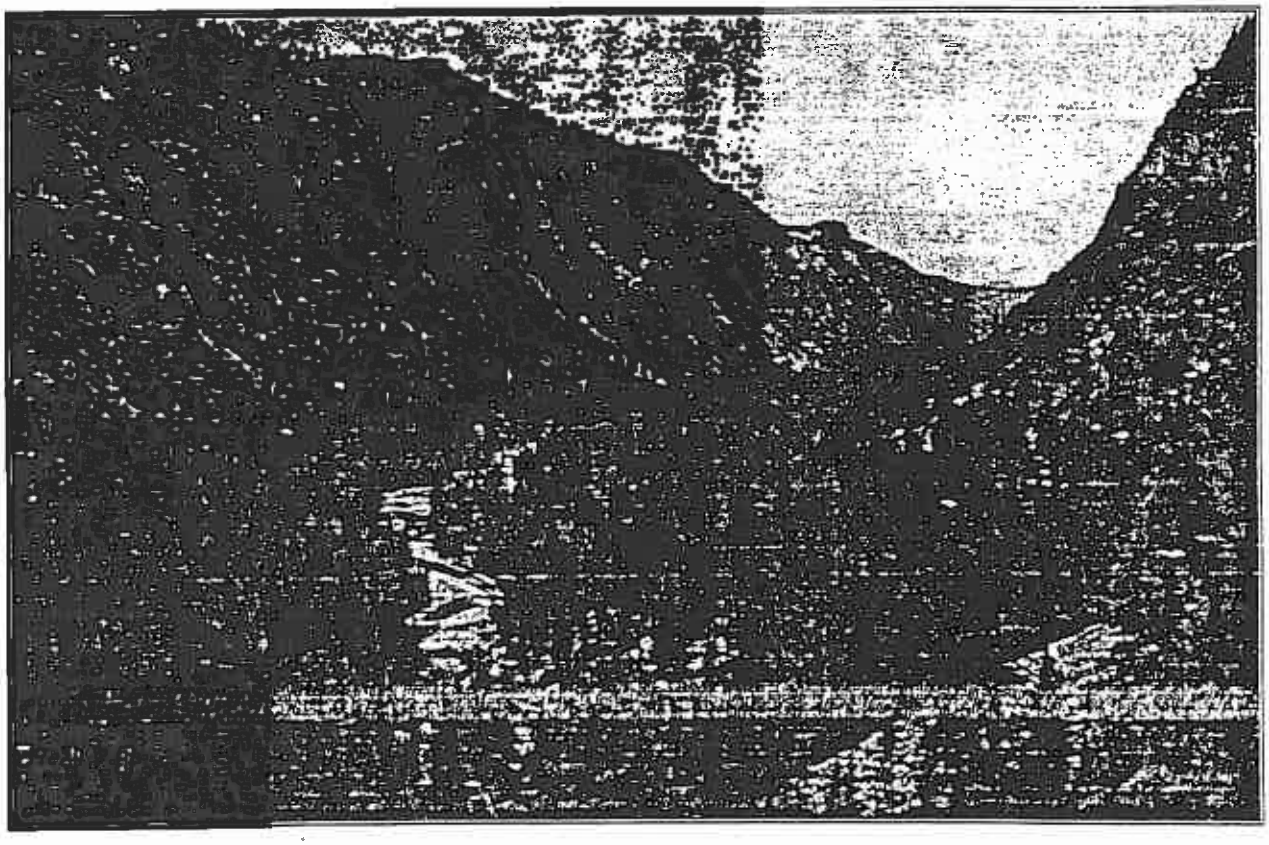
Date: December 9, 2005

Title: CNO MANAGER

EXHIBIT 1

UPPER KERN BASIN
FISHERY MANAGEMENT PLAN

UPPER KERN BASIN FISHERY MANAGEMENT PLAN



Cover Photo - Kern River in Sequoia National Park looking south from Rattlesnake Creek. Photo by Dave Lentz.

UPPER KERN BASIN FISHERY MANAGEMENT PLAN

A Cooperative Program of

California Department of Fish and Game

Sequoia National Forest

Sequoia National Park

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April 1995

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UPPER KERN BASIN
FISHERY MANAGEMENT PLAN

approved by:

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MANAGEMENT PLAN OVERVIEW

This overview briefly describes what you will find in this document. It will give you a general understanding of the management goals, the organization of the document and the initial management actions proposed for the four management segments of the Kern River drainage upstream from Isabella Reservoir.

GOALS

Based on public comment, current laws and policies, and the interpretation of the fisheries data, the following fishery management goals were developed for the upper Kern basin.

- **Protect and enhance native fish populations and their habitats.**
- Restore, **protect, and enhance the native Kern River rainbow trout populations so that threatened or endangered listing does not become necessary.**
- **Provide for recreational fishing.**

DOCUMENT ORGANIZATION

This Management Plan is divided into five chapters and two appendices.

CHAPTER 1 - INTRODUCTION - This section describes the background, purpose, and need for developing this Plan, its development process and how it will be initiated and implemented.

CHAPTER 2 - DESCRIPTION OF THE RESOURCE AREA - This section provides a brief description of the environment of the upper Kern basin. It discusses the general physical features of the area and its developments.

CHAPTER 3 - FISHERY RESOURCES - A brief history of the upper Kern basin fisheries is provided. It includes a general discussion of both native and introduced species.

CHAPTER 4 - FISHERIES MANAGEMENT - This section is the heart of the Management Plan. For each basin segment there is a review of past fisheries management, a list of goals, management objectives for these goals, a detailed description of the short term actions to achieve the goals and the necessary monitoring to evaluate their effectiveness.

CHAPTER 5 - ENVIRONMENTAL CONCERNS - This section describes issues which could directly or indirectly affect fishery management in the upper Kern basin. It is not meant to be a detailed review or discussion of these issues. Such a discussion is not within the scope of this document. The purpose of this section is to point out these concerns so that they may be addressed in other documents or evaluated during the implementation of this Plan.

Appendix A - FISHERY INFORMATION - Much of the fishery information used in the development of this plan is summarized in this appendix.

Appendix B - MANAGEMENT OF NON-SALMONID SPECIES - This appendix discusses proposed management of non-salmonid species. While some of these species are native and must be protected, it is believed that the impoundment of Isabella Reservoir, along with other influences, has resulted in increases or decreases in some of these populations.

ACTION PLAN SUMMARY

The following is a summary of the actions proposed to realize the goals and objectives in each of the four segments of the upper Kern basin. Goals, objectives and monitoring for each segment is detailed in the fishery management section of this document.

SEGMENT 1: ISABELLA RESERVOIR TO JOHNSONDALE BRIDGE

This segment includes the Kern River and all tributary streams between these two points. Management of Isabella Reservoir and the South Fork Kern River are covered in separate management plans.

- Develop a Kern River rainbow trout broodstock at Kern River Planting Base near Kernville and San Joaquin Hatchery near Friant.
- Change stocking locations, number, and timing of trout plants to improve returns of catchable-sized trout to the angler.
- Evaluate the effectiveness of the Kern River rainbow trout stocking program.
- Recommend to Southern California Edison and the Federal Energy Regulatory Commission that the fish ladder on Fairview Dam be temporarily closed.
- Manage the squawfish population to reduce the abundance of large predatory fish and restore fish communities to a more natural balanced population.
- Fund a graduate student to study the ecological relationships of native fishes.
- Construct interpretive centers at the Johnsondale Bridge parking lot and Kern River Planting Base.
- Improve water quality for optimal trout production.
- Collect trout from tributary streams and determine genetic characteristics. Manage these streams for Kern River rainbow trout.

- No angling regulation changes are proposed.

SEGMENT 2: SPECIAL MANAGEMENT SECTION

This is the four mile long reach of the Kern River immediately upstream of Johnsondale Bridge under catch-and-release management and all tributary streams entering the Kern River in this reach.

- Conduct genetic analysis of trout in the Kern River and tributary streams to detect threats to Kern River rainbow trout.
- Maintain and enhance, where possible, the habitat (including water quality) required for optimum wild trout population.
- Protect the natural character of the streamside environment.
- Consider the 4-mile long Special Management Section of the Kern River for designation by the State Fish and Game Commission as a Wild Trout stream.
- Encourage a self sustaining Kern River rainbow trout wild trout fishery in the Special Management Section.
- Manage tributary streams for Kern River rainbow trout and evaluate future Kern River rainbow trout planting program.
- Regulate angling in the Kern River to produce an exceptional trout fishery.
- Evaluate current regulations to ensure that quality angling can be maintained.

SEGMENT 3: SPECIAL MANAGEMENT SECTION TO SEQUOIA NATIONAL PARK BOUNDARY

This segment of the basin extends from the upper boundary of the Special Management Section (Forest Service trail 33E30) upstream to the southern boundary of Sequoia National Park. It includes all tributary streams entering the Kern River in that reach and all lakes within those tributary drainages. Management of the Little Kern River and Golden Trout Creek are covered in separate management plans.

- Evaluate current regulations to ensure that quality angling can be maintained.
- Identify and mitigate threats to native fish and their habitat.
- Evaluate future Kern River rainbow trout catchable trout planting program in tributary streams in this Segment.

- Conduct genetic analysis of trout in the Kern River and tributary streams to detect threats to Kern River rainbow trout.

- Maintain and enhance, where possible, habitats (including water quality) required for optimum wild trout populations.

- Protect the natural character of the stream-side environment.

- Regulate angling to produce an exceptional trout fishery.

SEGMENT 4: SEQUOIA NATIONAL PARK

This segment includes the Kern River and all its tributary streams and lakes within the Park boundaries.

- Periodically conduct fish population surveys near Junction Meadow, Upper Funston Meadow, and Lower Funston Meadow.

- Human influences will be determined from historic records, from a systematic survey of the drainage, and from a genetic analysis of fish that may be native to the drainage.

- Conduct research on the ecological effect of beaver on the relative abundance of Sacramento sucker and Kern River rainbow trout.

- Conduct research on historic mechanisms that have prevented interbreeding within the historic range of Kern River rainbow trout and determine how current demographics may influence or change those historic mechanisms for reproductive isolation.

- Recreational fishing will be permitted in accordance with state and federal laws.

- Determine the distribution and relative abundance of native and nonnative fish species in tributary streams using results of genetic studies, historic records, and location of natural fish barriers. Evaluate the potential threats to Kern River rainbow trout in the Kern River.

- Remove fish populations which threaten the existence of native Kern River rainbow trout and replace them with native Kern River rainbow trout transplanted from adjacent populations where such action is consistent with National Park Service policy.

- Retain populations of nonnative trout which do not threaten native trout, other aquatic resources or other native wildlife within the park.

- Remove nonnative fish populations that threaten native fish and other wildlife.

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CHAPTER 1 - INTRODUCTION

BACKGROUND INFORMATION

The development of this fishery management plan is a cooperative program between Sequoia National Park, Sequoia National Forest, the California Department of Fish and Game and the public. The purpose of this plan is to provide direction for management of the fish resources of the upper Kern basin. This plan does not cover the cooperating agencies' responsibilities for compliance with the National Environmental Policy Act or the California Environmental Quality Act. Implementation of any significant actions proposed under this plan will require compliance with these and all other laws.

The upper Kern basin is defined as the Kern River watershed in Kern and Tulare counties from Isabella Reservoir upstream to its headwaters in Sequoia National Park. For the purposes of this plan the upper Kern basin is divided into four segments based on differences in proposed management (Figure 1). **Segment 1** extends from Isabella Reservoir upstream to Johnsondale Bridge. **Segment 2** includes the four mile long Special Management Section. **Segment 3** extends from the upstream boundary of the Special Management Section to the Sequoia National Park boundary. **Segment 4** includes all of the Kern River watershed within Sequoia National Park (Figure 4).

The upper Kern basin is located in the southern portion of the Sierra Nevada Range. The fish resources within the drainage are unique because they include the entire endemic range of the golden trout complex of fishes. The golden trout complex is made up of three unique fishes that are classified as separate sub-species of rainbow trout (*Oncorhynchus mykiss*). These three sub-species are the Little Kern golden trout (*O. m. whitei*), the Volcano Creek golden trout (*O. m. aguabonita*) and the Kern River rainbow trout (*O. m. gilberti*). The golden trout is officially designated the State Fish of California and has been transplanted to other parts of western North America. The Kern River drainage is the only place in the world where golden trout are native. Thus the protection, restoration, and enhancement of these native fish resources are important.

Other fish species native to the upper Kern basin include the Sacramento sucker (*Catostomus occidentalis*), hardhead (*Mylopharodon conocephalus*) and Sacramento squawfish (*Ptychocheilus grandis*) (Moyle, et al., 1989). The protection of all native aquatic species within the upper Kern basin is a guiding principle for this fishery management plan.

Several factors threaten the survival of each of the golden trout sub-species. The introduction of non-native trout, which interbreed and compete with native trout, is the factor that most threatens the continued existence of these fishes. In addition, portions of the habitat have been damaged and many trout populations have been depleted by land management practices and heavy recreational use. Little Kern and Volcano Creek

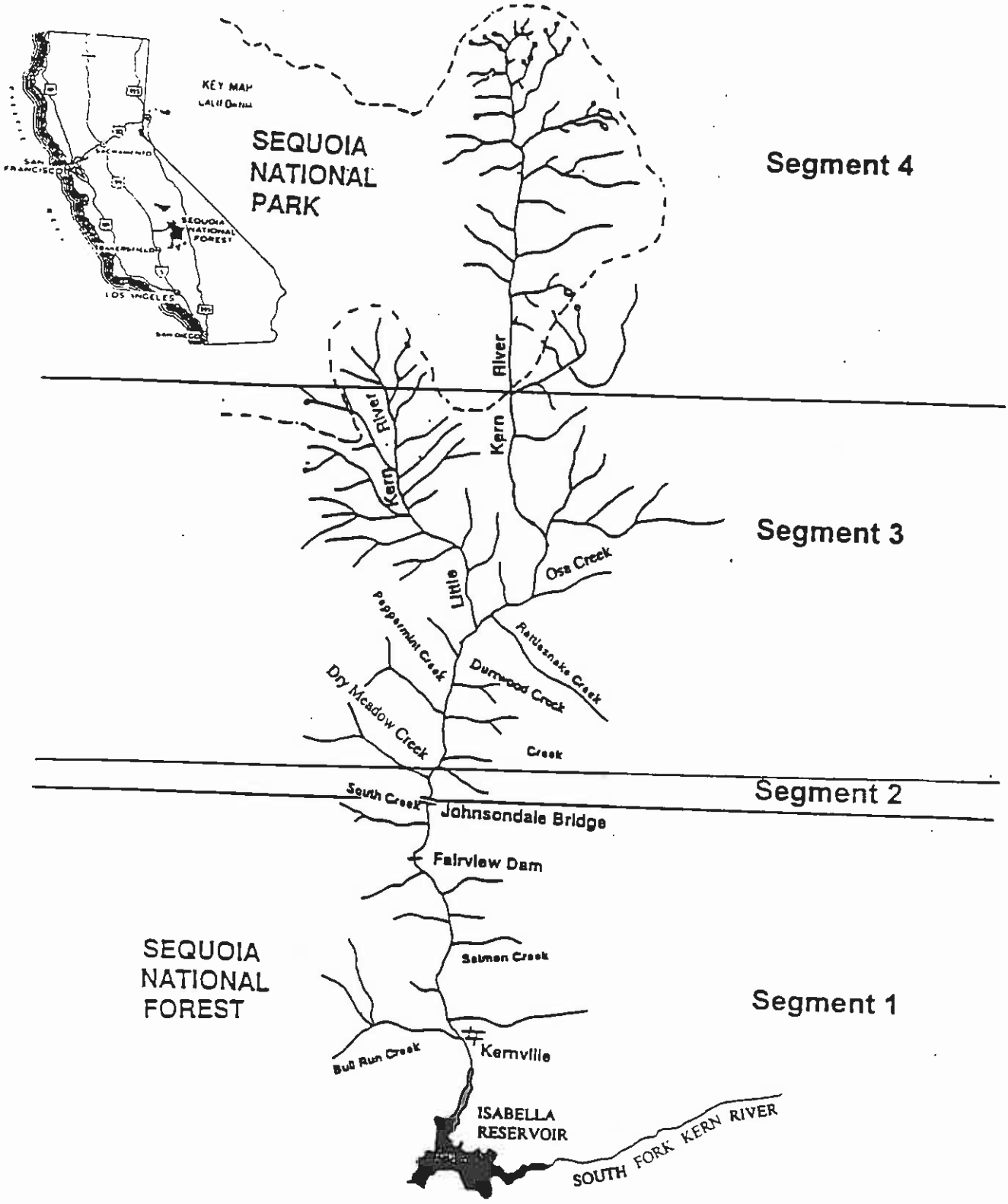

Figure 1 - Map of the Upper Kern Basin showing location of management segments

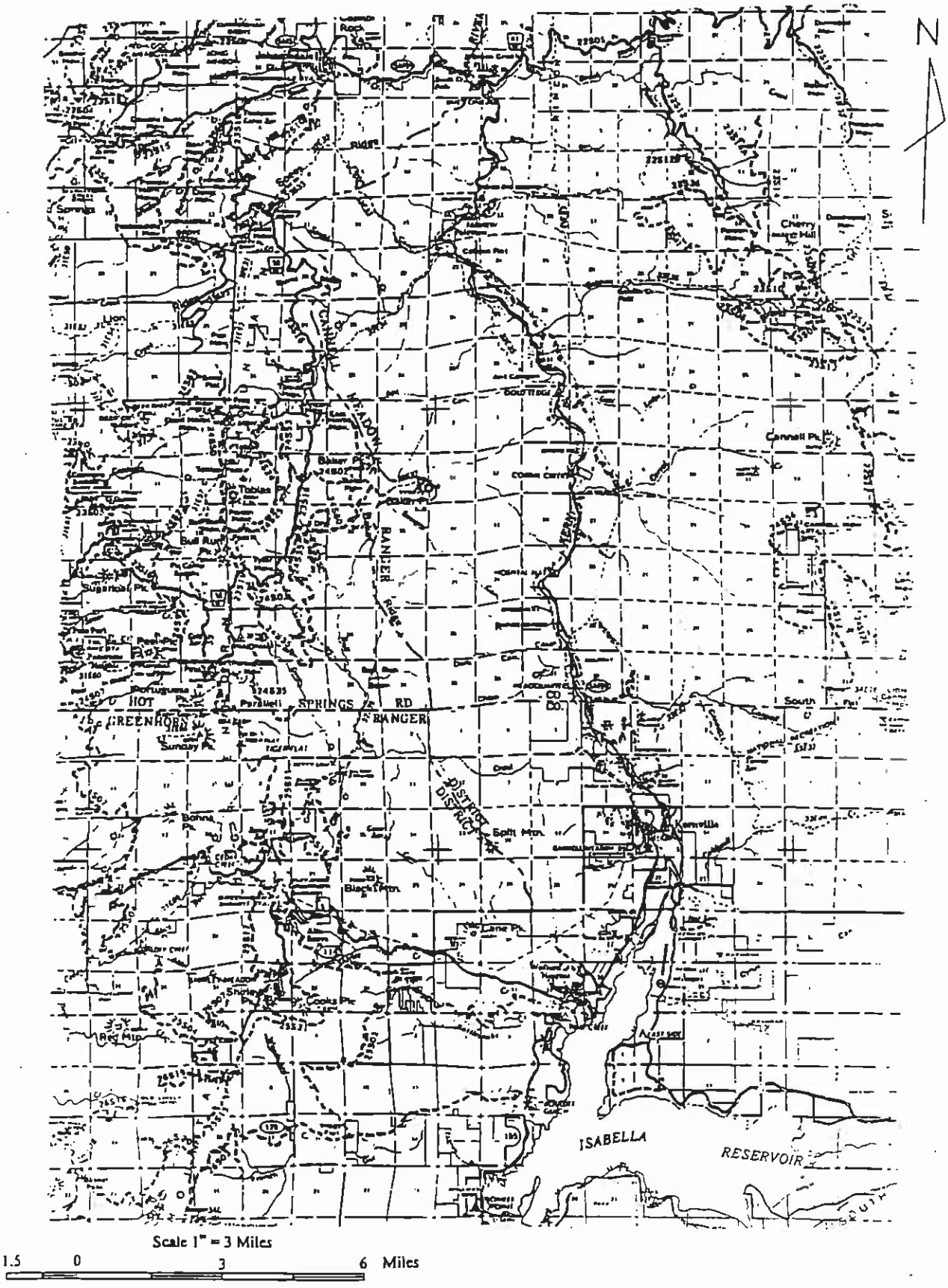

Figure 2 - Upper Kern Basin Management Segment 1

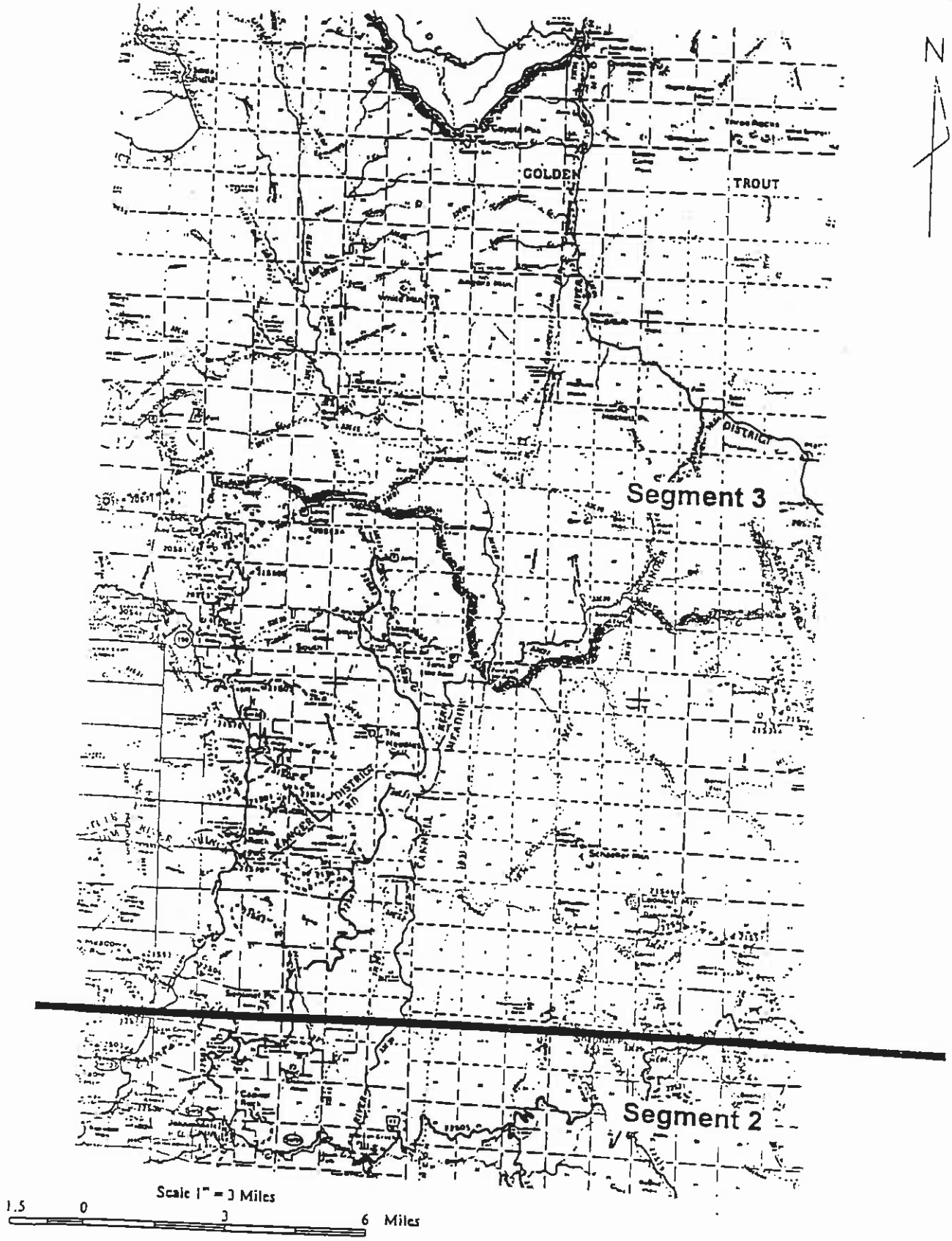

Figure 3 - Upper Kern Basin Showing Management Segments 2 and 3

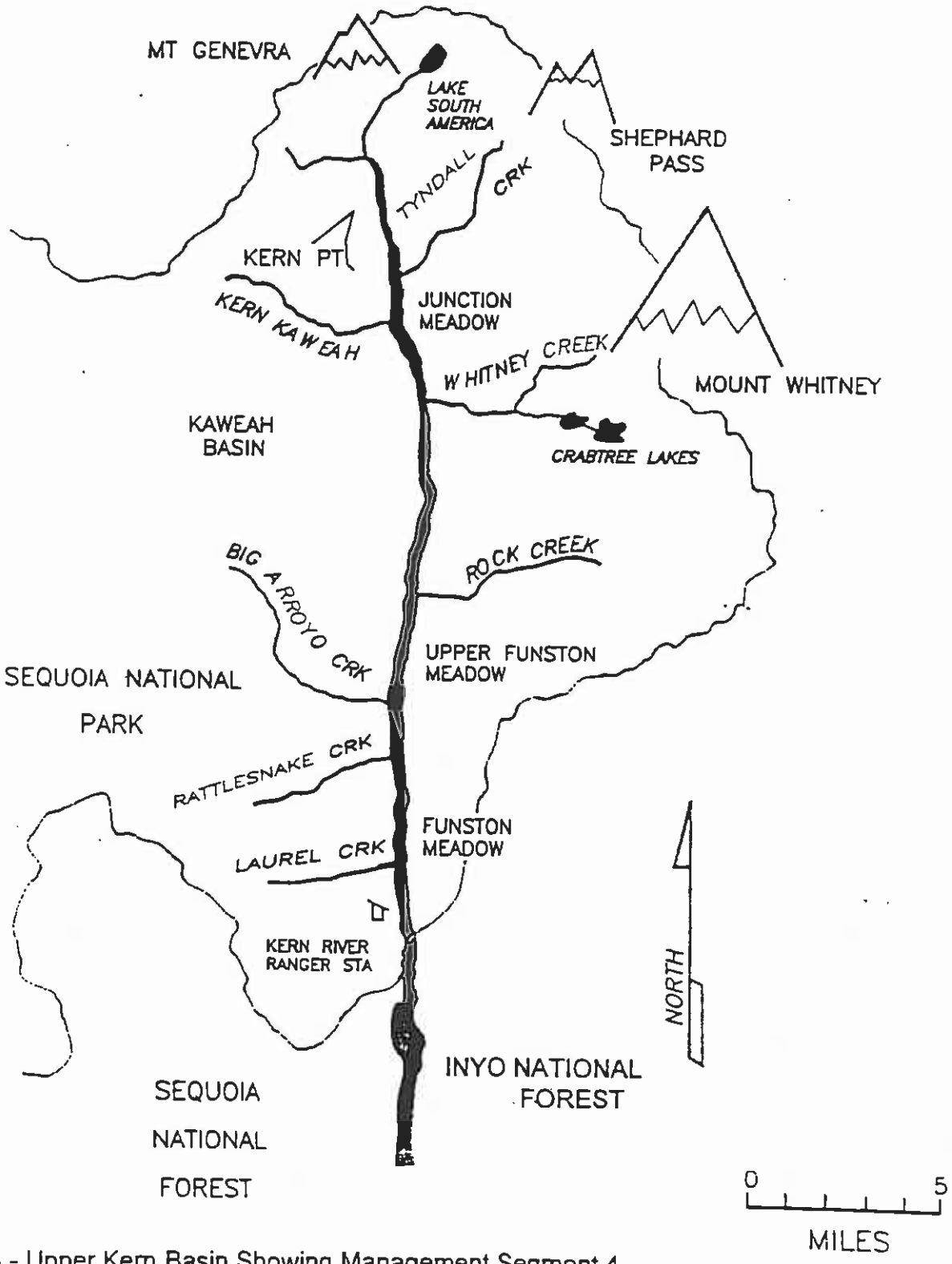

Figure 4 - Upper Kern Basin Showing Management Segment 4

golden trout recovery efforts are documented in other fishery management plans (Christenson, 1984; Schneegas, et al., 1965) and will only be mentioned briefly in this document. This plan will address the recovery of the Kern River rainbow trout. It will bring together current information and propose short- term and long-range management actions necessary for the protection of the aquatic resources of the upper Kern basin.

PUBLIC INVOLVEMENT

Since fishery management proposals in this Plan have the potential of affecting so many users, it was decided that the public should be involved with its development. Various state and federal contact lists were used to develop an Upper Kern Fishery Management Plan contact list. Over one thousand scoping letters were mailed on March 3, 1993 to individuals and organizations to solicit issues and concerns to be addressed in the Management Plan. In late March 1993, a news release was made to the local media to announce two scheduled public meetings. The first meeting was held in Bakersfield on April 3, 1993. The second public meeting was held in Kernville on April 7, 1993. At these meetings background information was presented and the purposes for the Plan were explained. Comments and questions from the public were received. Written comments were solicited as well. The contact list was then updated and includes all those in attendance at the two public meetings, those who submitted written comments and those who responded to the initial scoping document indicating a desire to remain on the mailing list.

Based on public comments and legal mandates of the managing agencies, a Draft Upper Kern Basin Fishery Management Plan was prepared and mailed on July 22, 1993 to over 200 individuals and organizations for review and comment. Comments were grouped by category and individually addressed in Appendix B of the Draft Plan. This information is not contained in this final plan. A meeting was held on September 18, 1993 in Kernville to discuss the Draft Plan and receive comments. Written comments were also solicited. An attempt was made to either incorporate in the final Plan or otherwise respond to all comments that were received. In addition, several presentations were given to resource user groups, including fishing clubs, commercial packstock guides and others. It was felt that the effort to solicit input and the public response received was comprehensive enough to adequately guide the preparation of the Plan.

A public meeting will be held annually in Kernville around the first of the year to review the previous year's activities in the implementation of the Upper Kern Basin Fishery Management Plan and to discuss proposed activities scheduled for the following field season.

FIVE YEAR IMPLEMENTATION SCHEDULE

The five year Implementation Schedule (Table 1) provides a tabular summary of actions expected to be taken, the year(s) in which particular activities are scheduled to occur and who will be responsible for the costs. At the end of the five year period (1999), the

Plan will be reviewed and revised as needed. At that time, the public will again be involved. Evaluation of the effectiveness of this Plan will be discussed and changes in direction will be considered. Public input will be solicited should any significant change in the implementation of this Plan be needed during the five year period.

Additional funding will be required to implement this Plan. These funds are not currently available. The California Department of Fish and Game will begin efforts to fund a project position and operating budget for implementing this Plan. Sequoia National Forest and Sequoia National Park will also seek funding to accomplish the goals and objectives of this plan. If sufficient funding is not secured or other circumstances prevent full implementation, the five year schedule will have to be modified.

Efforts will also be made to seek funding from sources outside the cooperating governmental agencies. Sequoia National Forest has already been successful in securing funding from the "Bring Back The Natives" program of the Fish and Wildlife Foundation for projects in the upper Kern basin. This money was used in 1993 to collect trout from 48 sample sites in the Kern River drainage and to fund genetic analysis of these samples. These funds were used in 1994 to begin work on the interpretive center at the Johnsondale Bridge Parking Lot. In addition, the Forest has received funding for habitat projects from the California Wildlife Conservation Board. The cooperating agencies and interested private groups and individuals should seek funding from all available sources. This funding, in addition to the agencies' budgets, will be critical to the success of the plan.

Task	Year Scheduled	Estimated 5-Year Expenditure DFG	USFS/NPS	Temporary Help
FISHERY MANAGEMENT				
Angler Surveys				
Angler Survey Boxes	annually	$7,000		$5,000
Creel Census-Special Management Section	1997	$10,000		$5,000
Fish Population Monitoring				
Direct Observation	1994, 1997	$20,000	$20,000	$8,000
Electrofishing	1995, 1996	$20,000	$20,000	$8,000
Catchable Trout Harvest				
Tagging Study	1995, 1998	$10,000		$8,000
Age and Growth Study	1995	$7,500		$3,000
Fish Habitat Improvement	annually	$125,000	$625,000	$125,000
Control of Trout Predators				
Mapping Squawfish Concentrations	annually	$37,500	$7,500	
Squawfish Diet Study	annually	$2,000	$2,000	
Squawfish Derby	1995	$37,500	$7,500	
Physical Removal	1995	$37,500		
Study Relationship to other species	1995-1997	$25,000	$25,000	
Fairview Fish Ladder				
Temporary Closure	1995	$500	$500	
Fish Movement Study	1995	$1,000	$1,000	$4,000
Evaluate Impacts of Beaver	1995-1997		$45,000	
DEVELOP INTERPRETIVE PROGRAM				
Johnsondale Bridge	1994	$40,000	$40,000	
Kern River Planting Base	1996	$30,000	$4,000	
MAINTAIN INTERPRETIVE PROGRAM				
Johnsondale Bridge	1995, annually	$3,000	$15,000	
Kern River Planting Base	1996, annually	$1,000	$2,000	
RECREATIONAL USE CONFLICTS				
Recreational Survey	1995	$5,000	$5,000	$6,000
Education	annually	$75,000	$50,000	
WATER QUALITY				
Monitor for Coliform Bacteria	1996-1998	$50,000	$50,000	
Install & Maintain Pit Toilets	annually		$120,000	
LAND USE MANAGEMENT				
Evaluating Proposed Projects	as needed	$7,000	$10,000	
Control Public Access			$80,000	
RESTORATION OF KERN RIVER RAINBOW TROUT				
Collection of Genetic Samples	as needed	$45,000	$45,000	$20,000
Mapping Trout Distribution	as needed	$2,800	$2,800	$5,000
Collection & Rearing of Kern River Rainbow Trout Broodstock	annually	$75,000		$10,000
FIVE YEAR TOTAL EXPENDITURE		***$674,300***	***$1,177,300***	***$207,000***

Table 1 - Five Year Implementation Schedule for the Upper Kern Basin Fishery Management Plan

CHAPTER 2 -DESCRIPTION OF THE RESOURCE AREA

GENERAL SETTING

The headwaters of the Kern River lie between the crest of the Sierra Nevada on the east and the Great Western Divide on the west. This area is within Sequoia National Park and has many of the highest peaks in the Sierra Nevada including the highest in the lower 48-states, Mount Whitney (elevation 14,495 feet). The Kern River drains eastern Tulare County and flows almost due south through the mountains of Sequoia National Park and Sequoia National Forest to Isabella Reservoir in Kern County. Through much of this distance it passes between the glacially carved walls of the Kern Canyon.

The environment within the upper Kern basin varies from bare, glacially carved granite cliffs, benches and canyons through montane conifer forests, steep chaparral brush-lands and oak woodlands. The presence of water along stream courses produces a variety of stream-side riparian habitats and meadows.

Most of the upper Kern basin consists of high mountains over 6000 feet in elevation. The higher elevations receive large amounts of precipitation, mostly falling as snow. This feeds many small tributaries and results in the "large river" status of the Kern, despite its being adjacent to the arid Mojave Desert. The entire area is also subject to summer thunderstorms. Winter temperatures drop to well below freezing throughout the area while summers vary from over 100 degrees Fahrenheit to near freezing, depending on time of day and elevation.

The upper Kern basin is heavily used for recreation. The area is less than a four hour drive for the eleven million people of the Bakersfield, Fresno and Los Angeles metropolitan areas. Its proximity to millions of people makes it one of the California's most heavily fished recreational areas. This population is predicted to continue to increase in the future. Population within the Kern River Valley (Isabella Reservoir area) is also growing. Current population estimates are around 17,000 people. In the year 2010, the population of the valley is projected to be 36,000. Many of these individuals are retired and live there because of the recreational opportunities available.

LAND OWNERSHIP

The majority of the upper Kern basin is under federal ownership. The upper reaches, from the headwaters to just downstream of the Kern Ranger Station, is under the jurisdiction of Sequoia National Park. The 20 mile section downstream of the Park boundary is within the Golden Trout Wilderness which is managed by Sequoia and Inyo National Forests. From the Wilderness boundary downstream to the Tulare County line (a distance of 32 miles) the drainage is under the jurisdiction of Sequoia National Forest. There are many small private inholdings scattered throughout Sequoia National Forest,

including Quaking Aspen, Johnsondale, Fairview, Riverkern and Alta Sierra. The Kern River downstream of the Tulare County line is surrounded by private property.

GEOLOGY

The geologic character of the upper Kern basin is the product of a history of geologic events, including mountain building, intrusion, and glaciation. The mountains are part of the up-lifted Sierra Nevada Batholith which is dominated by granitic rock. Subsequent glaciation, erosion and weathering carved the canyons and drainages. In certain areas, older rock formations which over-laid the Batholith are still in evidence. More recent volcanic deposits are also present in areas in and around the Golden Trout Wilderness. A detailed description of the formation of the Sierra Nevada can be found in "The Geology of the Sierra Nevada" (Hill, 1975). The Kern River Canyon runs generally to the west of and parallel with the north-south trending Kern Canyon Fault.

The Southern California Edison Company (1991) concluded the upper Kern River is "sediment supply limited" and capable of transporting a greater amount of sediment than is available in the drainage. They found that sediments supplied to the River are only temporarily stored during low flow periods. Under peak flow conditions, most sediments are moved downstream. As a result, the river substrate is dominated by cobbles and boulders. The river banks consist of granite bedrock and boulders with extensive lateral sand deposits which support sparse vegetation.

SOILS

The granitic character of the basin determines soil type and therefore strongly influences the nature of sediments entering streams. The soils, weathered from the granitic bedrock, are characteristically thin and course-grained with low water holding capabilities, and they tend to be low in nutrients. The erosion potential of the majority of soils within the basin is moderate. Temporary increases in sediment transport occur from various sub-watersheds within the basin due to natural causes (forest fires, bank erosion, landslides, etc.) and management activities (logging, road building, recreation trails, cattle grazing, etc.). The major component of sediment delivered to the Kern River is fine-grained decomposed granite.

CLIMATE

The climate of the southern Sierra Nevada at lower elevations is dominated by relatively mild Pacific air brought inland by the prevailing westerly winds. The climate is classified as Mediterranean Subtropical. Summers are warm with air temperatures ranging between 80° and 100° Fahrenheit. Winters are comparatively mild with maximum temperatures ranging between 30° and 70° Fahrenheit at lower elevations. Colder temperatures are experienced at higher elevations.

The north-south alignment of the Sierra Nevada, including the Western Divide and Greenhorn ridges to the west of the upper Kern basin, creates a rain shadow effect from the dominant northwest weather pattern, which results in a lower total rainfall than most other Sierra foothill areas (Southern California Edison Company, 1991). Thunder shower activity is common during the summer at higher elevations, but these are usually of short duration and do not contribute significantly to the runoff pattern.

The majority of the precipitation occurs during winter as snow at the higher elevations (above 5,000 feet). The average standing snowpack in April is between 50 to 75 inches at the higher elevations and between 10 to 25 inches at the lower elevations of the snow zone. At the lower elevation, most of the moisture falls as rain. Snow that falls at this elevation usually melts within several days.,

HYDROLOGY

The upper Kern basin covers a large portion of the southern Sierra Nevada. The overall drainage pattern is dendritic (tree branch-like) with relatively steep stream gradients. The basin is considered typical of mountain watersheds with bedrock-controlled upper reaches.

The upper Kern River is about 80 miles long and has several hundred miles of tributary streams and over one hundred small high mountain lakes (averaging about 5 acres) within its watershed. The upper reaches of tributary streams flow at about 1 cubic foot per second during the late summer base-flow period. Major tributary watersheds may have base-flow levels up to 25 cubic feet per second.

Tributary streams in steep gradient sections within the basin are usually carved from granite bed-rock with alternating falls and plunge pools. In gentler gradient sections, they usually consist of shallow riffles and pools with cobble and gravel substrates. In these areas, there will usually be stream-side riparian development and meadows.

The substrate of the upper Kern River is very resistant, being composed primarily of large boulders and cobbles well worn from hydraulic action with little sod bank development. Gravel components are extremely limited because of the flushing action of flood flows, but lateral sand deposits are common.

The Kern River from its headwaters to Fairview Dam is free-flowing (unaltered) and ranges in width from about 20 feet at Junction Meadow to about 100 feet in the lower reaches. Flows of up to 600 cubic feet per second are diverted for about 15 miles from Fairview Dam to the Edison Company Kern River Number 3 Powerhouse, about 1 mile upstream from Kernville, for hydro-electric generation purposes.

The hydrograph (seasonal stream-flow pattern) is somewhat atypical for a Sierra Nevada river (Figure 5). Winter precipitation in the upper basin occurs as snow, the river does not usually experience a major rain-induced peak in runoff during November through

December. Instead, the peak in runoff usually occurs in late April or early May. Low stream-flows normally occur from September through January.

The upper Kern River monthly base-flow run-off levels measured at Kernville during September through January, average between 200 and 400 cubic feet per second. During the snow-melt season (April through June), maximum discharge from 1979 through 1990 ranged from 890 cfs (1990) to 8,970 (1983) cubic feet per second. The extremes in run-off flows for the upper Kern basin range from about 78 to 60,000 cubic feet per second. Figure 5 summarizes the mean discharge for the Kern River near Kernville.

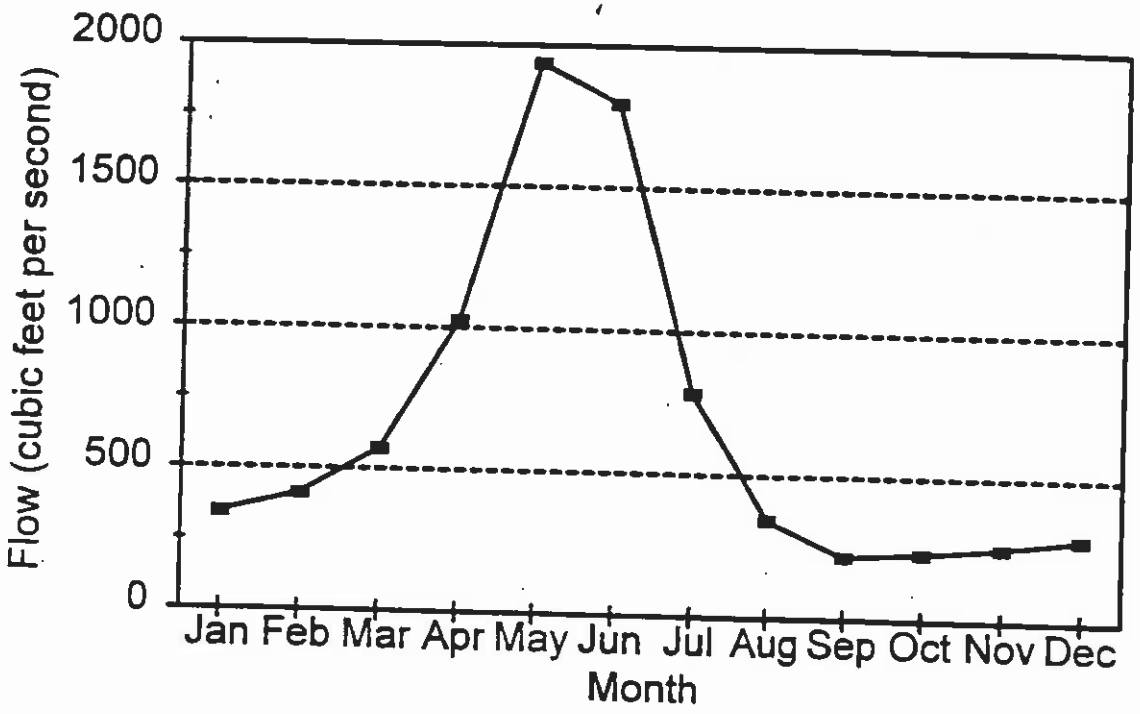

Figure 5 - Mean monthly flows for the Kern River, near Kernville, over a ten year period (1980 to 1990).

WATER QUALITY

Water quality in the upper Kern basin is generally good, there being little development to contribute pollutants. Water flowing in upper basin streams is usually cold and clear, except during rain and snow-melt runoff conditions, when there can be considerable increases in turbidity. Soil disturbance within the drainage represents a source of stream turbidity and sedimentation. Concentrated recreational use along the roadside section of the upper Kern River creates a concern for water quality at low flows.

Water quality in the upper Kern River watershed is generally good. Water quality standards for the Kern River watershed are set by the State Water Resources Control Board. Water temperature should be no more than 5° F above natural temperature of water. The level of dissolved oxygen in the water (cold water designation) should be 8 milligrams per liter or higher (State Water Resources Control Board, 1975). Upper Kern basin waters in general are typically low in turbidity and dissolved solids, and slightly alkaline. State standards for water quality parameters are rarely exceeded during the spring runoff period. During the summer months, for the Kern River upstream of Isabella Reservoir, water temperature standards may be exceeded. A complete discussion of water quality can be found in the Kern River Number 3 Relicensing Application (Southern California Edison Company, 1991).

In Salmon Creek, total suspended solids concentrations and fecal coliform bacteria counts have exceeded state standards. Dissolved oxygen concentrations in Corral Creek have occasionally been lower than state standards. The occasional low DO levels and high fecal coliform levels are thought to result from high stream temperatures, land use practices (primarily grazing) on adjacent lands, and human waste from recreational activities.

No substantial consumptive water use occurs upstream of the Kern River Number 3 Hydroelectric Project; however, the river is intensely managed for flood control, irrigation, and recreation between the powerhouse and Isabella Reservoir.

STREAM CHARACTERISTICS

The upper Kern River runs through a long, fairly straight glacially carved canyon. Within the canyon, the river flows through nearly level valleys alternating with steep rocky canyons. A typical section of the river would consist of alternating stretches of high gradient riffles, cascades, runs, pools and pocket water. The substrate is dominated by bedrock and large boulders with course sand along the river margins. There are no major barriers to upstream fish movement except Fairview Dam.

Headwater streams and tributaries throughout the upper Kern basin are typically steep, bedrock controlled streams interspersed with mountain meadows. The substrates of tributary streams are usually bedrock or cobble. Gravel and course sand substrates are common in lower gradient stream sections. Pools may accumulate fine sand and silt at low flows, but these are usually flushed out at higher flows. Lower reaches of tributary streams generally have a steep drop-off into the Kern River canyon.

LAND MANAGEMENT PRACTICES

The northern most segment of the upper Kern basin (27 miles of the Kern River) is under the jurisdiction of Sequoia National Park and is managed as wilderness. For the next 20 miles downstream from the Park Boundary the drainage is within the Golden Trout Wilderness and is managed by Sequoia and Inyo National Forests. The balance of the

upper Kern basin to the south is managed for multiple uses by the Sequoia National Forest with some private lands toward the lower end which are mostly developed for residential and commercial purposes.

Sequoia National Park wilderness management policies are consistent with protection and restoration of native species and certain recreational uses. Sequoia National Forest land management activities are under the direction of a Land Management Plan approved in February 1988. Under the Sequoia National Forest Final Land and Resource Management Plan, as amended by the Mediated Settlement Agreement (1992), most of the upper Kern basin is managed for wildlife and dispersed recreation. Timber harvest (outside of wilderness boundaries) and domestic cattle grazing are a major emphasis of the Forest Management Plan. Protection and restoration of native species, habitat restoration, wild trout management and recreational uses are compatible with Wilderness Area management, the Land Management plan and the Mediated Settlement Agreement.

WILD AND SCENIC RIVER DESIGNATION

The Sequoia and Inyo National Forests have released a Final Environmental Impact Statement and Final Implementation Plan North and South Forks of The Kern Wild and Scenic River (Sequoia and Inyo National Forests, 1994). The Wild and Scenic designation extends upstream to the headwaters of the Kern River in Sequoia National Park. The Kern River from the Tulare County line to a point about 1 mile (5,000 feet) upstream of the Johnsondale Bridge is designated as "Recreation". From this point upstream to the Sequoia National Park boundary the river is designated as "Wild". This plan is compatible with the Wild and Scenic River designation.

RECREATIONAL USE

Access

Paved road access to the upper Kern basin includes State Highway 155 from Isabella Reservoir to Alta Sierra and Glenville, Mountain Road 99 along the upper Kern River from Kernville to the Johnsondale Bridge and west to California Hot Springs, State Highway 190 and Western Divide Highway from Springville to Quaking Aspen and Johnsondale and Forest Road 22S05 from Johnsondale Bridge east to Black Rock and Kennedy Meadows. In addition, many other paved and non-paved roads lead to, or follow tributary streams as far north as North Fork Clicks Creek on the west and Osa Creek on the east. Trails lead to almost all other points along the river, on tributary streams and to high elevation lakes. Trail-heads are located at many points within and adjacent to the upper Kern basin including Kernville, Fairview, Johnsondale Bridge, Lloyd Meadows, Fish Creek, Clicks Creek, North Fork Clicks Creek, Shake Camp, Mineral King, Giant Forest, Whitney Portal, Horseshoe Meadows and Black Rock. There are also many other incidental trail access points along the roads throughout the area.

Accommodations

There are numerous Forest Service campgrounds and parking areas around Isabella Reservoir and along the Kern River from Kernville to Johnsondale Bridge. Other developed campgrounds in the drainage include Horse Meadow on Salmon Creek, Holey Meadow on Double Bunk Creek, Redwood Meadow and Long Meadow on Long Meadow Creek, Peppermint and Lower Peppermint on Peppermint Creek and Quaking Aspen in the Tule River drainage. There are many other primitive campsites throughout the basin. Private camping and commercial lodging is available in the Kern River Valley around Isabella Reservoir, along the Kern River south of Fairview Dam, west on Highway 190 and along Highway 395 to the east. The old logging mill at Johnsondale has been converted to a private resort.

Whitewater sports

Whitewater rafting is a very popular recreational activity on the Kern River. Most activity is concentrated between Kernville and the Forks of the Kern. The rafting season is determined by the spring run-off. The Forks Run is usually raftable for 8-10 weeks, from May through June. The Kern River, downstream from the Johnsondale Bridge, is usually raftable for 12-14 weeks, from May through July. As a result of the limited boating season, potential impacts to people fishing do not exist for most of the year. The rafting season occurs during high water flows in the early spring, whereas fishing is best during lower flows. Public comments reflected some level of conflict between whitewater sportspersons and anglers. A study is needed to evaluate the level of conflict and seek ways to minimize these conflicts.

Hiking and Camping

Virtually all the upper Kern basin is in federal ownership and therefore open to the public. Golden Trout Wilderness and Sequoia National Park wilderness areas require a permit for access. Most of the upper Kern basin is accessible via an extensive trail system. There is no significant reported conflict documented between hikers or campers and anglers due to the separation of these activities. Impacts from trails and campsites in close proximity to streams and lakes are of concern from the standpoint of erosion and sedimentation, trampling of riparian vegetation and degradation of water quality. Re-routing trails away from streams and lakes will minimize impacts. Regulations require location of campsites at least one hundred feet (twenty-five under some circumstances) from lakes, streams and meadows.

Packstock

Commercial and private packstock use is managed through various management plans which cover the Golden Trout Wilderness and Sequoia National Park. Specific guidelines designed to limit the impact of packstock use on riparian resources are incorporated into use permits. The maintenance of the trail system to reduce the concentration of water

and the resulting erosion and stream sedimentation is important to the health of the watershed. Packstock use of the trail system represents a possible source of stream sedimentation. Instances of damage from packstock use should be corrected. Occasionally conflicts between equestrians and anglers occur because they use the same trails and stream-sides.

Off-Highway Vehicle Use

The Sequoia National Park and the Golden Trout Wilderness portions of the upper Kern basin are closed to off-highway vehicle use. In the balance of the basin, many road and trail systems are designated for motorcycle and four-wheel drive vehicle use. Vehicle use of these roads and trails represents a possible source of stream sedimentation.

CHAPTER 3 - FISHERY RESOURCES

BACKGROUND INFORMATION

During the ice ages, waters at higher elevations of the Sierra Nevada were depleted of fish life by the ice covering and glacial scouring of its waterways. Fish were able to ascend and colonize streams and lakes in the periods between glacial advances. In the most recent glacial periods, portions of the upper Kern basin were spared the effects of glaciers. For the last ten to twenty thousand years, these streams have been inhabited by an assemblage of fish species which invaded the area from lower elevations and the ocean. The native Kern trout species are descendants of rainbow trout progenitors, and have been isolated for thousands of years due to natural barriers and uninhabitable conditions (warm water and limited oxygen) downstream, which have cut off their connection with other trout populations. Through many generations of isolation, the native Kern trout populations have developed into the unique golden trout complex presently found there.

The upper Kern basin was initially inhabited by native Americans who undoubtedly utilized native fish for food. They spent most of their time at lower elevations (southern portion commonly referred to as the Kern River Valley) of the upper Kern basin. In the summers, they would move into the higher elevations to take advantage of the cooler climate and to hunt for food.

Beginning in the 1850's, European people came to the area for cattle and sheep ranching, farming and mining. These people also fished for food and sport, primarily seeking trout. Most of their activities were in the Kern River Valley area. Many of these people also spent time at higher elevations during the summer tending livestock, hunting and fishing. Early in this period people began transplanting native trout into nearby barren waters, thus expanding the range of trout.

In the 1900's, there has been a tremendous increase in human population in the area. Development of roads made access easy and resulted in increased public use of the area. The increase in sport fishing has reduced trout populations in many places. The effects of other uses, such as grazing, logging, farming, transportation, dams, water diversions and recreation has further reduced the native trout populations and their habitat conditions. Efforts to extend the range of native Kern trout species, especially the Volcano Creek golden trout, were increased beginning early in this period. As recreational use increased, there were more efforts to "improve fishing" by introducing nonnative fish species. This has usually led to threats to the existence of native trout.

NATIVE FISHES

Historically the Kern River was renowned for its populations of large Kern River rainbow trout and beautiful golden trout (Evermann, 1906). Trout are limited to colder, well

oxygenated waters and thus are found primarily in streams at higher elevations and in larger rivers. They are opportunistic feeders, primarily insectivorous, but those of larger sizes can be predatory on smaller fish (Calhoun, 1966). Trout in the Kern River grow to about four or five inches long in their first year. Thereafter they grow about one or two inches per year until they are about fifteen inches long when the growth rate declines further. Growth rates of native trout in smaller tributaries are significantly less. Often trout in these habitats do not exceed six inches in length. The native Kern trout are very vulnerable to over-harvest and many populations have been depleted or destroyed by heavy angling pressure, especially near roads and easy trail access areas.

Other native fish species present in the upper Kern basin include Sacramento sucker, Sacramento squawfish, and hardhead (and possibly others). Each of these species (with the possible exception of hardhead) are doing quite well and some have actually benefited from changes that have occurred to the aquatic habitat.

Golden Trout Complex

The golden trout was named the official State Fish by the California Legislature in 1939. The three sub-species of native trout endemic to the upper Kern drainage are: 1) the Little Kern golden trout of the Little Kern River drainage; 2) the Volcano Creek golden trout of Golden Trout Creek and the South Fork Kern River; and 3) Kern River rainbow trout of the main-stem of the Kern River. All of these sub-species are genetically very closely related and each can be considered golden trout. The continued existence of each of these sub-species in their native range has been threatened in one way or another.

The native fishes of the upper Kern basin were first described around the turn of the century (Jordan 1894, Evermann, 1906). The taxonomic status of the native trout was the subject of modern genetic analysis beginning about 1970, as concern for their survival increased. The definitive taxonomic work was done by geneticists at the University of California at Davis beginning in 1973. Through starch gel electrophoresis of proteins from various tissues, they have been able to identify distinctive characteristics in each of the presently recognized sub-species of native trout and to recognize the presence of nonnative genetic characters (denoting hybridization).

Little Kern golden trout

The Little Kern sub-species of golden trout once inhabited most of the Little Kern River drainage. It was almost eliminated by hybridization with, and competition from; nonnative trout introduced in the 1930's and 1940's. It is federally listed as a threatened species and its recovery is being carried out through the implementation of the Revised Fishery Management Plan For The Little Kern Golden Trout (Christenson, 1984). A part of this program involves the development of broodstocks and artificial propagation of Little Kern golden trout at the Department of Fish and Game's Kern River Planting Base near Kernville.

Volcano Creek golden trout

The Volcano Creek golden trout is native to Golden Trout Creek and South Fork Kern River drainages and is the most colorful of the native trout. It has been threatened in portions of its range by the introduction of predatory nonnative brown trout and habitat deterioration. Restoration and protection of this sub-species of golden trout is covered by a separate management plan (Schneegas, Hunter and Pister, 1965)

Kern River rainbow trout

The Kern River rainbow trout is genetically a part of the golden trout complex and is endemic to the Kern River from the Kern Canyon north of Bakersfield upstream to the headwaters in Sequoia National Park. It also occupied, at least seasonally, the lower reaches of tributary streams below any impassable barriers. Except for those found in small, high elevation streams, they are the least colorful of the native Kern trout. These fish gained world-wide recognition because of the numerous, large-sized specimens caught (up to 24 inches in length, R. B. Price, personal communication, 1994). Kern River rainbow trout were known to inhabit the Kern River to well below the present site of Isabella Dam around the turn of the century (Ardis Walker, personal communication, 1990) and the South Fork Kern River upstream to Onyx (Bob Powers, personal communication, 1994). These trophy sized trout have been much sought after by anglers for many decades.

Kern River rainbow trout have probably been extirpated from the Kern River downstream from Johnsondale Bridge by the introduction of nonnative rainbow trout. Recent Department of Fish and Game studies (Appendix A) have shown that over-harvest has reduced the average size of Kern River rainbow trout substantially. Rarely are any over ten inches in length found in what remains of their populations. The implementation of "catch-and-release" regulations in the four-mile Special Management Section upstream of Johnsondale Bridge, beginning in 1990, has resulted in an increase in the average size of trout in that population.

The Kern River rainbow trout is classified by the U. S. Fish and Wildlife Service as a Category Two (candidate) species for federal listing under the Endangered Species Act. The definition of Category Two is a species which may need protection but there is not enough information at this time to warrant listing under the Endangered Species Act. One of the primary goals of this plan is to ensure that the subspecies is restored to historical population levels. The conversion to stocking native trout and research on the true distribution and status of the subspecies should provide the tools for accomplishing this goal.

The true distribution of the Kern River rainbow trout is not known. Genetic samples were collected from about fifty sites throughout the Kern River drainage in 1993. These samples will provide the first large scale look at the genetics of the native

trout of the Upper Kern basin. Previous genetic work concentrated on the Little Kern golden trout in the Little Kern River drainage. The genetic work done to date has relied on starch-gel electrophoresis as a technique to determine the ancestry of fish within the basin. New techniques in molecular DNA analysis may offer a more refined analysis technique. The best method to determine what a pure Kern River rainbow trout is and where they are distributed will be used. A comprehensive restoration plan will be developed when adequate genetic information is available.

Sacramento Sucker

The Sacramento sucker (*Catostomus occidentalis*) is a member of the sucker family (Catostomidae). They are bottom feeders, consuming algae, other plant material, invertebrates and detritus. Sometimes suckers are taken incidentally by anglers. Juvenile suckers provide forage for predatory species (Calhoun, 1966). They have a wide range of tolerance for temperature and dissolved oxygen, and are thus found in a wide variety of habitat types. They successfully co-exist with trout and other fish species in the upper Kern basin.

The Sacramento sucker is found throughout the Sacramento and San Joaquin River drainages, with populations extending upstream in almost all major tributaries as far as conditions will allow. Suckers are native to the upper Kern River and populations are believed to extend upstream to Junction Meadow in Sequoia National Park, the Little Kern River downstream from Rifle Creek, the South Fork Kern River downstream from Tunnel Meadow and the lower reaches of many tributaries to these streams. According to Moyle (1976) the sucker is a relatively recent invader from the lower Kern River. Sacramento suckers appear to be very numerous in almost all streams where they occur. Recent studies show that they are the dominant species in the upper Kern River (Appendix A).

Hardhead

The hardhead (*Mylopharodon conocephalus*) is a member of the minnow family (Cyprinidae), which can grow up to two feet in length. They are typically found in the more undisturbed sections of large streams at middle elevations. They are most abundant in warm, clear streams and rivers with large, deep pools with sandy bottoms (Moyle, 1976). They are classified as bottom browsers, feeding on small invertebrates and aquatic plants in quiet waters. Juvenile hardhead are primarily insectivorous and provide some forage for predatory species (Calhoun, 1966).

Hardheads are native to the Sacramento and San Joaquin River systems. They are native to the upper Kern River from South Creek downstream and the lower reaches of some of the tributaries to this section. They successfully co-exist with trout and other fish species in the upper Kern River.

Hardheads were found during 1989 and 1990 surveys of the Kern River from Southern California Edison Company Powerhouse Number 3 upstream to Goldledge Campground (Southern California Edison Company, 1991). Over its entire range the hardhead appears to have declined to a significant extent (Brown and Moyle, 1987). The Department of Fish and Game considers the hardhead a "Species of Special Concern." Moyle, et al. (1989) places the hardhead in Class 3, which means "These are uncommon taxa occupying much of their natural range, formerly more abundant, but still with pockets of abundance within their range." Little is known about the distribution and habits of the hardhead in the upper Kern basin. One of the goals of this management plan is to determine the abundance, distribution, and population structure of hardheads in the upper Kern basin.

Sacramento Squawfish

The Sacramento squawfish (*Ptychocheilus grandis*) is another member of the minnow family. They prefer warmer waters and pools, grow to large sizes (up to 45 inches long and 32 pounds), are voracious predators and occasionally sought after by anglers. Juvenile squawfish feed on insects and also provide forage for predators (Calhoun, 1966). Squawfish are native to the Sacramento and San Joaquin River systems. They are native to the upper Kern River from Forks-of-the-Kern downstream.

The Southern California Edison Company study (1991) found squawfish to be abundant in the upper Kern River between Isabella Reservoir and Fairview Dam. Squawfish of all sizes (up to 11 pounds) can be observed frequently in most sections of the upper Kern River downstream from Forks-of-the-Kern. Little information is available on food habits or movement of squawfish in the Kern River. The action plan calls for squawfish food habit studies to determine their diet. Of particular interest is the role of both wild trout and hatchery trout as forage in their diet. One of the goals of this management plan is the control of the squawfish population in sections of the river where predation can be shown to be detrimental to the trout fishery.

NONNATIVE FISHES

Nonnative fish have been introduced into California waters since before the turn of the century. Most of the early introductions were done for the purpose of providing a food supply. Later introductions were for providing or improving sport fishing opportunities. Often these introductions produced undesirable results, especially for the native fish species. A prime example is the carp (*Cyprinus carpio)*, introduced to provide a food source, which has had widespread detrimental effects on many fish populations.

In the early 1900's, as access was improved in the upper Kern basin and sport fishing became more popular, there was a great effort to transplant fish into waters which were naturally barren of fish or which had become "fished out". Nonnative rainbow trout, brown trout and brook trout were planted extensively in the Little Kern River drainage. A fish hatchery was established near Kernville in 1927 and nonnative rainbow trout were reared to plant in nearby waters to supplement natural populations. This has developed into the

present day "catchable trout" program to provide a strictly artificial recreational fishery for catchable-sized trout to satisfy increasing numbers of anglers.

More recently, with the construction of Isabella Dam and the impoundment of Isabella Reservoir, a wide variety of cold-water, warm-water, and forage fish species have been introduced to provide a sport fishery in this artificial lake habitat. These are the subject of a separate fishery management plan for Isabella Reservoir. Only a few of these species influence the upper Kern River fisheries.

Rainbow Trout

The primary nonnative trout introduced into the upper Kern basin is the rainbow trout (*Oncorhynchus mykiss gairdneri*). This species has characteristics, habits and habitat requirements similar to those of the native Kern trout, to which they are closely related. These fish are native to streams of western North America which have access to the Pacific Ocean.

The exact date of the initial introduction is unknown, but nonnative rainbow trout have been stocked in the upper Kern basin since before the turn of the century. Introductions of nonnative rainbow trout during the 1930's and 1940's are the principal cause of the threatened status of the Little Kern golden trout because of hybridization. Introduced rainbow trout and hybrids have been eliminated from almost all of the tributaries of the Little Kern River through the implementation of the Revised Fishery Management Plan for the Little Kern golden trout.

The introduction of nonnative rainbow trout is probably responsible for the extirpation of Kern River rainbow trout in the Kern River from Durrwood Creek downstream. The impact of hybridization on the genetic integrity of the remaining populations of Kern River rainbow trout is currently being evaluated through genetic analysis of trout samples taken throughout the upper Kern basin. Introduced rainbow trout have established populations or hybridized with native populations in some tributary streams. Genetic evaluations to date show that wild trout from the Kern River upstream of Durrwood Creek have similar genetic characteristics. These appear to be the best representatives of Kern River rainbow trout for the mainstem Kern River. Genetic testing has shown that trout from Johnsondale Bridge downstream are hybridized with nonnative rainbow trout. Wild trout in Ninemile Creek, Freeman Creek, Durrwood Creek and Bone Creek are also nonnative.

In the Kern River between Isabella Reservoir and Johnsondale Bridge, about 47,000 pounds of catchable-sized (averaging about 8 ounces each) nonnative rainbow trout are stocked each year from the Kern River Planting Base. These fish are planted each week during the summer (if access and stream conditions are suitable) and on alternate weeks during the winter. An additional 3,500 pounds are stocked in roadside sections of western tributary streams between Fairview Dam and Forks-of-the-Kern. Over the years, stocking of nonnative rainbow trout has resulted in the loss of genetic integrity of some native Kern River rainbow trout populations in the upper Kern basin. A goal of this plan is to eliminate

the stocking of nonnative trout in the upper Kern basin. Only artificially produced native Kern River rainbow trout would be stocked.

Brown Trout

Brown trout (*Salmo trutta*) had been stocked in the upper Kern basin during the mid-1900's. They are native to Europe and the British Isles and had been successfully transplanted to eastern North America. From there they have been introduced into waters of the western states. Brown trout can tolerate warmer water temperatures than brook trout and are able to occupy a wide range of habitats. They often reach a larger size and are much more carnivorous than brook trout. They are responsible for the threats to the Volcano Creek golden trout in the South Fork Kern River because of their predatory habits. Because they are not closely related to the native Kern trout and spawn in the fall, they do not pose a threat of hybridization.

Brown trout were stocked in the Kern River and presently are found from Funston Meadow in Sequoia National Park downstream to Isabella Reservoir. They maintain a self-sustaining population, but do not dominate the fishery. Several upper Kern basin tributaries have natural populations of brown trout. There are reports of brown trout having been planted in the Little Kern River drainage, but to date none have been found there.

Brown trout were planted in the South Fork Kern River in the 1930's. Subsequent to the Habitat Management Plan for Native Golden Trout Waters (Schneegas, Hunter and Pister, 1965) they had spread virtually the entire length of the South Fork, almost destroying the native Volcano Creek golden trout populations. They had been eliminated from the upper South Fork through barrier construction (Ramshaw, Templeton and Monache Meadows) and subsequent chemical treatments, as an extension of the Habitat Management Plan for Native Golden Trout Waters. They still persist from Monache Meadows downstream and in some tributaries. Brown trout were found to be re-established upstream of the Schaeffer Barrier near upper Monache Meadows in 1993. Brown trout were not found upstream of Templeton Barrier and a prophylactic chemical treatment occurred in 1994 to reduce the brown trout population until repairs can be made to Templeton Barrier (1995) and Schaeffer Barrier (1996). Once repairs have been completed the water between the two barriers will be retreated and stocked with Volcano Creek golden trout.

Brook Trout

Brook trout (*Salvelinus fontinalis*) were stocked into some headwater streams and lakes in the upper Kern drainage during the early 1900's. They are native to lakes and streams of northeastern North America. They have habits similar to native Kern trout, but prefer colder water temperatures and are found mostly at higher elevations. Their spawning requirements are less specific than native trout so they have a competitive advantage. Because they are not closely related to native trout and they spawn in the fall, they do not

pose a threat of hybridization. They do compete with the native trout for food and space and usually become the dominant species in lakes due to their ability to successfully reproduce in lakes lacking inlet and outlet streams. They became established in some lakes and streams at the headwaters of the upper Kern basin. Brook trout often overpopulate lakes, resulting in stunted populations. Those in the Little Kern River drainage have been eliminated through implementation of the Revised Fisheries Management Plan for the Little Kern Golden Trout.

Introductions Into Isabella Reservoir

Since its impoundment in the early 1950's, Isabella Reservoir has been stocked with a variety of fish species, mostly warmwater game species which have little affinity for stream habitat. Their management is the subject of a separate management plan for the reservoir (California Department of Fish and Game, 1978). Those species from the reservoir which affect the upper Kern River will be briefly mentioned here.

Each winter, under a "put-and-grow" trophy trout program, the reservoir receives 27,000 pounds of catchable-size nonnative rainbow trout. The purpose is for them to feed on the threadfin shad population and provide large trout (one to ten pounds each) for angling the following years. Most of these trout are caught within a few weeks of planting and have little chance to grow. A small percentage survive to reach a larger size. A few of these migrate into the upper Kern River, some of them to spawn. Their influence is probably limited to the first several miles of the river above the reservoir.

In the past, Chinook salmon (*Oncorhynchus tschawytscha*) and coho salmon (*O. kisutch*) have also been stocked in the reservoir in the hope that they would contribute to the sport fishery. Some of these also would have survived long enough to migrate into the upper Kern River to spawn. These species invariably die after reaching maturity and have had little or no success reproducing, so their influence was short lived.

Of the remaining reservoir fish species, only smallmouth bass (*Micropterus dolomieui*) can adapt to the river habitat and few of them have ever been noted in the Kern River upstream of Isabella Reservoir. It is not expected that they would migrate many miles up the upper Kern River. They could be predatory on the native species.

Occasionally carp and other species may enter the lowermost mile or so of the upper Kern River. Their influence is insignificant.

CHAPTER 4 - FISHERIES MANAGEMENT

BACKGROUND INFORMATION

This section of the management plan will detail both short-term and long-range fishery management goals for the upper Kern basin. Short-term goals are current management practices or proposed management practices that will be implemented within the next five years. Long-range goals are included to provide management direction toward a desired future condition. Long-range goals may not appear obtainable given current circumstances. As implementation of this plan continues, the likelihood of achieving these long-range goals should improve. For each river segment, the management goals are divided into short-term and long-range goals. Differences between short-term and long-range goals will be clarified over time and will be refined with each revision of this fishery management plan.

This management plan emphasizes the restoration, protection and management of Kern River rainbow trout. However, it is also necessary to address the management of other native fishes. Management of other native, non-salmonid fish species is detailed in Appendix B.

Historically, unlimited harvest of native trout (Kern River rainbow trout, Volcano Creek golden trout and Little Kern golden trout) was allowed. There were abundant populations of these trout and relatively few anglers. Excellent angling experiences were provided by the numerous large sized rainbows in the Kern River and the abundant and beautifully colored goldens found at the higher elevations.

As angling pressures increased due to the popularity of the area and its proximity to the many people in southern California, reduced daily bag limits were imposed to control over-harvest. Later, nonnative fingerling rainbow trout were stocked to supplement dwindling wild trout populations. This developed into the present "catchable trout" program that currently provides an artificial fishery to satisfy large numbers of anglers where wild trout populations have been reduced or eliminated. The Department of Fish and Game's Kern River facility now operates as a planting base. Catchable trout stocked in the upper Kern basin are reared at hatcheries outside the basin and are brought into Kern River Planting Base for distribution.

A description of the present fisheries management programs and long-range management objectives in the upper Kern basin is presented below. Proposed management measures are designed to ensure the survival of native fish communities. Fisheries management for the Volcano Creek golden trout (Golden Trout Creek and the South Fork Kern River drainages), Little Kern golden trout (Little Kern River drainage), and Isabella Reservoir are covered under separate fishery management plans.

Due to the variety of fishery resources present and differences in management directions, the upper Kern basin has been divided into four segments for fishery management purposes (Figure 1). **Segment 1** (Figure 2) includes the Kern River and its tributaries between Isabella Reservoir and Johnsondale Bridge (excluding Isabella Reservoir and the South Fork Kern River). **Segment 2** is the four mile long Special Management Section immediately upstream of Johnsondale Bridge and Dry Meadow Creek, the only tributary stream in this segment (Figure 3). **Segment 3** includes the Kern River and its tributaries from the upstream boundary of the Special Management Section to the southern boundary of Sequoia National Park (excluding the Little Kern River, Figure 3). **Segment 4** includes the Kern River watershed within Sequoia National Park (excluding Golden Trout Creek, Figure 4). For each Segment, background information, goals, objectives, action plans and monitoring requirements are presented.

MANAGEMENT BY RIVER SEGMENT

Segment 1: Isabella Reservoir to Johnsondale Bridge

Background Information

The upper Kern basin in the Isabella Reservoir to Johnsondale Bridge segment has had the greatest amount of alterations to the aquatic habitat and fish populations of any of the segments. Cattle grazing has impacted some tributaries to the Kern River. Road access is available all along the Kern River and to portions of almost every tributary stream in this segment. The Southern California Edison Company diverts water from the fifteen mile reach of the Kern River between Fairview Dam and the Kern River Number 3 Powerhouse near Kernville (Figure 2). It also diverts small amounts of water from Salmon and Corral creeks. Small diversions for irrigation remove water from the Kern River near Kernville. Urban developments are present along portions of South Creek, the Kern River and Tillie Creek (Johnsondale, Riverkern, and Kernville). Developed campgrounds are numerous along the Kern River. Angler access is very well developed and angling pressure is very high.

Fisheries management in Segment 1 is based on wild populations of trout in the tributaries and stocking of about 94,000 catchable-sized nonnative rainbow trout in the Kern River. The Kern River in Segment 1 is open to angling all year, with a bag limit of five trout per day, ten trout in possession. Tributary streams in the Valley District (Kern County) are open to angling all year with a bag and possession limit of 5 trout. Tributary streams in the Sierra District (Tulare County) are open to angling from the last Saturday in April through November 15 with a bag limit of 5 trout per day, 10 trout in possession (see map on page 33 of the 1994-1996 California Sport Fishing Regulations). Be sure to check the current California Sport Fishing Regulations booklet before you fish specific waters.

The Kern River in Segment 1 initially contained substantial populations of Kern River rainbow trout. Early increases in angler use quickly decimated the population.

Progressively more restrictive angling regulations were ineffective in protecting Kern River rainbow trout from over-harvest. Nonnative rainbow trout were planted in an attempt to supplement the wild trout populations. Brown trout were also introduced and are still present in low numbers. There are few wild trout in this segment and Kern River rainbow trout may have been eliminated. The Kern River in Segment 1 is divided into three reaches based on management goals. The goals, objectives, action plans and monitoring requirement detailed for **Segment 1** applies to each of these reaches. The purpose of subdividing the segment into reaches is to clarify fishery management in each river reach.

Isabella Reservoir to Goldledge Campground

The Kern River between Isabella Reservoir and Goldledge Campground is influenced by the Southern California Edison water diversion, heavy recreational use, urbanization and fish migrating upstream from Isabella Reservoir. Kern River rainbow trout have been eliminated from this reach of river. About 62,000 catchable sized nonnative rainbow trout are allotted annually to this twelve mile reach of river. Catch rates for planted trout range from fair to poor. Sacramento sucker and Sacramento squawfish are the dominant fish species present in this reach.

Restoring Kern River rainbow trout to this reach will require converting catchable trout planting in Isabella Reservoir and the Kern River from nonnative trout to artificially propagated native Kern River rainbow trout. Concentrating the planting of catchable sized Kern River rainbow trout and controlling the population of large predatory squawfish should improve angler success.

Goldledge Campground to Fairview Dam

The Kern River from Goldledge Campground to Fairview Dam is influenced by the Southern California Edison Company water diversion and heavy recreational use. A portion of the Kern River is diverted at Fairview Dam for hydroelectric generation. The diverted water re-enters the river at Southern California Edison Company's Kern River Number 3 Powerhouse (Figure 2).

Two resorts and one developed campground are located along this reach of river. Very few naturally produced trout are present and Kern River rainbow trout have been eliminated. About 16,000 catchable sized nonnative rainbow trout are allotted annually to this seven mile reach of the river. Catch rates are usually fair to poor. Only about 15% of catchable sized trout tagged in 1989 were caught by anglers (Christenson, personal communication). Sacramento sucker and Sacramento squawfish are the dominant fish species present in this reach of the Kern River.

The long-range goal is to manage this reach of river for native Kern River rainbow trout. Restoring Kern River rainbow trout to this reach of river will require converting catchable trout planting from nonnative trout to artificially propagated native Kern River rainbow

trout. The Kern River in this reach is capable of producing a self sustaining wild trout fishery when water temperature and flows are improved. Control of large predatory squawfish should increase the survival of stocked trout and improve angler success. Larger sized trout may help control the numbers of young squawfish and suckers.

Fairview Dam to Johnsondale Bridge

Streamflow in the Kern River upstream of Fairview Dam is unimpaired and recreational use is heavy in this reach. One developed campground is located along the river. A few naturally produced trout remain, but Kern River rainbow trout have been eliminated. About 16,000 catchable sized nonnative rainbow trout are allotted annually to this three-mile reach of river. Prior to 1994, over 28,000 catchable trout were stocked in this reach. Catchable trout tagging studies in 1989 indicate a low harvest rate of planted trout (about 30%) in this reach (Christenson, personal communications). About 12,000 trout have been redirected to the reach of river downstream of Fairview Dam. Sacramento suckers and Sacramento squawfish are the dominant fish species present in this reach. The fish ladder at Fairview Dam allows migration of fish from downstream and should be closed to facilitate Kern River rainbow trout (RT-KR) restoration upstream.

To restore Kern River rainbow trout to this reach will require converting catchable trout planting from nonnative rainbow trout to artificially propagated native Kern River rainbow trout. The Kern River in this reach is capable of producing a self sustaining wild trout fishery. Larger sized trout may help to control the numbers of young squawfish and suckers. Eventually trout stocking would stop and this reach would be managed for wild trout.

Tributary Streams

Tributaries to the Kern River in **Segment 1** were initially barren of fish life or contained Kern River rainbow trout. Other native fish species also inhabited the lower reaches of these streams. Early management of tributary streams consisted of transplanting native species into these streams from nearby waters. Recent genetic studies indicate that the "golden trout" in Salmon Creek are native. Which of the golden trout is in this tributary stream is unclear at this time. Nonnative rainbow and brown trout were stocked in the South, Brush, Tobias, Salmon and Bull Run creek drainages resulting in hybridization or predation of native rainbow trout populations. The planting of catchable sized nonnative rainbow trout in South Creek was discontinued in 1994.

Most of the tributaries in this area are accessible and are subject to moderate to heavy angling pressure. Restrictive regulations may be required at some future date to maintain a satisfactory fishery. They are not anticipated as being necessary within the next few years. Some tributary streams may require long-term stocking of catchable-sized Kern River rainbow trout to maintain a satisfactory recreational fishery.

Interpretive Displays

It is important that the general public appreciate the uniqueness of the upper Kern basin as the native range of the golden trout, the State Fish. They should also understand the importance of wild trout management, the roles of restrictive angling regulations and hatchery reared trout. Interpretive displays should also provide information regarding aquatic communities.

Funding has been obtained by Sequoia National Forest for an interpretive center at the Johnsondale Bridge parking lot. The first phase of a rock wall to replace the guard rail along the river side of the Johnsondale Bridge parking lot has been completed. A rock pedestal has been incorporated into the wall to support a sign displaying a map, description of the uniqueness of the upper Kern basin, the fish that are native, and other natural resources. Also included will be information on the need for special management of these fishery resources. Phase II of the project will involve replacing the remaining guard rail on the river side of the parking lot with a rock wall.

Also planned at some future date is a similar interpretive display at Kern River Planting Base. Included would be an explanation of the function of the planting base in the Kern River rainbow trout recovery program and an aquarium with specimens of the three native golden trout.

Goals - Isabella Reservoir to Johnsondale Bridge

Short-term

a. Continue planting catchable-sized nonnative rainbow trout in the Kern River.

b. Continue present angling regulations.

c. Close the Fairview Dam fish ladder.

d. Initiate development of RT-KR broodstock and production of catchable-sized RT-KR.

e. Continue genetic analysis of trout populations in tributary streams.

Long-range

f. Protect and enhance native fish populations and their habitats.

g. Restore, protect, and enhance the native fish communities including Kern River rainbow trout populations so that threatened or endangered listing is unnecessary.

h. Provide for a satisfactory recreational fishery.

i. Replace the current put-and-take (stocking nonnative catchable trout) trout fishery with a native Kern River rainbow trout by planting catchable sized artificially propagated Kern River rainbow trout.

j. Manage tributary streams and the Kern River upstream of Goldledge Campground with wild populations of native Kern River rainbow trout.

k. Maximize put-and-take fishery by re-allocating all catchable-sized trout planting to Kern River from Goldledge Campground downstream.

Objectives - Isabella Reservoir to Johnsondale Bridge

a. Encourage the restoration of the Kern River rainbow trout.

b. Convert the planting of catchable-sized trout upstream of Fairview Dam from nonnative to catchable sized Kern River rainbow trout and improve the return of planted trout to the angler (meet Fish and Game Commission policy of 50% return).

c. Determine the ecological relationships between the aquatic organisms in the ecosystem.

d. Raise public awareness on the uniqueness of the native golden trout complex of fishes and the Kern River watershed.

e. Determine the genetic characteristics of trout populations in various tributary streams within this river segment.

f. Continue angling regulations that promote satisfactory fishing opportunities.

g. Manage the fishery between Fairview Dam and Johnsondale Bridge for wild trout.

Action Plan - Isabella Reservoir to Johnsondale Bridge

a. Develop a Kern River rainbow trout broodstock within three to four years. Produce up to 16,000 catchable sized Kern River rainbow trout annually for stocking in the Kern River upstream of Fairview Dam. Although the broodstock would be raised at Kern River Planting Base and San Joaquin Hatchery (and possibly an alternative site to be determined) eggs would be taken to San Joaquin Hatchery near Millerton Lake to be raised to catchable-size. Funding for raising and planting catchable-sized Kern River rainbow trout will come from re-

allocating costs of present nonnative catchable trout planting program for these waters. A separate plan would be developed to detail this project.

b. Recommend to Southern California Edison and the Federal Energy Regulatory Commission that the fish ladder on Fairview Dam be temporarily closed. The dam would serve as a fish barrier to upstream migrating fish and facilitate the restoration of Kern River rainbow trout.

c. Change stocking locations, number, and timing of trout plants to improve returns of trout to the angler. Evaluate effectiveness of these changes.

d. Manage the squawfish population to reduce the abundance of large predatory fish and restore fish communities to a more natural balanced population.

e. Fund a graduate student to study the ecological relationships of native fishes.

f. Construct interpretive centers at the Johnsondale Bridge parking lot and Kern River Planting Base to educate the public as to the value of native fishes. These centers would provide visitors with a map of the area, brief geological history; information on native fishes and fishery management programs.

g. Collect and analyze trout from the mainstem and tributary streams and determine genetic characteristics. Manage these streams for Kern River rainbow trout.

h. No angling regulation changes are proposed in this management plan for this reach of river at this time. However, the long-range goal of wild trout management upstream of Fairview Dam will require either a reduction in the creel limit and restriction of tackle to artificial lure and flies.

I. Replace non-native rainbow trout currently stocked upstream of Fairview Dam with catchable-sized RT-KR. Once adequate river flows are reestablished downstream of Fairview Dam, shift the planting of all trout downstream of the dam. The long-term goal is to manage the river upstream of Goldledge Campground for wild trout.

Monitoring - Isabella Reservoir to Johnsondale Bridge

a. Genetically monitor Kern River rainbow trout hatchery broodstock to ensure they remain pure. Periodically infuse these broodstock with wild stocks to broaden the gene pool and prevent in-breeding.

b. Evaluate the return of catchable trout through a periodic trout tagging program.

c. When the 3-mile reach of river upstream of Fairview Dam comes under wild trout management, carefully monitor angler success to insure a quality fishery is maintained. Consider the fall stocking of fingerling RT-KR to supplement natural reproduction.

d. Periodically survey the species composition and size of fish present in this segment.

e. Periodically monitor trout populations to determine genetic attributes.

f. Monitor trout habitat conditions in the Kern River and tributary streams.

Segment 2: Special Management Section

Background Information

The Kern River Special Management Section is the 4-mile reach immediately upstream of Johnsondale Bridge (Figure 3). This section is accessed from the parking lot at Johnsondale Bridge. There is a good trail that parallels the river along the east side. About one-quarter mile upstream of the upper end of the four-mile Special Management Section, the trail becomes impassable. Recent genetic analyses show that the rainbow trout immediately downstream of this reach are hybridized. Brown trout are present in low numbers throughout the Kern River in this reach.

Since the early 1970's there has been an increasing interest in quality trout angling through "catch-and-release" management. Under catch-and-release management, harvest is limited to 0-, 1-, or two-trout limit and angling method is generally limited to artificial lures and flies. The purpose of these regulations is to allow a wild trout population to increase in numbers and size so that the catch rate and opportunity to catch large trout will improve. This type of management has been effective in most places where it has been implemented.

The Special Management Section has been under catch-and-release management since 1990. Angling is restricted to artificial lures and flies, with barbless hooks. The daily bag and possession limit are two trout, 14-inches or greater in length. Preliminary results indicate that these regulations are improving angler success, allowing the trout population to increase and allowing for trout to achieve larger sizes. Beginning in 1994, this reach of the Kern River was opened to winter angling (November 16 through the Friday preceding the last Saturday in April) with a zero-limit during the winter season. Opening this low elevation water to angling during the winter months allows anglers access to a quality reach of river during a period when most other quality waters are closed.

This management scheme appears to be working and there are currently no plans to change this regulation. Season-long angler survey and snorkeling surveys in 1992

showed that this reach of river is responding well to special regulations. Catch rates and populations have improved since implementation of the restrictive regulation. The highest density of trout greater than 12 inches in length was observed in this 4-mile reach during the 1992 survey of the Kern River (Appendix A). There is interest in increasing the minimum size limit as the trout fishery responds to catch-and-release management and larger trout (greater than 14-inches) become more common.

The Legislation that established the catch-and-release program mandates periodic review of the angling regulation to insure trout numbers and/or size is not negatively affected by angling. The response of the fishery to current management will be evaluated in 1997 through a creel survey of anglers.

Tributary Streams

The stocking of tributary streams to the Kern River with nonnative rainbow trout has become very controversial in the last few years. The concern is that these nonnative rainbow trout will interbreed with RT-KR and result in the hybridization (loss) of these native fish. Catchable-sized nonnative rainbow trout are produced at state hatcheries outside the Kern basin and brought to Kern River Planting Base where they are held for stocking at a later time.

Nobe Young, Bone (tributaries to Dry Meadow Creek) and Dry Meadow Creek are currently stocked with nonnative rainbow trout. Dry Meadow Creek enters **Segment 2** of the Kern River about two miles upstream of Johnsondale Bridge. Dry Meadow Creek (including tributaries Bone and Nobe Young creeks), had a 1994 allotment of 2,800 trout.

These three tributary streams will continue to be stocked with nonnative rainbow trout with the understanding that this is the first priority for replacement with hatchery-reared native RT-KR. If the hatchery production of catchable RT-KR is successful, it is anticipated that this will occur within three to four years and evaluated. However, if the hatchery production of RT-KR is not successful, stocking of these tributary streams will stop. They will have to be managed under some sort of restrictive harvest to protect the few wild trout that remain in these streams.

Goals - Special Management Section

Short-term

a. Continue planting catchable-sized nonnative rainbow trout in the three tributary streams.

b. Continue present angling regulations.

c. Initiate stocking of catchable-sized RT-KR in tributaries

Long-term

d. Preserve, enhance and protect native fishes and their habitats.

e. Restore and protect the native Kern River rainbow trout to ensure that wild populations are maintained at levels that support a recreational fishery and eliminate the need for listing as threatened or endangered.

f. Manage tributary streams for Kern River rainbow trout.

g. Provide for an exceptional recreational fishery.

Objectives - Special Management Section

a. Encourage the restoration of Kern River rainbow trout.

b. Maintain a wild trout population that offers the opportunity to catch trout greater than 14-inches in length.

c. Maintain average catch rates of 0.5 trout per hour or greater in the mainstem Kern River SMS.

d. Manage tributary streams for wild Kern River rainbow trout.

e. If appropriate, eliminate nonnative trout populations that could pose a threat to Kern River rainbow trout.

Action Plan - Special Management Section

a. Produce seven thousand 8" to 10" catchable RT-KR at San Joaquin Hatchery for stocking in Bone, Nobe Young and Dry Meadows creeks.

b. Analyze trout in this section, including tributary streams, for genetic structure.

c. Maintain and enhance, where possible, the habitat (including water quality) required for optimum wild trout population.

d. Protect the natural character of the streamside environment.

e. Consider the 4-mile long Special Management Section of the Kern River for designation by the State Fish and Game Commission as a Wild Trout stream.

f. Encourage a self sustaining Kern River rainbow trout wild trout fishery.

g. Manage tributary streams for Kern River rainbow trout.

h. Provide for exceptional angling quality - when the average size of a significant percentage of the trout caught in this section of river is 14-inches or greater, consider increasing the minimum size.

Monitoring - Special Management Section

a. Conduct a creel census of anglers at five-year intervals to determine trends in the fishery.

b. Collect scales from trout observed during the creel survey to monitor growth rates.

c. Monitor trends in angler success by continuous use of the angler survey box at the Johnsondale Bridge.

d. Periodically conduct snorkeling surveys determine trends in numbers, sizes of trout present.

Segment 3: Special Management Section to Sequoia National Park Boundary

Background Information

Fisheries management in this segment of the upper Kern basin is based on naturally produced wild trout populations, except in some western tributaries (see discussion in **Segment 2** above). Two major tributaries (Little Kern River and Golden Trout Creek) contain native populations of golden trout and their management is covered by separate plans. The Kern River in this segment initially contained populations of Kern River rainbow trout that were transplanted years ago to other nearby waters. Development of motorized trail bikes resulted in easy access and over-harvest of trout in some portions of this segment. Motorized vehicles were prohibited from a portion of the area when it was designated as the Golden Trout Wilderness in 1977. Trout populations appeared to increase in size and numbers. Recently, road construction adjacent to the wilderness has resulted in easier access and again over-harvest of trout is taking place.

A rock-slide about 1866 dammed the Kern River just downstream of the Sequoia Park boundary, creating Kern Lake, which was about fifteen feet deep and a mile long. Early concerns for protecting the numerous large Kern River rainbow trout in Kern Lake as a broodstock for populating the river upstream led to its closure to fishing for several decades. Over time the river eroded its outlet and sediments filled in much of the upper portions reducing size to a few acres of shallow water so that it could no longer fulfill any fish rearing purposes. Recently the Kern Lake fishing closure was removed.

Recent genetic analyses show that pure Kern River rainbow trout are present in the Kern River upstream of Durrwood Creek (Gall, 1991). Past genetic analysis has shown that the trout near the Johnsondale Bridge are not Kern River rainbow trout. However, trout samples have not been collected and analyzed between Durrwood Creek and

Johnsondale Bridge. Brown trout are present in low numbers throughout the Kern River in this reach.

In recent years, the Kern River from the upstream boundary of the Special Management Section to the Sequoia National Park boundary has been managed with a 5 trout daily bag and 10 trout in possession limit. Angling gear had not been restricted on the Kern River in this reach previously (including the portion within the Golden Trout Wilderness).

Surveys in 1992 by California Department of Fish and Game biologists found that the trout fishery in most of the Kern River in this reach were being affected by the harvest of larger trout. In 1994 the California Fish and Game Commission adopted a regulation change for this reach. This regulation applies to the mainstem Kern River from the point where Forest Service Trail 33E30 heads east to join the Rincon Trail (the upstream limit of the Special Management Section) upstream to the mouth of Tyndall Creek in Sequoia National Park. The angling season remains unchanged, from the last Saturday in April through November 15. The maximum size limit is 10 inches total length for rainbow trout only. There is no size limit for other species of trout. Angling method is restricted to artificial lures, barbless hooks. The creel limit is two trout per day, two trout in possession. In addition, up to 10 brook trout, less than 8 inches in length, may be taken per day.

There are several concerns for the fisheries in **Segment 3**. The presence of nonnative trout is a threat to the continued existence of native Kern River rainbow trout. The number of Kern River rainbow trout in portions of the Kern River are depressed due to over-harvest. While catch rates are good (1.72 trout per hour) in portions of the Kern River, trout populations are limited and catch rates are lower than in **Segment 4** (Sequoia National Park) and angler response is negative toward the small numbers and size of trout in the catch. Few trout over 12 inches were observed in the Kern River during a 1992 California Department of Fish and Game survey, indicating over-harvest (Appendix A).

Tributary Streams

Tributaries to the Kern River in **Segment 3** (except the Little Kern River and Golden Trout Creek) were probably originally barren of fish life or had Kern River rainbow trout present. Early management consisted of transplanting native species from nearby waters into these streams. Later, nonnative rainbow, brook and brown trout were introduced to many of these waters.

Fishery surveys have determined the distribution of various trout species within some tributaries in **Segment 3**. Recent genetic analyses show that pure Kern River rainbow trout are present in upper Ninemile Creek, Rattlesnake Creek, Osa Creek and possibly upper Peppermint Creek. Nonnative rainbow trout are known to inhabit lower Ninemile Creek, Durrwood Creek, and Freeman Creek (Gall, 1991). Brook trout are present in Coyote Lakes.

The angling season is open from the last Saturday in April through November 15. In non-wilderness area tributaries the daily bag limit is 5 trout with 10 in possession. Angling in tributaries within the Golden Trout Wilderness is regulated to restrict the harvest of native trout. The daily bag and possession limit is 5 trout in all streams in the Golden Trout Wilderness, except the Kern River (see above). In all waters within the Golden Trout Wilderness, including the mainstem Kern River, angling is restricted to artificial lures and flies, with barbless hooks.

Two tributaries, Peppermint and Freeman creeks, enter the Kern River in **Segment 3**. Their 1994 allotment was 3,800 trout and 400 trout respectively. Of these two tributary streams, only Freeman Creek enters the Kern River where RT-KR are thought to exist. Tributary streams in **Segment 2** and along the Lloyd Meadow Road in **Segment 3** (Figure 2) are currently stocked annually with a total of 7,000 nonnative rainbow trout. This is a reduction from previous years when 18,000 catchable trout were stocked.

With the possible exception of upper Peppermint Creek, Kern River rainbow trout do not appear to be present in these tributaries. However, Kern River rainbow trout may currently be present where these streams enter the Kern River. Stocked trout have been observed in the Special Management Section of the Kern River. These fish either moved downstream from these tributary streams or upstream from Johnsondale Bridge area. There are concerns that trout stocking is currently, or will in the future, impact Kern River rainbow trout restoration efforts through hybridization.

The highest priority action item for **Segments 2** and **3** is the replacement of nonnative rainbow trout stocked in the western tributary streams along the Lloyd Meadow Road with Kern River rainbow trout produced at San Joaquin Hatchery. The production of these fish, if the broodstock program is successful, is three to fours years away.

It is clear that as the restoration of Kern River rainbow trout progresses downstream, the issue of stocking nonnative rainbow trout in these western tributary streams will have to be addressed. If the production of catchable sized Kern River rainbow trout (or some other stocking alternative) is not successful, stocking nonnative trout in these tributary streams will be terminated. Management would be changed to restoration of habitat and production of wild trout. This would include restrictive harvest regulations because of the limited resources that would be available.

Goals - Special Management Section to Sequoia National Park Boundary

Short-term

a. Continue planting catchable-sized nonnative rainbow trout in Freeman and Peppermint creeks.

b. Continue present angling regulations.

c. Initiate stocking of catchable-sized RT-KR in Freeman and Peppermint creeks.

Long-range

a. Preserve, enhance, and protect native fishes and their habitats.

b. Restore and protect the native Kern River rainbow trout to ensure that wild populations are maintained at levels that support a recreational fishery and eliminate the need for listing as threatened or endangered.

c. Provide for exceptional recreational fishing.

d. Manage tributary streams for Kern River rainbow trout.

Objectives - Special Management Section to Sequoia National Park Boundary

a. Replace nonnative rainbow trout with Kern River rainbow trout in those tributary streams along the Lloyd Meadow Road that are currently stocked with catchable trout.

b. Determine the presence and distribution of nonnative trout in tributary streams.

c. Manage tributary streams for Kern River rainbow trout.

d. Encourage the restoration of native Kern River rainbow trout to a historical size and number.

e. Regulate angling to provide opportunities for exceptional recreational fishing for wild trout.

f. If appropriate, eliminate nonnative trout populations that could pose a threat to Kern River rainbow trout.

Action Plan - Special Management Section to Sequoia National Park Boundary

a. Annually produce Kern River rainbow trout for stocking in Freeman and Peppermint creeks.

b. Identify and mitigate threats to native fish and their habitat.

c. Conduct genetic analysis of trout in the Kern River and tributary streams to detect threats to Kern River rainbow trout.

d. Maintain and enhance, where possible, habitats (including water quality) required for optimum wild trout populations.

e. Protect the natural character of the stream-side environment.

f. Regulate angling to produce an exceptional trout fishery.

Monitoring - Special Management Section to Sequoia National Park Boundary

a. Periodically conduct angler surveys to evaluate the effectiveness of current management direction.

b. Evaluate effectiveness of this stocking program.

c. Evaluate current regulations to ensure that quality angling can be maintained.

d. Continue the operation of the angler survey box at Forks-of-the-Kern trailhead to monitor trends in fishing success.

e. Collect scales from trout observed during the creel survey to monitor growth rates.

f. Periodically conduct direct observation surveys (using face- plate diving techniques) to determine trends in numbers, sizes of trout present to ensure the trout population is responding to management actions and goals are being met.

Segment 4: SEQUOIA NATIONAL PARK

Background Information

The entire upper Kern basin in Sequoia National Park is managed as wilderness. Access to the area is difficult so angler use has always been relatively light. The Kern River within **Segment 4** (Figure 4) initially contained populations of native Kern River rainbow trout.

Tributary streams in **Segment 4** were initially barren of fish life because glaciers had eliminated fish populations, and waterfalls in their lower reaches prevented fish from re-populating from downstream. Early management consisted of transplanting fish from nearby native populations, especially Volcano Creek golden trout, into barren tributary waters within **Segment 4**. Little Kern golden trout were transplanted into Coyote Creek from the Little Kern River watershed, and are presently used as one of the remaining stocks for the restoration of this sub-species. Other, nonnative trout (brook, brown, and rainbow), have been introduced into some of the tributaries and have established populations that persist today. Downstream movement of trout with nonnative genetic characteristics could eventually result in the extinction of Kern River rainbow trout in the

entire Kern River. Introducing nonnative species is now prohibited by Sequoia National Park policy.

Exceptional angling opportunities exist in almost all tributary streams and lakes in Sequoia National Park under present regulations.

Under regulations adopted in 1994, angling in the mainstem Kern River downstream of Tyndall Creek to the upstream boundary of **Segment 2** (Forest Service trail 33E30), is restricted to artificial lures and flies, with barbless hooks. Anglers may only keep two trout, with a maximum size limit of 10-inches for rainbow trout. There is no size limit for other species of trout, but only two trout may be kept from the Kern River. In addition, up to 10 brook trout less than 8 inches in length may be taken per day. The tributary streams are not affected by this regulation.

Angling regulations on the balance of the waters in **Segment 4** are the same as the Sierra District General Regulations. All lakes are open to year round angling. The angling season for streams is from the last Saturday in April through November 15. The daily bag limit is 5 trout, with 10 in possession. In addition, up to 10 brook trout less than 8 inches in length may be taken per day.

Fishery surveys have determined the distribution of various species in some of the waters within **Segment 4**. Recent genetic analyses show that pure Kern River rainbow trout remain in the Kern River within **Segment 4**. Additional sampling of tributary trout populations will help to determine future management direction, which may include restoration of wild populations of Kern River rainbow trout.

The results of a 1992 California Department of Fish and Game survey of the Kern River within the Park raised several concerns about the future of this Kern River rainbow trout population. Trout populations are relatively low and there is a lack of larger size classes. With populations of about 4,000 fish per mile, only about 25 percent are trout (4% by weight); the rest are suckers. Almost all the trout are Kern River rainbow trout, but a few brown and brook trout are present. The abundance of suckers could be a result of recent drought conditions, the effects of the beaver on the habitat or the result of a lack of large predatory trout.

Angler catch rates are high (2.55 to 3.73 trout per hour), indicating extreme vulnerability of the trout, in view of their scarcity. An angler opinion survey showed that there was a general satisfaction with fishing on the Kern River in **Segment 4**, but concerns were expressed about the number of suckers present and the need for restrictive regulations on the harvest of rainbow trout and their enforcement. Even though most of the trout caught by anglers are returned to the stream, there is still a lack of larger sizes (few trout over 12 inches in length have been caught or observed).

Goals - Sequoia National Park

Short-term

a. Determine genetic status of trout populations in the Kern River and tributary streams.

b. Determine the effects of beaver on the aquatic habitat and fish populations.

Long-range

a. Restore and maintain the historic distribution and abundance of native fish and their habitat.

b. Restore historic age and size structure to the Kern River rainbow trout population.

c. Provide for a quality recreational fishery.

Objectives - Sequoia National Park

a. Determine the population structure and distribution of existing fish species and monitor long-range changes.

b. Determine the distribution of nonnative trout in tributary streams.

c. Identify and mitigate threats to native fish and their habitat.

d. Provide opportunities for exceptional recreational fishing for wild trout.

e. If appropriate, eliminate nonnative trout populations that could pose a threat to Kern River rainbow trout.

Action plan - Sequoia National Park

a. Determine the distribution and relative abundance of native and nonnative fish species in tributary streams using results of genetic studies, historic records, and location of natural fish barriers. Human influences will be determined from historic records, from a systematic survey of the drainage, and from a genetic analysis of fish in the drainage. Evaluate the potential threats to Kern River rainbow trout in the Kern River.

b. Conduct research on the ecological effect of beaver on the relative abundance of Sacramento sucker and Kern River rainbow trout. It is currently believed people introduced beaver into the Kern River drainage beginning in the 1940's. Beaver rapidly moved upstream into the Park causing widespread changes to the

riparian vegetation and stream channels. There is concern that beaver populations may have altered natural spawning conditions, changing the relative abundance of native species.

c. Conduct research on historic mechanisms that have prevented interbreeding within the historic range of Kern River rainbow trout and determine how current demographics may influence or change those historic mechanisms for reproductive isolation.

d. Recreational fishing will be permitted in accordance with state and federal laws. Angling regulations will be recommended to enhance fish population structure so that all size classes occur at an abundance that is controlled primarily by natural factors. Regulations will minimize hooking mortality and require release of those fish whose harvest would have the most adverse impact on native fish population structure and abundance. Regulations will encourage catch-and-release fishing of native species and harvest of introduced species. Regulations will provide for limited harvest of native species.

e. Remove fish populations that threaten the existence of native Kern River rainbow trout and replace them with native Kern River rainbow trout transplanted from adjacent populations where such action is consistent with National Park Service policy.

f. Retain populations of nonnative trout that do not threaten native trout, other aquatic resources or other native wildlife within the park.

g. Remove nonnative fish populations that threaten native fish and other wildlife. If nonnative fish need to be removed, preference will be given to removing fish from those areas that present the greatest risk to native species and which receive the least human visitation. Native species will be restored to areas where they are known to have occurred historically and managed to restore a natural size-class distribution and abundance. Fish will not be planted in areas that are naturally barren of fish. Native species may be planted beyond their pristine distribution in designated historic zones if they contribute to the historic scene and do not threaten adjacent natural areas.

Monitoring - Sequoia National Park

a. Periodically conduct fish population surveys near Junction Meadow, Upper Funston Meadow, and Lower Funston Meadow. Monitor fish populations on the Kern River at five-year intervals in permanent transects located near Lower Funston, Upper Funston, and Junction Meadow. Document changes in size-class distribution and abundance of each species to assess the relationship between fish populations and harvest practices as well as the impacts of

nonnative species. The 1992 fish population survey data will be used as a baseline.

b. Genetically evaluate Kern River rainbow trout populations periodically to ensure they are not being effected by hybridizing with nonnative trout.

c. Evaluate the effects of angling regulations in accomplishing desired goals by assessing angler success and harvest practices through the use of the angler survey box at Kern Ranger Station and occasional trout population inventories.

d. Spot check the distribution of fish species in tributary streams at ten year intervals. Existing populations of nonnative fish that may pose long-range threats to native populations will be evaluated at five-year intervals. If any fish populations are either restored or eliminated, those sites will be surveyed annually for five consecutive years to ensure that management actions are effective.

e. Trends in the quality of the recreational fishery will be spot-checked by rangers while doing routine patrol and documented in their annual end-of-season reports.

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CHAPTER 5 - ENVIRONMENTAL CONCERNS

Nothing in this plan is intended to relieve the cooperating agencies from their responsibilities for compliance with the National Environmental Policy Act or the California Environmental Quality Act. Any significant actions proposed under this plan, as well as any dealing with the concerns discussed below, will require compliance with these and all other laws.

BACKGROUND INFORMATION

With the immigration of Europeans to the area, human habitation in the Kern River Valley changed from scattered tribes of native people to development of ranches and small settlements. This resulted in the alteration of some riparian habitats in alluvial areas for homes and crops, small diversion of water for irrigation and an increase in fish harvest for food and recreation. Early development consisted of establishment of trails, equestrian transportation, mining, primitive roads, timber cutting and grazing of domestic sheep and cattle. Soil disturbance and vegetative removal from some of these activities most likely caused erosion and stream sedimentation in some areas. Meadow dissection also occurred in a number of locations.

Increases in human populations over the years resulted in more demands on the environment for timber cutting with its associated road construction. Additional stream sedimentation accompanied this development. A lumber mill community was developed at Johnsondale but recently these operations were moved west to Terra Bella in the San Joaquin Valley. Activities associated with the construction and operation of the Johnsondale facilities resulted in some stream sedimentation. Spills from the log pond also caused some pollution incidents in South Creek and the Kern River.

Improvement in access brought additional recreational use to the upper Kern basin with a consequent reduction in trout populations. Cow camps, mining camps, campsites and summer cabins are scattered around the drainage. In addition to the recreation-based facilities in the Kern River Valley, commercial resorts are located at Fairview, Roads End, Johnsondale and Quaking Aspen. The upper Kern basin upstream of Johnsondale Bridge has had limited recreational development, however, it is heavily influenced by developments in the Kern River Valley and areas to the west. Trout populations have been depleted in almost all of the easily accessible areas and reduced in most others due to over-harvest.

In the 1920's a hydro-electric power project was constructed on a 15 mile stretch of the Kern River north of Kernville. This development, which consists of roads for access, a diversion (Fairview Dam), a tunnel, flume and penstock delivery system, a powerhouse and transmission lines, takes a maximum of 600 cubic feet per second of water from the river. Reduction of flow in the diverted section of the river has resulted in altered stream habitats and a shift in balance from trout to non-game fish species. A fish ladder was

provided at Fairview Dam to allow upstream passage of fish. Initial flow releases past Fairview Dam of 2 cubic feet per second provided for fish ladder operation during the period when the dam is not spilling. Recently these flows have been increased to 100 cubic feet per second during portions of the year to improve conditions for trout. Under these flow releases, trout habitat is not equivalent to pre-project conditions. This hydro-electric facility is currently being relicensed. The procedure for relicensing is a lengthy one in which environmental concerns are addressed and solutions recommended. The final issuance for the license is expected about 1995. Negotiations between Southern California Edison Company and the management agencies are in progress.

MINING

Mining and mineral resources have played an important role in the history of the upper Kern basin. Many of the early settlers of the area were prospectors. Several gold, silver, and tungsten claims were filed along the river in the late 1800's and mid- 1900's. Considerable prospecting occurred and some gold and a small quantity of tungsten was removed for milling. The upper Kern basin did not support large scale mining efforts.

The most abundant salable mineral resources are rock aggregate and decomposed granite. Oil, gas, and other leasable mineral potential is very low. Mining and exploration are not expected to increase in the near future. There are currently several active mines in the basin. These mines are small and do not produce a large quantity of minerals. The disturbance from these active mines is minimal.

TIMBER MANAGEMENT AND ROADS

The upper Kern basin has a long history of timber harvest. The tributary drainages on both sides of the River, from Isabella Reservoir to the Golden Trout Wilderness have been roaded and logged. Some of the tributary drainages have been extensively roaded. Timber units and roads have combined to increase the sedimentation of these small streams. A comprehensive approach to correcting past problems and restoring watersheds is needed.

The upper Kern River is a large system that is capable of carrying more sediment than is being delivered (SCE, 1991). Therefore, the sedimentation problems in the small streams have not had much of an impact on the river. However, because of sedimentation, habitat conditions in the tributaries have been degraded as well as their value as food sources for fish populations in the Kern River. In addition, the value of the lower reaches of tributaries as spawning habitat and nursery grounds for river fish has probably been reduced.

DOMESTIC LIVESTOCK GRAZING

Livestock grazing is permitted in most of the upper Kern basin within Sequoia National Forest. The grazing has impacted some tributary drainages. These small stream

systems have been altered by a history of bank damage, erosion and increased sedimentation from grazing. The Kern River has not been affected to a large degree due to its size and high flows. However, the river fish populations are linked to the tributary streams as discussed above. Efforts are currently underway to document these impacts through monitoring current grazing practices. Standards will be set and grazing modified to meet these standards.

RECREATION

Visitor use in some upper Kern basin areas is high and there are impacts to the aquatic environment. This is especially true for some of the tributary streams along the Lloyd Meadow Road. While a few developed campgrounds exist in this area, there are many primitive campsites. Sanitary facilities are not available. Visitors are allowed to drive vehicles over large areas along streams. The result is many areas where heavy rains result in runoff of surface soils into the creeks. Efforts should be made to either develop additional improved campsites or place some control over use of these undeveloped campsites.

There is similar concern for undesignated campsites along the Kern River between Kernville and the Johnsondale Bridge. While some sanitary facilities are available, they may not be adequate for the number of visitors in this area. This is a problem which will have to be addressed by the land management agency.

COLIFORM BACTERIA

The lower reaches of the Kern River, from Johnsondale Bridge downstream, receive high recreational use. Much of this use involves human contact with the water that flows in the Kern River. At certain times of the year when the flow in the river are low, there appears to be a health concern due to high levels of coliform bacteria. The source(s) of this contamination is unknown, but most likely come from fecal contamination of the water from human and/or animal waste. This management plan proposes funding (Table 1) a study to determine the source(s) of this contamination. Once located, steps would be undertaken to reduce or eliminate the risk of contamination.

WATER DIVERSION

The water diversion that has the greatest impact on the trout fishery occurs in Segment 1. Water is diverted by Southern California Edison Company at Fairview Dam for hydro-electric power generation at Kern River Number 3 Powerhouse. There is potential for improving habitat for trout during low flow periods by reducing water temperatures by increasing flow releases from Fairview Dam. The various agencies and the public should work through the relicensing process, or other methods if practical, to obtain these water allocations during this critical low flow period.

BEAVER

There is concern that beaver may be impacting fish and wildlife resources of the upper Kern basin. Not much is known about the impacts of beaver on other aquatic dependent resources, especially fish populations. We have made provisions in this plan to study the impacts of beaver in the upper Kern basin (Table 1). It is anticipated that this would be a project conducted by a graduate student with financial support from the agencies. This study may have to wait to the return of a wet cycle to provide suitable conditions evaluate. The current drought appears to be forcing the beaver in the lower reaches of the drainage. However, once a wetter cycle returns, the beaver will migrate up the Kern River.

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APPENDIX A - KERN RIVER FISHERY INFORMATION

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Tables and Figures

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INTRODUCTION

Appendix A summarizes fishery information available on the Kern River upstream of Isabella Reservoir. In some instances information is relatively old and needs to be updated. The information contained in this appendix is important because it forms the biological basis for fishery management decisions and recommendations made in this management plan. Information is grouped into the same four river Segments as used in the management plan.

SEGMENT 1 - ISABELLA RESERVOIR TO JOHNSONDALE BRIDGE

Fish Population Surveys

Most of the current fishery information for Segment 1 comes from studies done for Southern California Edison Company as part of their relicensing of Kern River Powerhouse Number 3. Southern California Edison (SCE) has given permission for their information to used in this management plan.

Five sites were sampled by SCE's consultant with electrofishing equipment in 1989 and 1990 to collect fish for analysis and estimate the population of the various species. The sites sampled were between Kern River No. 3 Powerhouse to just upstream of Fairview Dam. Species composition by percent abundance from the 1989 survey are summarized in Figure 1. Sacramento squawfish were the most frequent species collected in the two downstream sites. Sacramento sucker dominated the samples in total biomass.

Wild trout were present in very low numbers at all five sample sites. They comprised just under 5% of the estimated biomass upstream of Fairview Dam and about 3% immediately downstream of the dam (Figure 1). Very few wild trout were observed at the other sample sites. The 1990 electrofishing results were very similar and are not presented here.

Fish populations at the five sample sites were also evaluated during 1989 using direct observation techniques (snorkeling). The results of the survey (Figure 2) were different from the electrofishing survey. Squawfish were the most frequently observed species at all five sites, followed by suckers. Other species were observed in low numbers.

It has been the experience of DFG biologists that suckers are underestimated by direct observation. They tend to hug the stream bottom and disappear under rocks at the sight of a diver. The squawfish are probably underestimated by electrofishing. The deep waters of the Kern may have made it difficult to collect these larger fish. The fish population is most likely what was seen in the electrofishing data, with the addition of some larger squawfish. In both instances, wild trout were present in very low numbers.

Age and Growth

The only information on age and growth for trout from this reach of river comes from the SCE study (Table 1). Age and growth information from various sections of the Kern River, and other rivers, is compared later in Table 8.

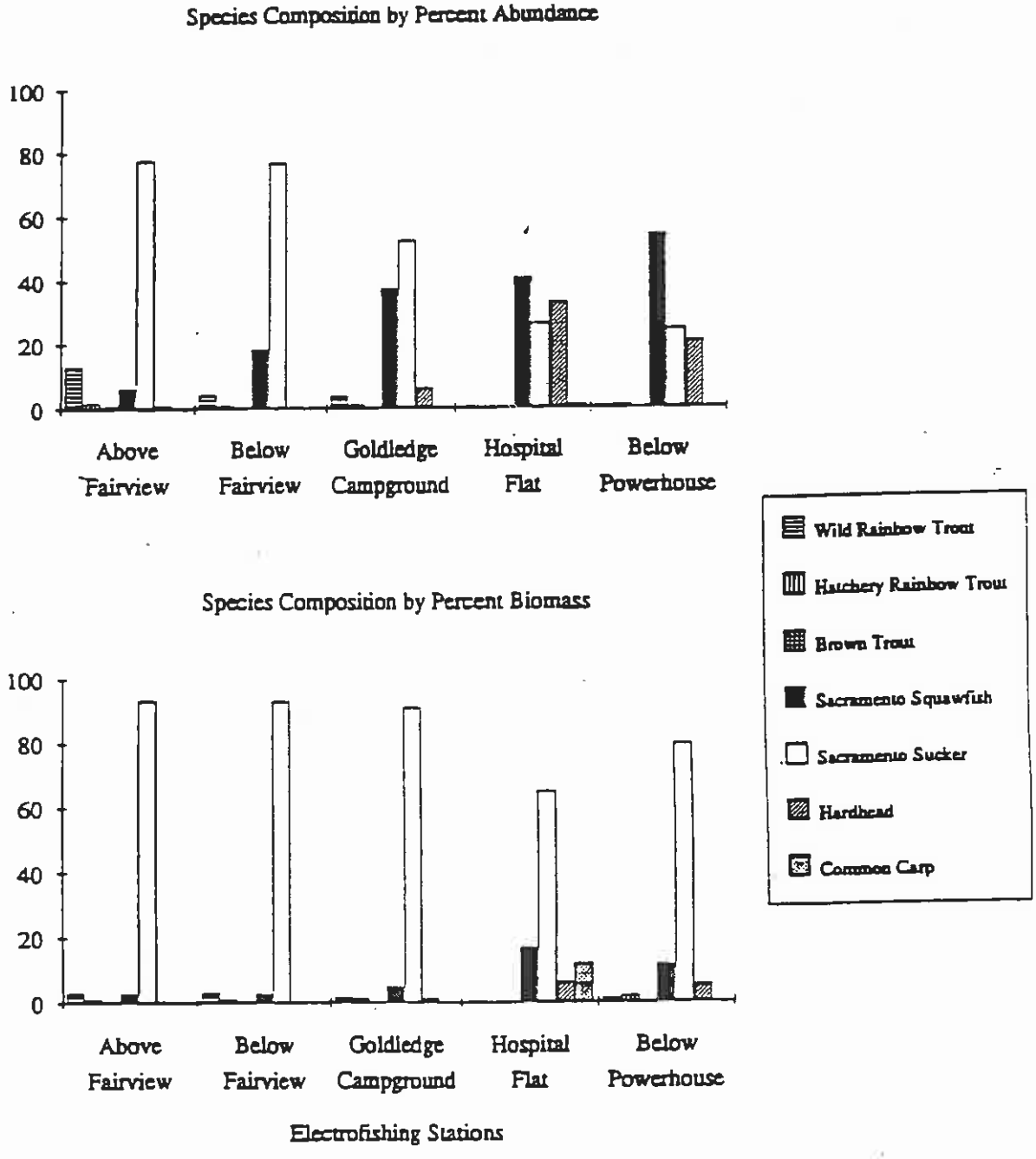

Figure 1 - Species Composition by Percent Abundance and Biomass for Five Electrofishing Stations, North Fork Kern River, September 1989 (SCE, 1991)

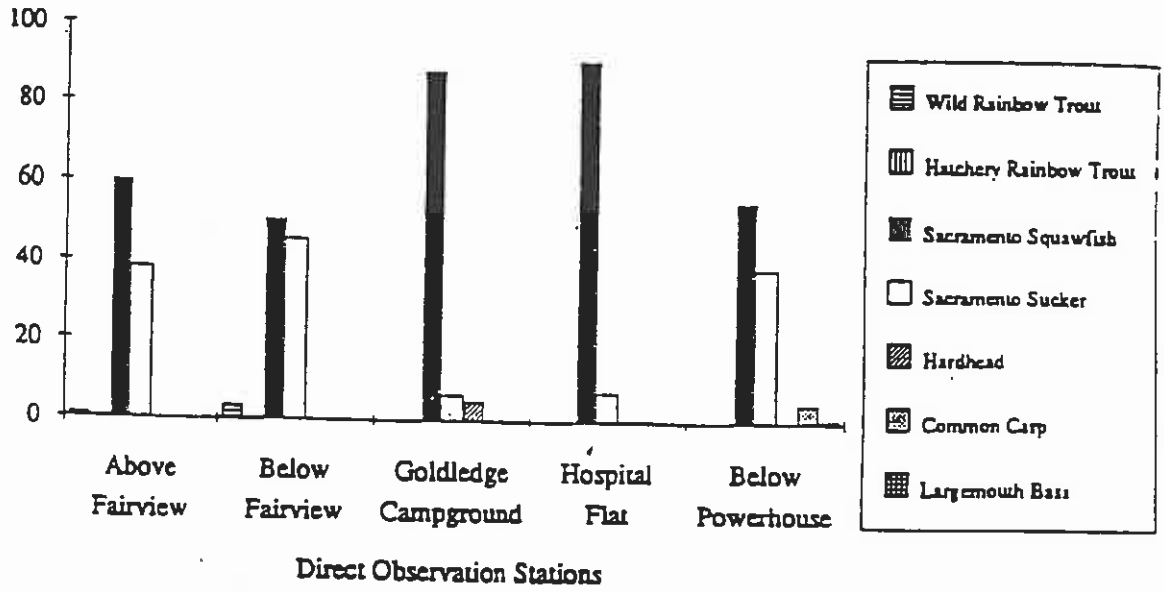

Figure 2 - Species Composition by Percent Abundance for Direct Observation Stations, North Fork Kern River, September 1989 (SCE, 1991)

Age Class	1989 Range (mm)	Fish / km by Age Class	Percentage of Total Population	1990 Range (mm)	Fish / km by Age Class	Percentage of Total Population
Above Fairview Diversion Dam						
0+	60-104	346	56	70-116	150	63
1+	135-174	128	21	166-185	50	21
2+	171-206	128	21	196-225	30	13
3+	274	18	3	230	10	4
Below Fairview Diversion						
0+	52-96	91	29	101-113	57	31
1+	153-178	45	14	121-139	57	31
2+	169-197	137	43	169-210	72	38
3+	162-270	45	14	—	0	0
Near Goldledge Campground						
0+	65-110	129	48	105	12	14
1+	110-175	51	19	145	12	14
2+	184-195	51	19	194-204	62	72
3+	200-225	38	14	---		
Near Hospital Flat Campground						
0+	83	10	100	---	0	0
1+	—	0	0	---	0	0
2+	—	0	0	---	0	0
3+	—	0	0	---	0	0
Below Powerhouse No. 3						
0+	—	0	0	Not sampled in 1990		
1+	—	0	0			
2+	182-188	29	67			
3+	215	14	33			

Table 1 - Rainbow Trout Age Structure by Electrofishing Sampling Location for the North Fork Kern River, 1989 and 1990. (SCE, 1991)

SEGMENT 2 - SPECIAL MANAGEMENT SECTION

The Special Management Section (SMS) of the Kern River was included under catch-and-release management by the State Fish and Game Commission in 1990. Anglers are restricted to artificial lures, with barbless hooks. Only two trout, 14-inches or greater in length may be kept during the last Saturday in April through November 15 season. Beginning in March 1994, angling was allowed during the winter season (November 16 through the Friday proceeding the last Saturday in April). While terminal tackle requirements remain unchanged, there is a zero trout limit during this winter season.

Following are summaries of information collected from the SMS.

Creel Census

A roving creel census of anglers on the 4-mile SMS was conducted in 1989, prior to the implementation of the special regulation (Stephens, 1993a), and in 1992, after regulation implementation (Stephens, 1993b). Anglers were interviewed 12-days each month during the general trout season. Census efforts were evenly divided between weekend and weekdays. The census was conducted from dawn to dusk and information on hours fished, area of the river fished, number and species of fish kept and released was recorded. The length of fish released was estimated and fish kept were measured and weighed when possible. In addition, scales were collected for age determination. Census techniques were identical in both years.

The number of anglers interviewed and hours fished during 1989 and 1992 were similar (Table 2). There was an increase in the trout catch per hour in 1992 compared to the 1989 catch. In 1989, prior to implementation of the restrictive regulation, 234 were kept by anglers interviewed. In 1992, this figured dropped to only 16 trout. This is a dramatic reduction in harvest. The majority (98%) of trout caught in both years were rainbow trout.

The length-frequency of trout reported in the 1989 and 1992 census are compared in Figure 3. There is an increase in the number of trout caught in all size ranges in 1992 (except for the less that 6-inch size category) compared to 1989. In 1989 1% of the trout caught were greater than 14-inches. This figure jumped to 3% during the 1992 census.

A total of 58 non-game fish were reported during the 1992 census. The catch consisted of 43 Sacramento squawfish and 15 Sacramento suckers. Most of these fish were released alive.

Angler Survey Box

An angler survey box is located immediately upstream of the Johnsondale Bridge on the east bank. Anglers are asked to complete a survey form (Attachment A) at the end of the angling day. Information from the survey box is used to monitor long term trends in the fishery. Angler survey box data for 1990 through 1992 is summarized in Table 3.

Not all anglers complete survey forms and there is most likely a tendency for unsuccessful anglers not to complete forms, resulting in an overestimation of the catch rate. This overestimation can be evaluated by comparing the results to those of the creel census. The catch rates from the 1992 angler survey box (0.86) and the 1992 creel census (0.76) are relatively close.

	No. Anglers	No. Hrs.	Rainbow Kept	Rainbow Rel.	Brown Kept	Brown Rel.	Total	C/Hr
1989	863	1643	229	742	5	11	987	0.60
1992	838	1624	16	1200	0	24	1240	0.76

Table 2 - Comparison of Results of the 1989 and 1992 Creel Census of the Special Management Section, Kern River.

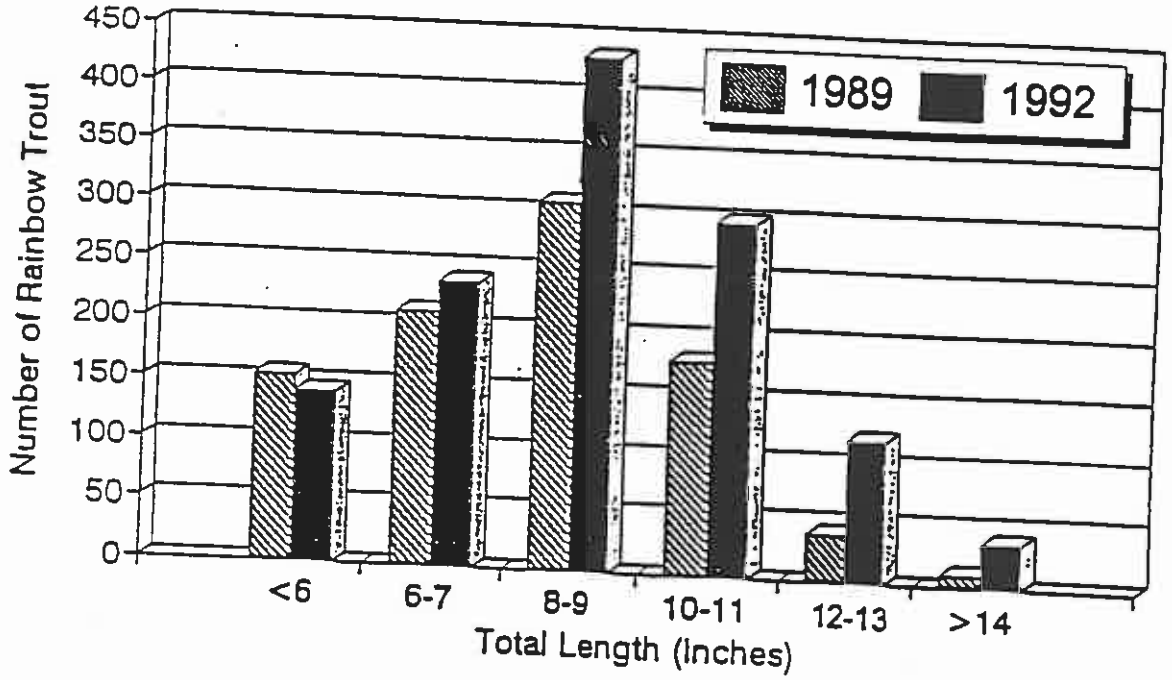

Figure 3 - Comparison of Length-Frequency of Trout Reported During the 1989 and 1992 Creel Census of The Special Management Section, Kern River.

Direct Observation

The 4-mile Special Management Section was sampled using direct observation methods September 2-4, 1992. Divers began at the upstream boundary of the reach and traveled downstream approximately 3-miles to the Johnsondale Bridge (4-3.3 through 2-1.2, Figure 4). Counts of fish were made in the deeper pool and run habitats. A total of 28 habitat units measuring 6,291 feet length were counted by observers using mask and snorkel. Because Sacramento suckers were so abundant they were counted in only 25% of the habitat units sampled. Only one brown trout was observed. Trout were counted in size groups of <6 inches, ≥6 inches, and ≥12 inches. Results of the fish counts are shown in Table 4. The highest density of trout greater than 12-inches were seen in the SMS section of river (with the exception of the Park).

	1990	1991	1992
Surveys received	138	221	230
Hours fished	568.3	956.5	1015.5
Rainbow trout kept	8	9	18
rainbow trout released	677	956	812
Total rainbow trout	685	965	830
Brown trout kept	0	0	5
Brown trout released	26	21	41
Total Brown trout	26	21	46
Overall catch/hour	1.25	1.03	0.86
Mean trout/angler	5.2	4.5	3.8

Table 3 - Summary of Johnsondale Bridge Angler Survey Box Results, 1990 through 1992.

	TOTAL LENGTH (Inches)			
Species	< 6 in.	≥ 6 in.	≥ 12 in.	Total
rainbow trout	146	333	48	527
Sacramento sucker				1,358
Sacramento squawfish				353

Table 4 - Count of fish (number/mile) from 28 habitat units in the Special Management Section, 1992.

Age and Growth

Scales were collected from angler caught fish during the 1989 creel survey of the Special Management Section. They were aged by DFG biologist (Table 8).

SEGMENT 3 - SPECIAL MANAGEMENT SECTION TO SEQUOIA NATIONAL PARK BOUNDARY

Almost no information is available for the reach of river between the upstream boundary of the SMS and Forks of the Kern. Access is limited to fishermen's trails that follow along tributary streams from the lower Lloyd Meadow Road down to the Kern River. Travel upstream and downstream from these trails is reported to be limited.

Little fishery information is available for the Kern River between Forks of the Kern and Sequoia National Park. Fishery information was collected during 1992. Monitoring of the fishery consisted of a creel census, angler survey boxes, postcard and snorkeling surveys.

Backcountry Creel Census

A creel census clerk surveyed anglers on the Kern River in the Golden Trout Wilderness on five occasions in July and August 1992. The census clerk alternated his entry into the wilderness between the south and north. He would contact as many anglers as possible and gather information on hours fished and numbers and species of fish caught and released. Fish were measured and weighed when possible. Trips lasted from three to five days. The information was not separated by park and forest, so these results include the entire Kern River from Forks of the Kern upstream to the headwaters.

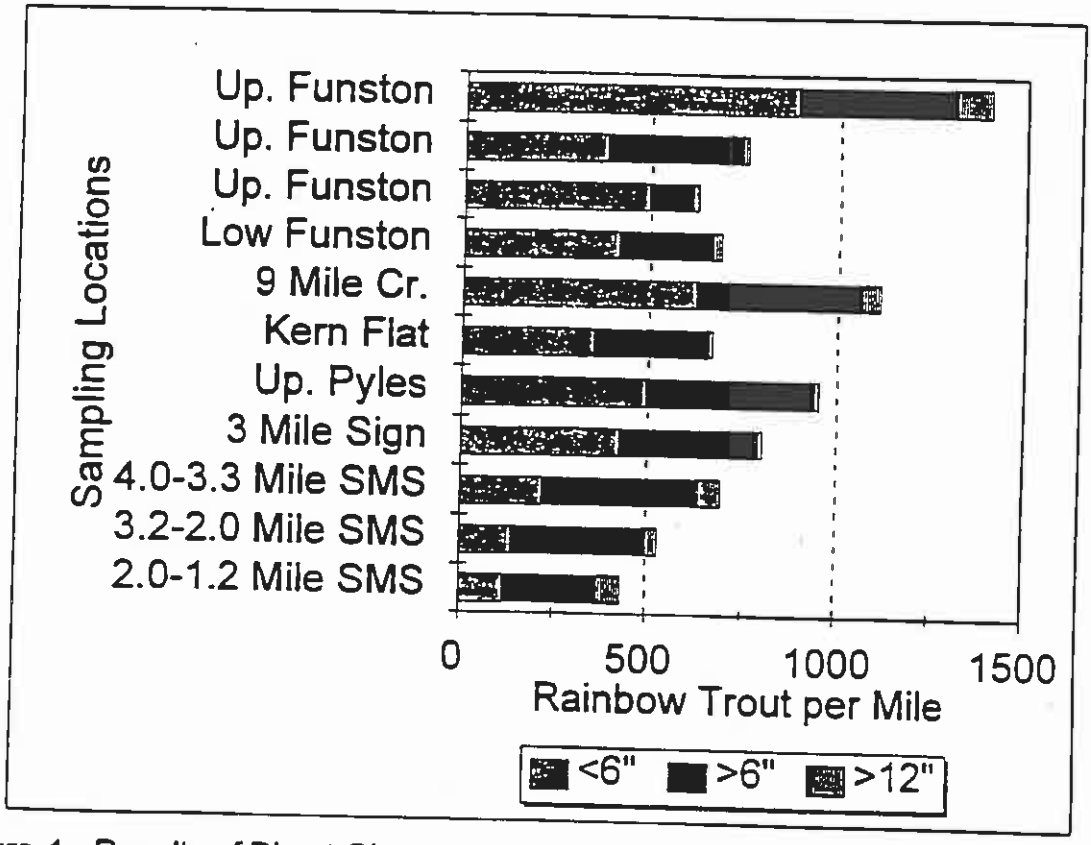

Figure 4 - Results of Direct Observation and Electrofishing Surveys on the Kern River During 1992 (see below for description of name abbreviation).

Segment 4

Up. Funston	Electrofishing sites in the park,
Low Funston	Snorkeling site in the park just upstream of Low Funston Meadow.
9 Mile Cr.	Snorkeling, Kern River beginning an confluence of Ninemile Creek downstream to confluence of Mahogany Creek.

Segment 3

Kern Flat	Kern Flat
Up. Pyles	Pyles Camp
3 Mile Sign	3 mile sign

Segment 2

4.0-to 2-1.2	4-mile Special Management Section upstream of Johnsondale Bridge

Twenty-five anglers were contacted during the 18-days of actual creel census. They had fished a total of 63.5 hours and caught 109 trout (1.72 trout per hour). The catch was composed of rainbow trout, except for one brown trout. Forty percent of the trout were harvested.

The length-frequency of the rainbow trout reported during the creel census is summarized in Figure 5. Seventy-eight percent of the rainbow were less than 12-inches in length. The average length of the rainbow trout was 8.9-inches. Note the high percentage of trout greater than 8-inches harvested.

Angler Survey Box

An angler survey box is located at Forks of the Kern Trailhead. This is the point of access for this section of river for most anglers. The results of the 1990 through 1992 survey are summarized in Table 5. The catch rate is relatively high, ranging from 1.07 to 1.93 trout per hour.

Postcard Survey

Another approach used to collect information on angler success on the main stem Kern River was through the use of an angling survey postcard. About 800 postcards were printed (Attachment B) at the expense of a local angling club. The postcards were distributed to government agencies who issued wilderness permits and commercial horse pack stations who use the area. In addition, cards were handed-out by the creel census clerk (see below). Postage was applied to 200 of cards in an attempt to increase their return.

It is apparent few of these cards were handed out to backcountry users. Only nineteen cards were returned. Of these, 68% were cards handed out by the creel census clerk. Some cards contained information on more than one angler or covered more than one

day of fishing. A total of 22 anglers were accounted for on the cards. Anglers were asked where they fished. Using this information, the results were divided between the park and the forest.

Nine anglers fished the Kern River in Sequoia National Forest. They fished a total of 79 hours and caught 106 trout (1.34 trout/hour). The catch consisted of 103 rainbow and 3 brown trout. Thirty-four percent of the rainbow trout catch was harvested. Ninety-one percent of the rainbow trout were reported to be less than 12-inches in length. All 3 brown trout were greater than 12 inches (Figure 6).

Anglers were asked to rate their angling experience from -2 (not satisfied) through a scale to +2 (satisfied). The three categories were: 1) Overall angling experience; 2) size of the trout; and 3) number of trout (Attachment B). The results (negative and positive numbers) were added to obtain an overall score (Table 6).

Anglers were asked to express their opinion about their angling experience on the back side of the postcard. Several anglers (8) took the opportunity to write a note. Several anglers expressed concern about the large number of Sacramento suckers observed. Some anglers had comments about the need/lack of need for restrictive angling

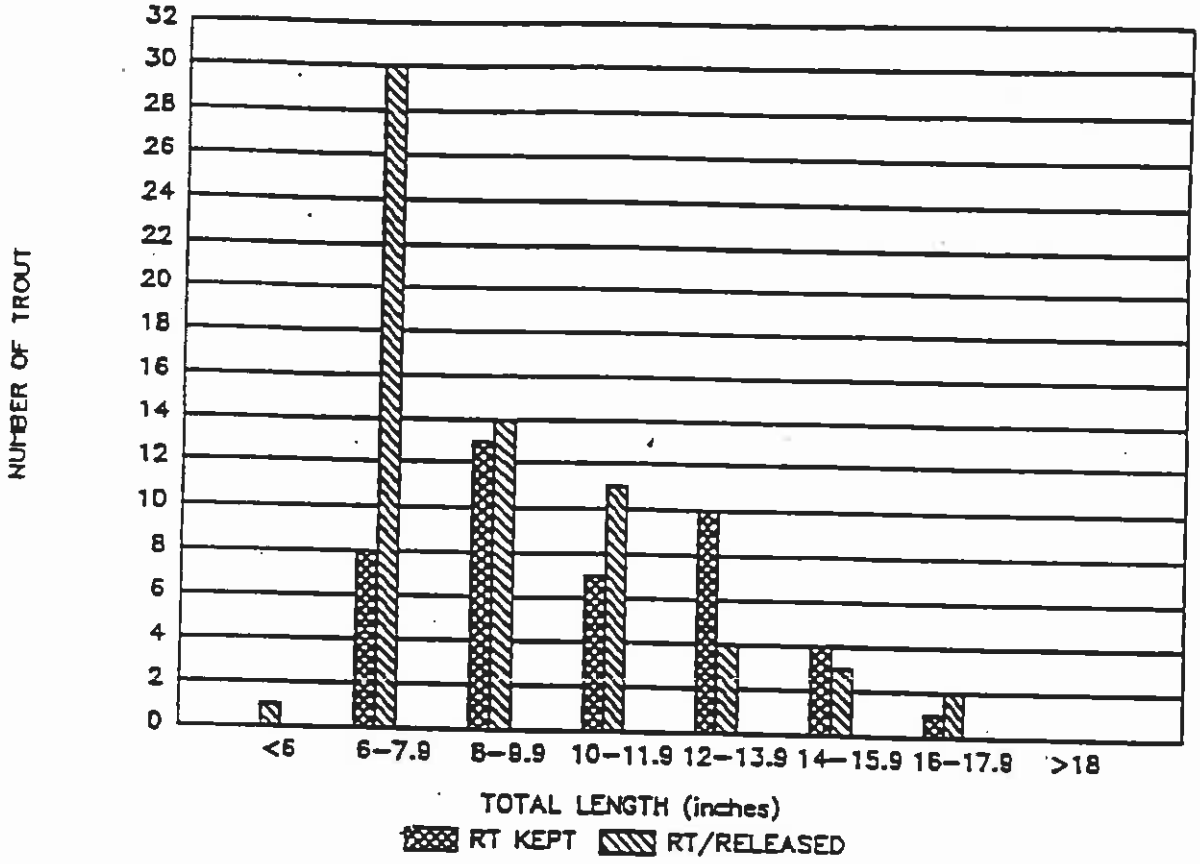

Figure 5 - Length-Frequency of Trout Reported During a Backcountry Creel Census of Anglers on the Kern River.

	1990	1991	1992
Surveys received	73	103	121
Hours fished	285	488.5	402.8
Rainbow trout kept	119	89	138
rainbow trout released	416	406	456
Total rainbow trout	535	495	594
Brown trout kept	7	6	18
Brown trout released	9	20	18
Total Brown trout	16	26	36
Overall catch/hour	1.93	1.07	1.56
Mean trout/angler	7.5	5.1	5.2

Table 5 - Results from angler Survey Box Near Forks of the Kern, 1990 through 1992.

regulations. Another wanted to see more enforcement of angling regulations. Most anglers welcomed the opportunity to communicate with someone.

	SNP	SNF
Overall Angling Experience	14	5
Size of Trout	5	5
Number of Trout	10	5

Table 6 - Summary of angler's attitude (sum of scores for nineteen anglers with possible range between -2 to +2) while fishing in Sequoia National Forest and Sequoia Nation Park.

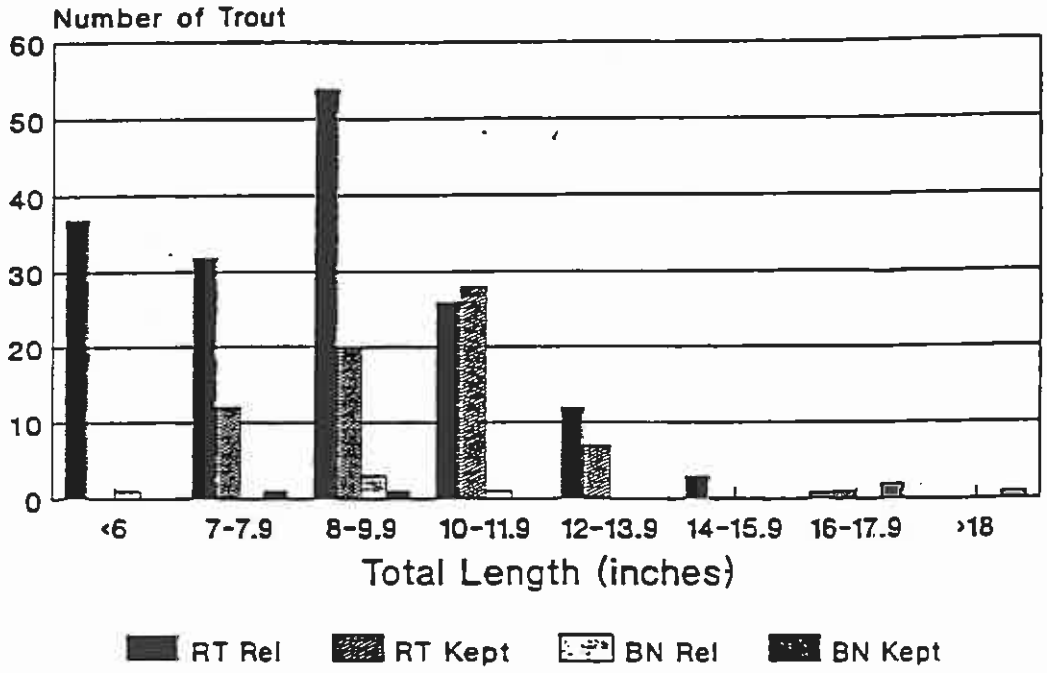

Figure 6 - Length-Frequency Distribution of Trout Reported from Postcard Survey of the Kern River.

Direct Observation

The Kern River from the confluence of Ninemile Creek downstream to just upstream of Forks of the Kern was sampled using direct observation in September 10-14, 1992. Fish were counted by species and size groups as described above. Only 3 squawfish were observed in this reach of river. Counting was done in 39 habitat units measuring 10,178 feet in length. Suckers were extremely abundant and were counted in only 10% of the habitat units. Results of counts upstream of the Forks of the Kern are shown in Table 7. Few trout greater than 12-inches in length were observed in the sections of river surveyed.

Age and Growth

Fifty-five trout scale samples were collected during 1989 and 1992 creel census of the SMS. Scales were collected from 84 trout by members of Trout Unlimited during the fall of 1991 from Segments 3 and 4. Scales were used by DFG biologists to estimate the age of the trout. Scales were also collected by volunteers from Trout Unlimited and DFG biologists during 1991 and 1992 surveys. Trout Unlimited contracted with Humboldt State University to age these scales (Taylor, 1993). Scales collected during

Species	< 6 in.	> 6 in.	> 12 in.	Total
rainbow trout	455	391	15	861
Sacramento sucker				2,986
Sacramento squawfish				3

Table 7 - Fish Counted (fish/mile) from Ninemile Creek to Forks of the Kern, 1992.

University on the Trout Unlimited contract (Whitman, 1992). All known available information is presented in Table 8, along with age and growth information from other west slope Sierra streams. Scales collected by SCE biologist came from downstream of Fairview Dam.

Samples from the Kern River were collected from trout at various elevations and different growing conditions. It would appear that trout in the Kern River are growing at a faster rate than rainbows from the Kings River and average growth rates for west slope Sierra streams.

SEGMENT 4 - SEQUOIA NATIONAL PARK

A trip was made by DFG biologist into the upper Kern River in August 1992. Three sections were sampled with electrofishing gear. Fish population estimates were made. All fish were measured and weighed and scale samples taken from a representative sample of trout. In addition, some creel census and postcard information was collected, along with angler survey box information.

Age and Growth

During the 1992 DFG survey of the Kern River within Sequoia National Park, scales were collected from trout for age determination. All fish were measured to the nearest mm total length. Scales were aged by a graduate student at Humboldt State University and the results summarized (Witman, 1992). Eighty trout were used to determine lengths at various age classes (Whitman, 1992, Table 8. It would appear that trout from the upper Kern River are growing faster than means figures from other west slope Sierra streams.

Electrofishing Survey

A survey trip was made into the Funston Meadow area of the Park in August 1992 by Department biologists. Three reaches of the Kern River were sampled by electrofishing and population estimates were made using maximum likelihood removal estimator. The results of the electrofishing survey are summarized in Table 9 and Figure 4.

Direct Observation

Near lower Funston Meadow, seven habitat units with a total length of 1,270 ft were sampled by direct observation method. Sacramento suckers were extremely abundant but were not counted. Squawfish were not observed. Results of the counts for rainbow trout in number of trout per mile were as follows: < 6 inches – 416, > 6 inches – 245, >

12 inches – 25, for a total of 686 trout. Only three brown trout and one brook trout were observed.

Age	DFG[+]	SCE[++]	Kings River[+++]	Sierra Nevada[*]	Humboldt Study[**]	Humboldt Study[***]
0	—	2.4-4.1	—	—	5.6	4.51
1	7.5	5.3-6.9	4.2	3.9	8	6.72
2	9.25	6.7-8.1	6.9	6.5	9.9	9.70
3	11.9	10.8	9.05	8.3	—	12.32
4	12.75	—	—	—	—	15.98

Table 8 - Comparison of Mean Total Lengths (inches) of Age Classes for Kern River Rainbow Trout with Kings River and Sierra Nevada Rainbow Trout.

\+ Special Management Section, Kern River (Segment 2)
++ Southern California Edison, 1991 (Segment 1)
+++ Murphy, K. 1988 (Kings River upstream of Pine Flat Reservoir)
* Snider and Linden, 1981 (various west slope Sierran streams)
** Humboldt State University, Taylor, 1993 (Kern River, Segments 2,3, & 4)
*** Humboldt State University, Whitman, 1992 (Kern River, Segments 2,3, & 4)

	River Section	Length of Section (FT.)	Est. Fish per Mile	Lbs/Acre	Est. No. > 6 inch/Mile
RT	1	248	1405	31.4	521*
SKR	1	248	3874	537*	
RT	2	371	1053	16.6	386*
SKR	2	371	3372	524*	
RT	3	475	622	8.2	126*
SKR	3	475	2011	322*	

* Approximate

Table 9 - Summary of Three Electrofishing Sites in the Funston Meadow Area of the Kern River, Sequoia National Park.

RT = rainbow trout
SKR = Sacramento sucker

Note: Section 1 was upstream of Upper Funston Meadow and away from the trail; Section 2 was also upstream of upper Funston Meadow, but closer to the trail; and Section 3 was about half way between upper and lower Funston Meadows.

Backcountry Creel Census

The creel census was not separated by park and forest. See the discussion under Segment 3 (page A-10 through A-11).

Postcard Survey

Thirteen anglers fished the Kern River in Sequoia National Park for a total of 42.5 hours. They caught 122 trout (2.87 trout/hour). The catch consisted of 115 rainbows and 7 brown trout. Twenty-seven percent of the catch was harvested. Eighty-seven percent of the rainbow and 100 percent of the brown trout were less than 12-inches in length (Figure 6). Angler's that fished the park had a higher catch rate than anglers fishing the forest (2.87 compared to 1.34 trout per hour). The postcard also asked questions about how angler felt about their experience that day. Table 6 compares the results for the park and the forest. The scores were much higher for anglers in the park than the forest.

Angler Survey Box

The angler survey box in the Park is located at the Kern Ranger Station. Results of the 1990 through 1992 surveys are summarized in Table 10. The number of forms received during 1990 and 1991 were low. A very cooperative backcountry ranger from Sequoia National Park caused the number of forms returned to increase dramatically during 1992. The catch rate remained high in all three years.

	1990	1991	1992
Surveys received	23	15	112
Hours fished	102.2	55.2	365.3
Rainbow trout kept	40	23	109
rainbow trout released	246	170	784
Total rainbow trout	286	193	893
Brown trout kept	4	1	8
Brown trout released	10	0	30
Total Brown trout	14	1	38
Overall catch/hour	2.93	3.73	2.55
Mean trout/angler	13.0	12.9	8.3

Table 10 - Results of Angler Survey Box at Kern River Ranger Station, Sequoia National Park.

REFERENCES

Murphy, K. D. 1988. Age and Growth of Wild Trout, *Salmo gairdneri*, in the Kings River, Fresno County, California. Senior Thesis, Humboldt State University. 25 pp.

Stephens, S. J. 1993a. 1989 Creel Census of the Kern River Special Management Area. Calif. Dept. Fish & Game, Region 4, Fishery Management Files, DRAFT.

Stephens, S. J. 1993b. 1992 Creel Census of the Kern River Special Management Area. Calif. Dept. Fish & Game, Region 4, Fishery Management Files, DRAFT.

Stephens, S. J. 1993c. 1992 Backcountry Survey of Anglers on the Mainstem Kern River, Golden Trout Wilderness. Calif. Dept. Fish & Game, Region 4, Fishery Management Files. 14 p.

Stephens, S. J. 1993d. Angler Survey of the Upper Kern River, 1992. Calif. Dept. of Fish & Game, Region-4 Fishery Management Files. 14 pp, DRAFT.

Taylor, R. N. 1992. Scale Analysis of Upper Kern River Rainbow Trout (Oncorhynchus mykiss gilberti) Samples by Trout Unlimited in the Fall of 1991. Humboldt State University, Arcata, Calif. 10 p.

Whitman, Vincent. 1992. Age analysis of Kern River trout. Humboldt State University, Dept. of Fish., Arcata, Calif. 6 p.

Attachment A - Angler Survey Form

Kern River Angler Survey

The Department of Fish and Game, in cooperation with Sequoia National Park, is conducting an evaluation of the wild trout fishery of the Kern River in the vicinity of the Kern Canyon Ranger Station. We request your help in this evaluation by providing the following information in this survey. Please use this form for one day's fishing on the Kern River by one angler only.

Please do not include information for any fishing you may have done on waters other than the Kern River.

Date fished _____ Number of hours fished _____

Check one gear used primarily: bait _____ lure _____ fly _____

Number of rainbow trout caught _____ kept _____ released _____

Number of brown trout caught _____ kept _____ released _____

Section fished:

Check if you fished primarily in the section upstream of the Sequoia National Park Boundary. _____

Check if you fished primarily in the section downstream of the Sequoia National Park Boundary. _____

SIZE OF FISH
Enter number of each species caught by sizes

	Rainbow Trout		Brown Trout	
	Kept	Released	Kept	Released
Less than 6"	____	_____	____	_____
6" - 7.9"	____	_____	____	_____
8" - 9.9"	____	_____	____	_____
10" - 11.9"	____	_____	____	_____
12" - 13.9"	____	_____	____	_____
14" - 15.9"	____	_____	____	_____
Greater than 16"	____	_____	____	_____

Please indicate your satisfaction with the following statements regarding this fishery by circling the number which most closely reflects your feelings.

	Not satisfied				Satisfied
1. Overall angling experience this day	-2	-1	0	+1	+2
2. Size of trout	-2	-1	0	+1	+2
3. Number of trout	-2	-1	0	+1	+2

If you wish to provide additional comments please use the reverse side of this form.

Thank you for your cooperation

Date Fished _____ Number of Hours Fished _____

Area Fished: ☐ Funstun Meadow ☐ Grasshopper Flats
☐ Forks of the Kern Other _____

Check fishing gear used the most: Bait ☐ Lure ☐ Fly ☐

Number of rainbow trout: Kept _____ Released _____

Number of brown trout: Kept _____ Released _____

SIZE OF TROUT

Enter number of each species of trout caught by size categories:

	Rainbow Trout		Brown Trout	
	Kept	Released	Kept	Released
Less than 6"	_____	_____	_____	_____
6" – 7.9"	_____	_____	_____	_____
8" – 9.9"	_____	_____	_____	_____
10.0" – 11.9"	_____	_____	_____	_____
12.0" – 13.9"	_____	_____	_____	_____
14.0" – 15.9"	_____	_____	_____	_____
16.0" – 17.9"	_____	_____	_____	_____
Greater than 18"	_____	_____	_____	_____

Please indicate your satisfaction with the following statement regarding this fishery by circling the number which most closely reflects your feelings.

	Not Satisfied				Satisfied
1. Overall angling experience this day	-2	-1	0	1	2
2. Size of trout	-2	-1	0	1	2
3. Number of trout	-2	-1	0	1	2

Please use the blank areas of this form if you wish to provide additional comments.

THANK YOU FOR YOUR COOPERATION

California Department of Fish and Game
Wild Trout Project
1234 E. Shaw Avenue
Fresno, CA 93710

KERN RIVER BACKCOUNTRY SURVEY

The Department of Fish and Game, in cooperation with packers and sportsmen's groups, is conducting an angler creel survey. We are asking your cooperation by providing the information requested on this survey form. Please use a separate form for each days fishing and include only one angler per form. Return the completed form to the packer, creel census clerk, or mail to DFG. Angler Survey Boxes are located at the Forks of the Kern Trailhead and Kern Ranger Station.

Appendix B - Management of Non-Salmonid Fishes

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MANAGEMENT OF NON-SALMONID FISHES

Native fishes, other than trout, of the upper Kern River basin are Sacramento sucker, hardhead, and Sacramento squawfish. It is the responsibility of the National Park Service, U. S. Forest Service and California Department of Fish and Game to see that native fishes are perpetuated. Non-salmonid fishes appear to be doing well, in part due to alterations in habitat caused by man.

Sacramento Sucker

The relationship of suckers to wild trout needs to be investigated. Efforts should be made to find a graduate student interested in pursuing this subject. Moyle (1976) states that sucker may be beneficial to gamefish populations, "as forage fish that utilize food [algae and detritus] largely unavailable to gamefishes." These nutrients are then available to the larger gamefish that prey on nongame species. There is some concern about the domination by suckers of some reaches of the upper Kern River.

Hardhead

The hardhead feeds primarily on invertebrates and aquatic plants, although large specimens could consume small trout. The Southern California Edison relicensing studies showed many hardhead present from Fairview Diversion Dam downstream to below Powerhouse Number 3. While there is an interest in reducing the population of large predatory fish, there is also a need to ensure the continued existence of smaller specimens. This is not anticipated to be difficult since the various sizes of the same species occupy different habitats. The larger fish are found in the large deep pools, while the younger, smaller fish occupy the shallow edges of pools.

Sacramento Squawfish

Catchable trout tagging studies by California Department of Fish and Game biologists have shown a fairly low return to the angler of planted trout in the Kern River. Studies have not been conducted to evaluate why these low return rates exist. There is little doubt, however, that large squawfish are impacting the catchable trout program through predation on stocked trout.

Large squawfish can be easily observed in most large pools. Fish population sampling conducted for the Southern California Edison relicensing of Kern River Number 3 (SCE, 1991) revealed that squawfish comprised from 20% to 60% of the fish population in sample sites from the powerhouse upstream to just below Fairview Dam (Figure 2, page A-6). Predation by squawfish on planted trout is well documented by hatchery personnel. Squawfish are, at least in part, responsible for the low return of catchable trout to the angler. One of the most

prominent comments received during the public scoping process dealt with reducing the squawfish population to give the angler a chance to catch the stocked trout.

The impact of squawfish predation on wild trout is less clear. Trout and squawfish evolved together in the Kern River. Vulnerability to predation is higher for hatchery trout than for wild trout. Wild trout will usually seek cover, including the whitewater at the upper end of large pools. Hatchery trout will usually take up a position in the center or upper end of a pool, making them more vulnerable to predators. While hatchery personnel avoid planting trout in large pools, the impact of large predators is still thought to be significant.

METHODS OF REDUCING LARGE PREDATORS

At present, there is virtually no harvest of squawfish. Following is a brief discussion of methods that could be utilized to reduce predatory fish at selected locations.

Spearfishing

The current angling regulations allows spearfishing in the Kern River upstream to the Johnsondale Bridge for the taking of carp, goldfish, western (Sacramento) sucker, hardhead, and Sacramento squawfish from May 1 through September 15.

Spearfishing is usually not a very effective method for eliminating large numbers of squawfish. Some squawfish can be killed, but once this occurs, the other squawfish become quite difficult to spear. However, the elimination of even a few large squawfish from trout stocking areas could result in increases in the return of planted trout to the angler. Efforts to reduce the population of large squawfish will have to be continuous.

Squawfish Derbies

Maintaining control over these large predators will require an ongoing program supported not only by government agencies but the public. The agencies responsible for management of the aquatic resources of the Kern River watershed support the concept of public involvement in this program. There are plans to request the support of the local chamber of commerce's or similar organizations in sponsoring an annual squawfish derby. To be successful, such a program will require widespread support and participation by the community.

Electrofishing

Electrofishing is the use of electrical current to stun fish. This can be an effective technique in shallow water. This technique is somewhat limited in large rivers.

However, in the diverted section of the Kern River, it may be possible to drop the flows to a low level which would increase the effectiveness of electrofishing to collect squawfish. Coordination with Southern California Edison and the use of volunteers could make this an effective option to remove squawfish from selected river reaches. Past sampling has shown that large squawfish can easily be herded by a team of divers. It may be possible to herd the larger squawfish into shallow water and then cut-off their return to deep water with nets. They then might be susceptible to electrofishing.

Chemical Control

There is a chemical (Squaxon) which is specific to squawfish. However, it is not currently registered for use. To get this chemical registered by both the federal and state government is costly and it is currently not appear feasible for the manufacturer.

The only chemical that is registered for control of unwanted fish is commercial formulations of rotenone. Rotenone treatments (either limited or extensive) could be used to reduce squawfish populations. Rotenone is toxic to all fish present.

There are three options for the use of chemicals to control undesirable fish populations. The first is total eradication of fish from a body of water. This is not feasible because it is difficult to accomplish a total kill and all sources of re-invasion of undesirable species would have to be blocked. Total eradication of native species is not consistent with the goals of this plan. The second option is a partial control treatment wherein certain portions of the target water would remain untreated. The third option would be a spot treatment where block nets are placed at each end of a selected section to prevent escape and the portion in between is then treated. Similar treatments have been conducted in nearby waters (lower Kern River, South Fork Kern River, Success and Kaweah Reservoirs), and if properly done, the latter two options would be consistent with the goals of this plan.

A great number of environmental requirements would have to be met before a decision to use rotenone could be implemented. Environmental concerns such as water quality, public health, etc. would have to be addressed before a treatment could take place. This would include public review of any proposed project. The California Department of Fish and Game has produced an Environmental Impact Report on the use of rotenone (California Department of Fish and Game, 1994).

Detonating Cord

Detonating cord is a round, flexible cord containing a center core of high explosives. It is used as a non-electrical detonating device for explosives.

Detonating cord has been used to sample fish in short reaches of stream. The Department of Fish and Game has been experimenting with detonating cord to eliminate an illegally introduced population of squawfish on the Eel River (Week, personal communication). The squawfish in the Eel River are negatively impacting native steelhead trout and salmon populations.

Snorkeling surveys on the Eel River revealed that during the low flow period, large squawfish were grouped in deep pools separated by some stream distance. California Department of Fish and Game biologists were able to concentrate their control efforts on these pools. The detonating cord was placed on the bottom of pools where squawfish were located. Detonation of the cord had little visible disturbance outside the river and resulted in an 80 to 90 percent kill in 18-foot deep pools. The use of detonating cord appears to be a viable option to manage large predatory fish populations.

Reaches of the Kern River from Fairview Dam downstream through Kernville were surveyed during late 1993 to map the location of concentrations of large squawfish. To use explosives in these areas, will require permits from the Forest Service, Kern County and the Fish and Game Commission (and possibly others). If these permits can be obtained, detonating cord may be used on an experimental basis to reduce the predatory fish population. A separate plan would be prepared detailing the location, techniques and safety precautions to be taken.

An Environmental Analysis would most likely have to be prepared before such a project could go forward. It is important that only the larger problem fish are removed. Any effort to control large predatory fishes should not negatively impact other species (i.e. frogs and western pond turtles) in the area. Snorkeling and electrofishing will be used to monitor fish populations to ensure squawfish are not being eliminated. Monitoring of other species, such as hardhead, will occur to ensure they are not being negatively impacted.

EXHIBIT 2
KERN RIVER NO. 3 HYDROELECTRIC PROJECT
MINIMUM INSTREAM FLOW REQUIREMENTS FOR LICENSE YEARS 1-30

MONTH	FLOW* (CFS)
October	80
November	40
December	40
January	40
February	40
March	70
April	100
May	100
June	100
July	130
August	130
September	100

* Or in-flow above 35 cubic feet per second (cfs), whichever is less. Edison diverts 25 cfs at Fairview Dam to provide a relatively cool source of water to the CDFG Kern River fish hatchery. The minimum flow for power generation at the project powerhouse is 35 cfs. As the difference of 10 cfs will not materially affect minimum flow levels of fish habitat, the FERC Draft Environmental Assessment recommends, and CDFG, USFWS, AND USFS agree, that the minimum diversion amount be 35 cfs to allow SCE to generate power while providing sufficient flow for the CDFG hatchery.

UPPER KERN RIVER BASIN FISHERY RESOURCE ENHANCEMENT MEASURES IMPLEMENTATION MEMORANDUM OF UNDERSTANDING

AMENDED AS OF NOVEMBER 9, 2005

LIST OF AMENDMENTS

AMENDMENT LOCATION IN THE DOCUMENT	AMENDMENT
Page 1, Title Page, added phrase as shown:	Amended as of November 9, 2005
Page 2, line 5 of title, added phrase as shown:	Amended as of November 9, 2005
Page 2, paragraph 1, line 3, added phrase as shown:	…into this 27th day of September 1995, and is amended as of November 9, 2005, by and between…
Page 3, Section 3., line 4, revised and added as shown:	...these goals will be proposed by the individual resource agencies and ~~each Party~~ the Parties, subject to Section II.A.1, will ~~have a~~ vote on whether….
Page 4, Section I.A.9, replaced "team" with "term".	The ~~team~~ term "Interest Account" means ……
Page 4, added Section I.A.10. as shown:	10. The USFS and the USFWS are not "Parties" to the following provisions of this MOU: Sections I.A.8; I.A.9; I.B.6; III.A.1; and III.A.3.
Page 4, Section I.B.5., lines 2 - 8: deleted as shown:	…(iii), ~~each party, except Edison, shall receive an equal amount if any money remaining in the Funding Account and the Interest Account. Provided that if each of~~ the Parties ~~except Edison~~ agrees to continue the use of the Funding Account and the Interest Account for the purposes described in this MOU. ~~, the trustee of the Funding Account and Interest Account may be directed by a unanimous vote of the Parties to maintain those accounts for another 180 days following termination in order to allow the Parties, except Edison sufficient time to execute another agreement concerning the use of any remaining money.~~
Page 4, moved lines 5-8 from Section I. B.5, established them as Section I.B.6 and revised them as shown:	~~t~~The trustee of the Funding Account and Interest Account may be directed by ~~a unanimous vote of~~ the Parties to transfer ~~maintain~~ those accounts to another trustee or a governmental agency for use in a manner consistent with the purposes of this MOU and the criteria listed under Section II(B)(6). ~~for another 180 days following termination in order to allow the Parties, except Edison sufficient time to execute another agreement concerning the use of any remaining money.~~

Page 6, Section II.A.1., line 3, added a shown:	Unless specifically authorized by their respective agency, the USFS and USFWS participants shall not have a vote on proposals that their respective Federal Agency may submit or implement, nor on measures that affect their respective Federal Agency, nor on determinations regarding choice of, actions of, or directions to the trustee of the Funding Account and the Interest Account. In such situations where a Federal Agency is not voting on a particular measure, then that Federal Agency will not be counted toward determination of a quorum.
Page 7, Section II.B.1., line 2: replaced "(1)" with "(i)" and added "and"-	The Parties shall ~~(1)~~(i) decide on the use of Interest Account funds for studies and enhancement measures; and (ii) treat…
Page 10, Section III.A.1.1, added a sentence at the end of the paragraph as shown:	The Parties may allow the Trustee to combine the Funding Account and the Interest Account into one account as long as the principal and net income on the principal are appropriately tracked.
Page 10, Section III.A.1.,3, added a phrase at the end of the paragraph as shown:	The Funding and Interest Accounts shall operate until the termination of this MOU to fund the activities discussed in Subsection II (B), or until such later time as the Parties may decide by written agreement.
Page 14, revised signature dates as shown:	~~1995~~ 2005