ORIGINAL

SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONAL Company
C. E. Miller
Manager of Hydro Generation

June 20, 1997

Ms. Lois D. Cashell
Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington DC 20426

Subject: Kern River Hydroelectric Project, FERC No. 2290 — 015
Fish Monitoring Plan

Dear Ms. Cashell:

In compliance with Article 411 of the New License for the subject project issued on December 24, 1997, enclosed are an original and eight copies of the following plan:

- "Fish Monitoring Plan" prepared by Entrix, Inc.

As required by Article 411, draft plans were submitted to the US Fish and Wildlife Service, US Forest Service, California Department of Fish and Game, and the National Park Service on April 16, 1997 for review. Comments received from those agencies are enclosed and have been incorporated into the final plan.

Should you have any questions or comments regarding this matter, please contact me or Mr. Ronald R. Schroeder at (818) 302-1603.

Sincerely,

C E Miller/RRS

cc: with enclosures
Kevin P. Madden, FERC, Washington DC
Noel Folsom, FERC, San Francisco CA
Frankie Greene, FERC, Washington DC
G. D. Nokes, California Department of Fish and Game, Fresno CA
W. S. White, US Fish and Wildlife Service, Sacramento CA
Art Gaffrey, US Forest Service, Porterville CA
Michael J. Tollefson, National Park Service, Three Rivers CA

9706270666-3

P. O. Box 800
2244 Walnut Grove Ave.
Rosemead, CA 91770

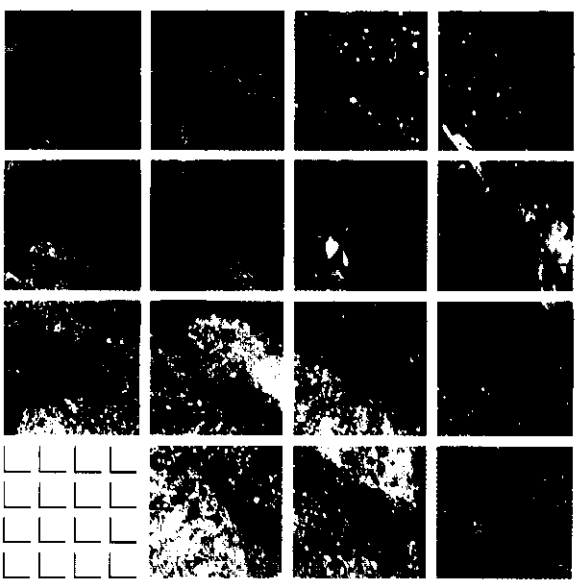
ORIGINAL

E N T R I X

FISH MONITORING PLAN
KERN RIVER NO. 3 PROJECT
FERC NO. 2290-~~006~~ 015

Prepared for:

SOUTHERN CALIFORNIA EDISON
Rosemead, CA



Prepared by:

ENTRIX, Inc.
Walnut Creek, CA

Project No. 306602

June 20, 1997

FISH MONITORING PLAN
KERN RIVER NO. 3 PROJECT
FERC NO. 2290-006

Prepared for:

SOUTHERN CALIFORNIA EDISON
2244 Walnut Grove Avenue, G.O. Quad 1A
Rosemead, California 91770

Prepared by:

ENTRIX, Inc.
590 Ygnacio Valley Road, Suite 200
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Project No. 306602

June 20, 1997

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1.1 BACKGROUND

Southern California Edison (Edison) operates the Kern River No. 3 Project (KR3) on the North Fork Kern River near Kernville, California (Figure 1-1). On December 24, 1996, the Federal Energy Regulatory Commission (FERC) issued new license for the Kern River No. 3 Hydroelectric Project (FERC 2290-006). Under the conditions of the new license, the FERC included Article 411 requiring monitoring of fish populations in the North Fork Kern River. The Article describes the conditions as follows.

> Within six months from the date of issuance of this license, the Licensee shall file with the Commission for approval a plan to monitor fish populations (Monitoring Plan). The Monitoring Plan shall include, but not be limited to, an implementation schedule, standard techniques for assessing fish populations, and sampling fish populations in 5 locations once every 5 years for the term of the license. The monitoring shall be 100 meter stations using techniques similar to those utilized in studies conducted for Exhibit E of the Licensee's application. A report shall be provided to the signatory agencies to the Settlement Agreement and to the Commission within 120 days of the end of each reporting period.
>
> The Licensee shall prepare the Monitoring Plan after consultation with the California Department of Fish and Game, the U.S. Forest Service, U.S. Fish and Wildlife Service, and the U.S. National Park Service. The Licensee shall allow a minimum of 30 days for the signatories to the Settlement Agreement and the National Park Service to comment and to make recommendations regarding timing, location and methodology for additional monitoring before filing the Plan with the Commission. The Licensee shall include as part of its filing documentation of consultation, including copies of the comments and recommendations on the Monitoring Plan received during the consultation. If the Licensee does not adopt a recommendation of a consulted entity, the filing shall include the Licensee's reasons, based on the project-specific information.
>
> The Commission reserves the right to require changes to the Monitoring Plan. Upon Commission approval, the Licensee shall implement the Monitoring Plan, including any changes required by the Commission.

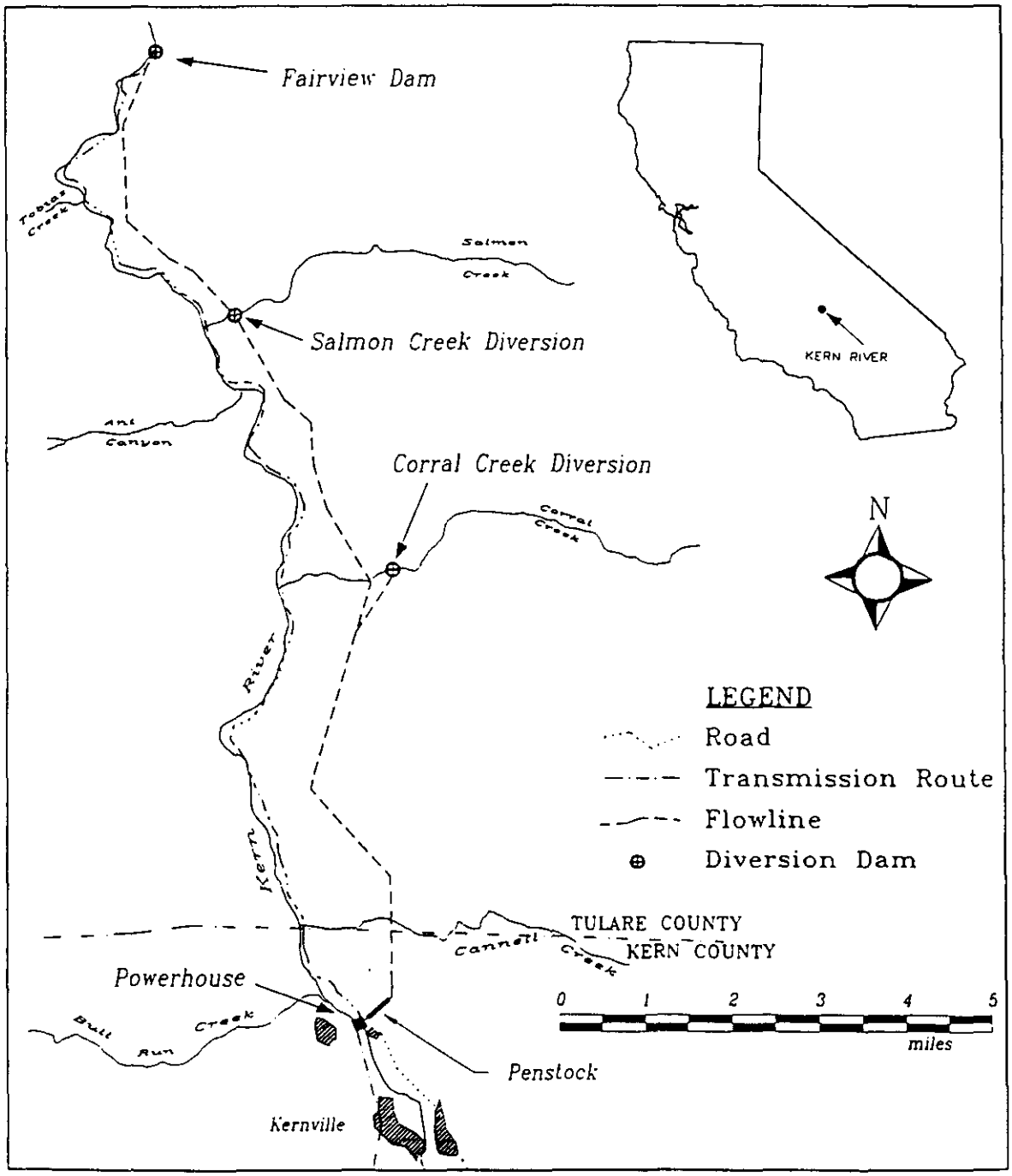

Figure 1-1. Location of the Kern River No. 3 Hydroelectric Project near Kernville, California

> If the results of the Monitoring Plan indicate that changes in project facilities or operations, including alternative flow releases, are necessary to protect fish resources, the Commission reserves the authority to direct the Licensee to modify project facilities or operations.

Discussions regarding potential monitoring activities were held during the preparation of the Kern River Trust Fund. The U.S. Forest Service reflected a portion of those discussions in Condition 5 of their 4(E) Conditions. The relevant portion of that Condition is as follows.

> The Licensee shall monitor fish populations in five locations along the Kern River. Two sites above the diversion, two sites between the diversion and Goldledge Campground and one site in the lower portion of the diverted reach. Monitoring should consist of standard techniques for assessing fish populations. The methods used should be similar to those used for preparation of the Exhibit E for this process. Monitoring shall be performed at each station every five year during the term of the license. Sampling should be conducted during the fall. A plan for monitoring must be agreed to by the agencies and the licensee.

The principle objective of this specific monitoring plan is to provide information on the abundance of fish near the KR3 project area over time. As identified by CDFG (see Section 1.3.2), this monitoring program will be one of a number of monitoring efforts. Most of those other efforts will be associated with the implementation of the Upper Kern River Fishery Management Plan (UKRFMP) and the Upper Kern River Fishery Trust Fund (Trust Fund). These other efforts may be conducted as normal management activities of the resource agencies or as specific monitoring of enhancement measures required by the Trust Fund. Many of the actions undertaken through the UKRFMP and the Trust Fund will occur outside the KR3 Project area. Therefore, some of the emphasis of those other programs will be outside the KR3 Project area. These actions may not directly affect fish populations in the areas monitored under this plan. Therefore, Edison and the resource agencies understand that it is very important that these efforts be coordinated on an ongoing basis. This coordination is likely to include data exchange, assistance with data collection efforts, and collaboration regarding analysis and interpretation of data. Edison is committed to an ongoing collaboration with the resource agencies both through the implementation of this plan and the implementation of the Trust Fund. The ultimate objective of these efforts is to improve the management and stewardship of the fish resources of the North Fork Kern River (NFKR).

1.2 PREVIOUS STUDIES

Recent studies of fish populations in the North Fork Kern River have been carried out as part of investigations for the preparation of the Application for New License for the KR3 project (Edison 1991). Figure 1-2 presents sampling locations used in studies for the Exhibit E. Studies also have been carried out in support of the preparation of the Upper

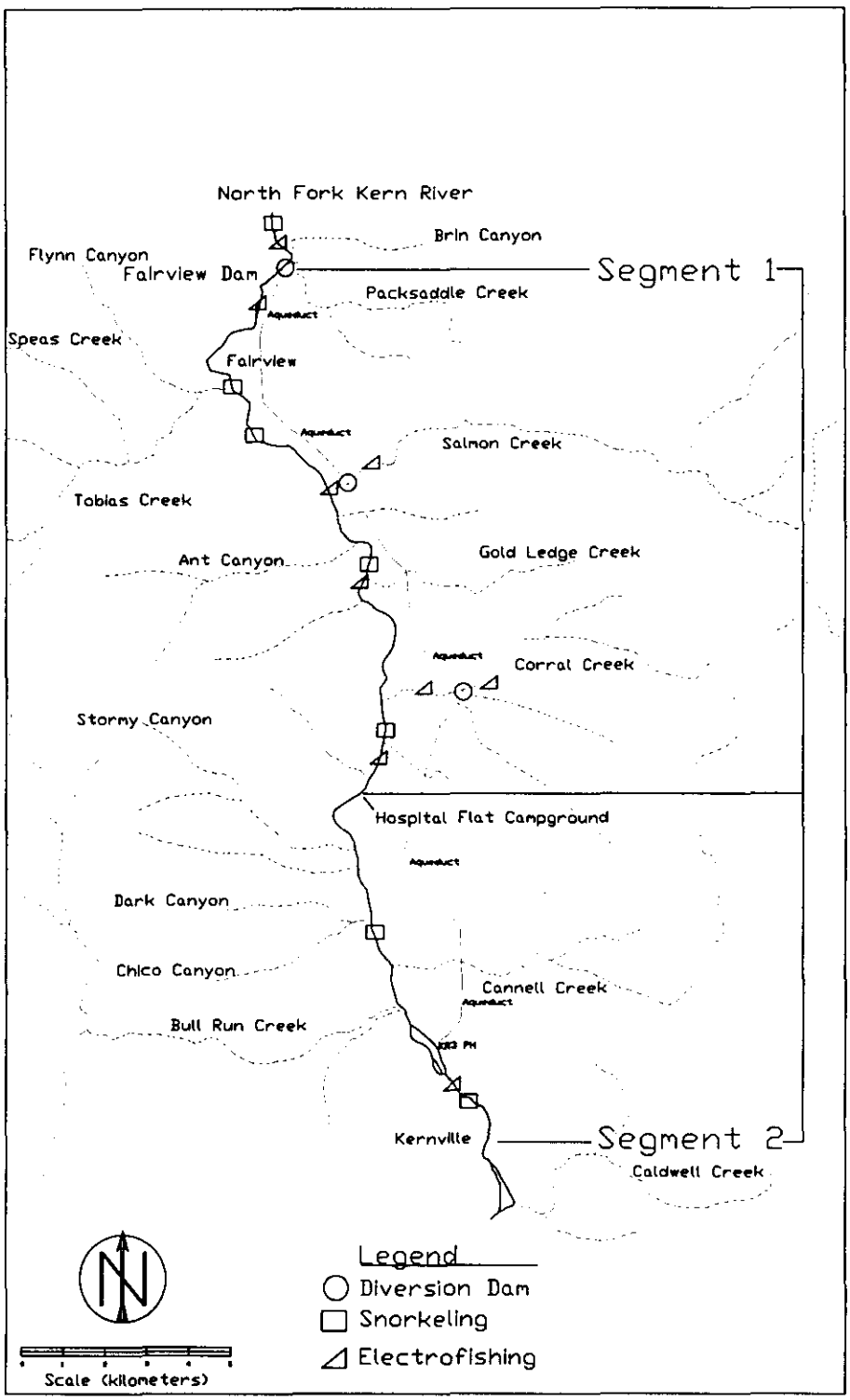

Figure 1-2. Sampling stations used for monitoring fish populations in the North Fork Kern River

Kern Basin Fishery Management Plan (Stephens *et al.* 1995). The locations of those studies were in the special management section of the river upstream of Johnsondale Bridge.

1.3 AGENCY CONSULTATION

Consultation with the resource agencies took place prior to the preparation of the draft Monitoring Plan and through comments on the draft Plan. These are discussed below. Conversation records and comments received from the reviewing resource agencies are included in Appendices A and B, respectively.

1.3.1 PRELIMINARY CONSULTATION

Extensive discussions regarding fish monitoring took place during the meetings that led up to the design of the Upper Kern River Fishery Trust Fund. In addition, specific discussions were held with the US Forest Service and CDFG as part of the preparation of the draft Fish Monitoring Plan. The general approach and the selection of specific sampling stations and techniques were discussed with Mr. M. Lechner (pers. comm.) of the US Forest Service and Mr. J. Staley of CDFG (pers. comm.). Memoranda summarizing those conversations are included in Appendix A of this plan.

1.3.2 DRAFT PLAN CONSULTATION

The draft Fishery Monitoring Plan was submitted to the US Forest Service, US Fish and Wildlife Service (USFWS), US National Park Service (Park Service) and CDFG for review during April 1997. Comments were received from each of the resource agencies (Appendix B).

CDFG commented that the proposed plan ". . .assumes an adequate scope of evaluation. . ." and that the draft Monitoring Plan ". . . is well designed. . .". CDFG recognized that ". . . major factors affecting the fish populations and the recreational fishery probably occur outside the project area." In addition, CDFG recognized that the project monitoring requirements ". . .should be just one part in a broader, basin-wide fishery assessment program. . ." and that other monitoring should occur under the auspices of the multi-agency Upper Kern River Fishery Management Plan (UKRFMP). Edison appreciates CDFG's comments and plans to coordinate fish monitoring results with the monitoring efforts associated with the UKRFMP. The context of the study in the overall framework of the UKRFMP has been added to the introductory material of this plan.

The US Forest Service agreed with the recommendations for monitoring fish populations presented in the draft Monitoring Plan. No comments requiring response were received.

The US National Park Service provided six principal comments on the plan. The first comment agreed with the selection of a sampling station upstream of the Johnsondale Bridge.

The second comment expressed concern regarding the practicality of the use of 0.125 in. block nets for electrofishing in the North Fork Kern River. The points made regarding the potential for clogging of these nets with debris, especially leaves, is well taken. This same comment also addresses problems with regard to the use of block nets in "stiff currents". This can be a problem if the deployment of the block nets is not performed strategically. Typically, block nets are deployed in transition zones where velocity is less of a problem. The use of the nets is important to prevent the movement of both large and small fish from the sampling area. It is necessary to prevent fish movement to provide for the calculation of valid abundance estimates. Where the field crew believes that there is a likelihood of fish escaping past the block net, a member of the field crew may be stationed at the upstream block net to count the number of fish that escape.

In any case, nets of this design and mesh size have been used successfully in conjunction with each of the electrofishing surveys conducted in support of the Exhibit E of the Application for New License for the KR3 Project. Since Edison's consultants have been successful in the use of this gear in this river, we believe that continued use of this approach should not pose an insurmountable problem.

The third comment seeks to establish, in advance of sampling, which abundance estimate approach will be used for electrofishing results. The comment indicated that one technique should be used consistently. Mark-recapture abundance estimates have been the primary sampling approach used by Edison's consultants in the North Fork Kern River. This approach would be used in preference to the multiple removal approach. However, there may be conditions under which multiple removal may be more efficacious. Since abundance estimates from either method are calculated including estimates of uncertainty (confidence limits), there should be no reason that valid comparisons cannot be made between results obtained using the two methods, if needed.

The fourth comment refers to the application of the direct observation method of fish enumeration. Edison agrees with the Park Service that crews should be experienced and that the approach must be carefully applied. Direct observation is a standard technique used by many fish biologists throughout California. It has been used by CDFG (Stephens et. al. 1995) and Edison's consultants in the Kern River (Edison 1991). This approach is routinely used by Edison's consultants to enumerate trout, native minnows, and suckers. Hankin and Reeves (1988), Hillman et. al. (1992), and Hicks and Watson (1988), referenced in this plan, provide information regarding the use and accuracy of this approach. This plan calls for the use of this technique in habitats where electrofishing is less likely to be efficacious. These generally are pools, deeper runs, and possibly deep pocket water habitats.

The fifth comment relates to the use of electrofishing to "calibrate" enumeration by direct observation. The Park Service questions how well a calibration within a shallow pool can be applied to a deeper pool. The Park Service further comments that each pool is different from others. The Park Service also questions the comparison between electrofishing and direct observation enumerations. These points are valid. However,

Hankin and Reeves (1988) recommend conducting a direct comparison between electrofishing and direct observation in order to understand the relative differences or biases of the results obtained from direct observation. Hankin and Reeves (1988) stated that they believed the use of electrofishing (using the Moran-Zippen equal effort method in their paper) provided a more accurate method of estimation. The plan focuses on making this comparison using only shallow pool habitat because this is the only habitat planned for direct observation sampling where electrofishing is likely to be effective. In deep pool habitats, electrofishing may be of limited effectiveness due to water depth and the ability of the field team to deploy equipment without using an electrofishing boat, which is likely to be infeasible. Part of the reason for performing the comparison is to understand the uncertainty of estimates, we are therefore adding electrofishing calibration comparisons for two additional pools. This will provide the basis for statistical comparison. Overall, by gaining some understanding of how the results of the two sampling approaches differ in application in the NFKR, our ability to interpret the results is enhanced.

The sixth comment of the Park Service deals with the time of year when sampling is to occur. The Monitoring Plan proposes to sample during early October. The Park Service is concerned due to low water temperatures and the potential effect of storms. These are valid concerns and were considered during the preparation of the Monitoring Plan. Previous studies were conducted during September. During the previous sampling programs, flows during the sampling period were about 65 to 70 cfs, depending upon water-year type. Under the new license, flows during September are a minimum of 100 cfs (or natural flow, whatever is less) under all water-year types. Minimum flows under the new license during October are 80 cfs. The principal trade-off is between the effect of sampling at higher flow or at a somewhat lower temperature. It is our evaluation that sampling at the lower flow will serve to facilitate the effectiveness of sampling. We believe that due to the greater similarity between the October flows and those during the previous sampling studies, the results of the proposed fish abundance surveys will be more comparable to previous sampling.

Comments received from the USFWS pertain to two principal areas. One area is the addition of a statement as to the purpose and objectives of the study. The second relates to the collection of habitat and other incidental data that could be collected as part of the monitoring effort.

The USFWS specifically comments that the introduction should state ". . .how the results will be used to measure the success of the implemented measures". The USFWS also commented that they wished to have the methodology section describe how fish populations will be compared and ". . .what criteria will be used to determine the success or failure of the improvement measures employed." It is our understanding that the USFWS, in these comments, is referring to monitoring of potential enhancement measures that may be implemented through the Upper Kern River Fishery Resource Enhancement Trust Fund (Trust Fund). The selection of and implementation of these measures will be under the direct control of the Trust Fund Committee (Committee) of

which the USFWS is a member. Enhancement measures will be selected on the basis of proposals submitted to the Committee and are supposed to include measures to monitor the results of the implementation. The guidance for those measures is contained in the UKRFMP. As pointed out by CDFG (Appendix B-CDFG comment letter: page two, paragraph one) in their comments to this plan, many of the enhancement measures that are likely to be implemented under the Trust Fund, are likely to be outside the area of influence of the KR3 Project. Monitoring of the efficacy of such enhancement measures is outside the scope of Article 411 and within the scope of the Trust Fund and other monitoring efforts to be conducted by the resource agencies. Part II C.2.iv of the *Trust Fund Memorandum of Understanding* clearly states that each proposal to implement enhancement measures must include:

> "(iv) criteria and methodology for measuring the success of each goal."

The potential for several and widespread enhancement measures and monitoring programs in a wide range of locations is one of the principal reasons that this monitoring effort will need to be coordinated with the efforts of the resource agencies, as CDFG has stated:

> ". . .the Project-required monitoring should be just one part in a broader, basin-wide fishery assessment plan."

As pointed out in the Kern River Fisheries Enhancement Trust Fund Technical Support Document (Edison 1995) (Support Document) and in the Exhibit E (Edison 1991), factors limiting trout populations in the vicinity of the KR3 Project are generally unrelated to the project. The major factors limiting the production and abundance of wild trout are lack of recruitment due to the natural scarcity of spawning habitat and extremely heavy mortality due to predation and harvest. Water temperature in the lower portion of the diverted reach is viewed as a contributory factor.

Based on analyses completed for the Support Document, rearing habitat available for the various lifestages is extremely underutilized. The data suggest that a very large increase in trout abundance would need to take place before rearing habitat would be of concern. Therefore, monitoring of most habitat types would not be an effective means of evaluating population trends. Two of the factors that may contribute to fish populations in the KR3 Project area are availability of spawning habitat and predator control measures (proposed under the UKRFMP). Scarcity of spawning habitat is likely contributing to limitations on trout recruitment. Therefore, information on this habitat type may be of value. However, the Sand Box Flushing Study Plan (Edison 1997) being implemented under Article 402 of the new license involves a detailed five-year study of the effect of the sediment transport conditions on spawning habitat downstream of Fairview Dam. The results of this study will provide the necessary information to assist in the interpretation of how spawning habitat may be affecting population abundance. At the conclusion of that study, the potential need for including the collection of such information in the fish monitoring study will be identified.

If enhancements to spawning habitat are made through the implementation of the Trust Fund, Edison expects such implementation will include monitoring of the habitat produced. To the extent that spawning habitat enhancements are produced within the area monitored under this plan, monitoring data will be available for interpretation of the results of population sampling. Edison plans to collaborate with the resource agencies to carefully coordinate such efforts. Such data, if available, would be used in analyses of fish population data collected under this Plan.

Predator control measures that are planned for the Kern River under the UKRFMP within the project area will be monitored by the resource agencies implementing them. These include the US Forest Service and CDFG. In addition, changes in abundance of predatory native minnows in the project area should be identifiable through the sampling program described in this plan.

Water temperature also was identified as a factor that affected the distribution of trout downstream of Fairview Dam. It was concluded that warm water temperatures may adversely affect the growth of trout in the lower portions of the bypass reach. However, the effect of temperature was probably most important to trout because it facilitated the presence and success of predatory native minnows in upper portions of the diverted reach. As stated above, the abundance of predatory native minnows will be determined through implementation of this Plan and other monitoring efforts. Water temperatures under the new minimum flow schedule will be characterized by a five-year study described in Article 408 of the new license. This should provide sufficient data to assist in interpretation of this factor.

Routine observations are planned of habitat and physical conditions in the specific areas sampled under this plan. These include physical measurements of water temperature, specific conductance, and dissolved oxygen. Water transparency will be characterized, habitats sampled will be measured for length and width, photographs will be taken, and other data collected (Platts *et al.* 1983). In addition, based on comments from USFWS, observations will be made to include characterization of each habitat unit sampled. These observations will include characterization of substrate and depth, riparian conditions, and the presence of woody debris or other cover. As stated above, the work conducted under the Fish Monitoring Plan will be carefully coordinated with other monitoring programs conducted in the NFKR by the resource agencies and Trust Fund. These data, to the extent that they are available and pertinent, will be used to assist in evaluating population data collected under this program.

Incorporation of material modifying the Draft Plan have been made in the appropriate sections of this Plan to respond to resource agency comments. Material incorporated is identified above.

2.1 OBJECTIVES

The objective of this monitoring program is to monitor fish populations in the NFKR, specifically, fish populations in the vicinity of the Kern River No. 3 Project. Fish populations are to be monitored every five years. The monitoring program should identify changes in fish populations. In order to assess a population of fish, both the abundance of fish and the age structure of the population should be identified. In previous studies, two sampling techniques were used. Electrofishing was used to sample riffles, wadable runs and pocketwater habitat types. In pools and deeper runs, direct observation (direct counts of fish made during snorkeling) was used to estimate fish populations. This plan proposes a similar approach using these standard techniques.

The fish populations of the North Fork Kern River consist of a variety of species including trout, native minnows, introduced minnows, suckers, and in the lowest reaches introduced sunfish and other species (Edison 1991). Introduced sunfish were most abundant in the lower part of the river, near Lake Isabella. The monitoring plan takes note of the differences in species and habitat present along the length of the river.

The monitoring program required under Article 411 of the new license is one of a number of monitoring efforts that will occur in the NFKR. Other programs will be related to the UKRFMP and will be performed by the resource agencies or other qualified parties selected to perform this work by the Trust Fund governing panel. Edison recognizes that there will be an on-going need to coordinate and consult with the resource agencies to obtain the data that are of maximum benefit to fisheries and watershed management. This coordination is a stated objective of this plan.

2.2 HABITATS TO BE SAMPLED

Since there are various habitat types present in the NFKR, differing physical conditions are present that affect the choice of sampling approach. Habitat in the NFKR differs along its length. Studies in support of the Exhibit E divided the river downstream of Fairview Dam into two habitat segments. The dividing line between the segments is Hospital Flats campground. The segments represented portions of the river with different gradients. The breakdown by habitat type is presented in Table 2-1.

Although habitats were not mapped upstream of Fairview Dam, they appear to be similar to habitats immediately downstream.

The habitats present include shallower habitats that are conducive to sampling using electrofishing. These include riffles, some runs, and some pocket-water habitats.

Table 2-1. Habitat Composition by Stream Segment, North Fork Kern River.

	Percent Composition	
Habitat	**Segment 1[a]**	**Segment 2[b]**
Riffle	5.5	10.9
Run	27.1	20.2
Boulder Run	16.5	21.4
Cascade	3.6	1.9
Boulder Pocket Run	10.3	17
Shallow Pool	15	33.7
Deep Pool	15.3	1.6

[a]Higher gradient stream reach upstream of Hospital Flat Campground
[b]Lower gradient stream Reach downstream of Hospital Flat Campground

Habitats more than three feet deep can include pools, runs, and some pocket-water areas. In order to adequately represent fish populations in both deep and shallow habitats, both will need to be sampled.

2.3 SITE SELECTION

As specified by Article 411, five stations will be sampled. Of these stations, three stations will be located downstream of Fairview Dam and two stations upstream. In general, most stations will be selected in the vicinity of areas sampled previously. The locations of sampling stations were discussed with USFS and CDFG biologists (Lechner pers. Comm., Staley Pers. Comm.). It was suggested that one of the sampling stations be located sufficiently far downstream of Fairview Dam to facilitate the sampling of native minnows. One of the stations sampled in support of the Exhibit E was located immediately downstream of Hospital Flat campground. This station was dominated by the presence of native fish species including minnows and suckers. This station is included among those proposed by this plan.

Another suggestion was to locate one of the sampling stations upstream of Fairview Dam in the area upstream of Johnsondale Bridge. The upstream site was suggested to facilitate sampling of the self-sustaining wild trout population in the special regulation section of the river. A concern regarding this potential sampling location is that fish in this area are well outside the influence of the project. In addition, since there is no planting of hatchery fish in this area and fishing regulations and gear used differ, the factors limiting trout populations are likely to be different. Considering this discussion, a sampling station is located a short distance upstream of the Johnsondale Bridge.

The remaining three sampling stations will be selected on the basis of providing an adequate sample of available habitats in each general area. Stations will include both shallow and deep habitats, which will be sampled by different methods. Each station will total about 100 m including both types of habitat. Only contiguous habitats of each type will be sampled. Figure 2-1 shows the general areas in which sampling will occur. The specific locations will be determined in the field based on sampling conditions and habitats present.

2.4 SAMPLING METHODS

2.4.1 COLLECTION METHODS

Standard sampling methods will be used to monitor fish populations. Procedures similar to those used in support of the Exhibit E will be used for monitoring. The use of similar sampling stations and collection methods between past and future monitoring should result in data that are directly comparable.

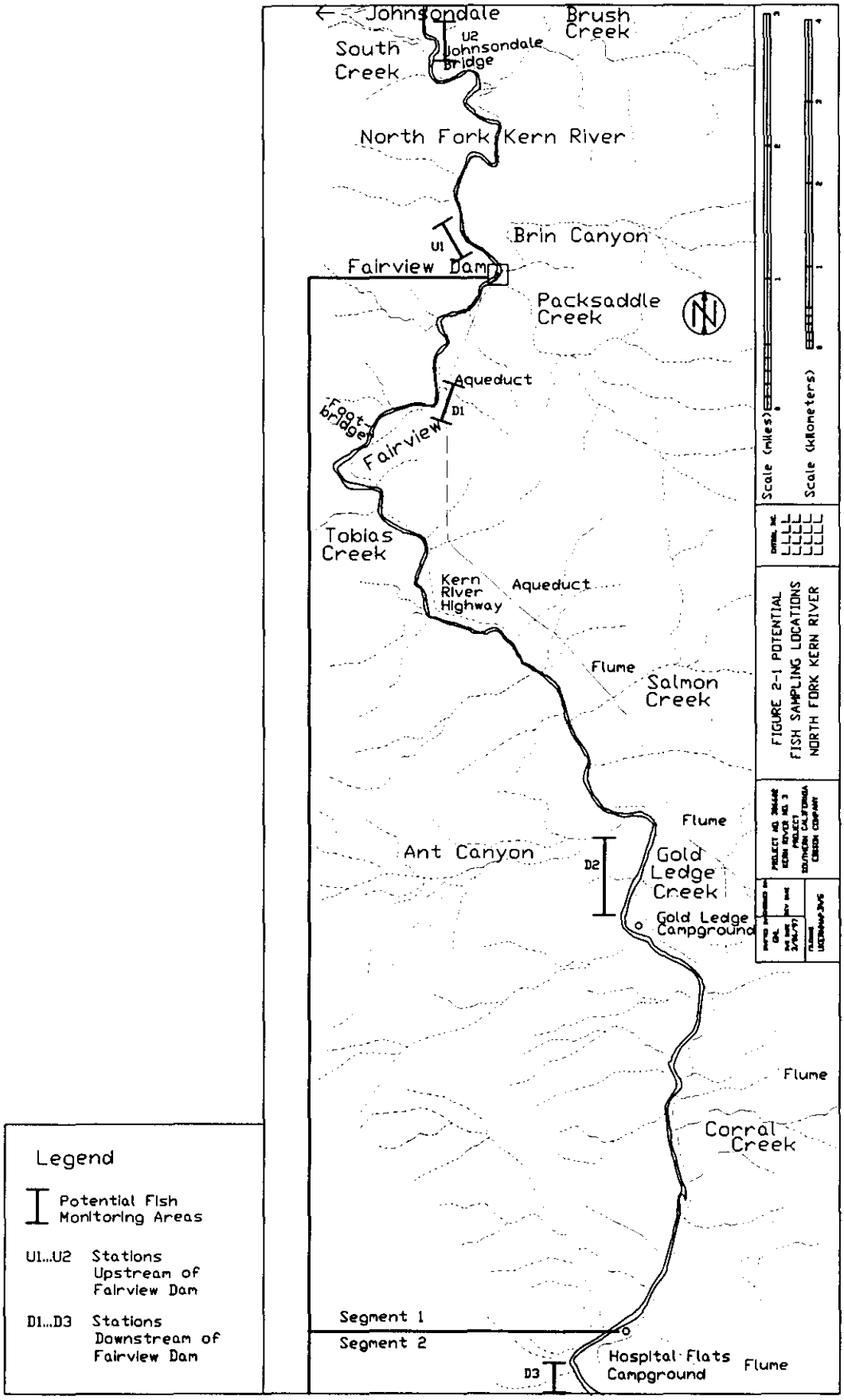

Figure 2-1. Proposed locations for fish monitoring stations

2.4.1.1 Electrofishing

Electrofishing will be carried out in habitats sufficiently shallow to allow for adequate sampling. Sites considered for electrofishing sampling will be evaluated to determine if habitats can be adequately sampled prior to initiating sampling activities. Sampling will occur during low flows to provide improved access to all areas (see Section 3.2 Schedule). The upstream and downstream ends of each electrofishing site will be blocked using 0.125 inch mesh block nets. The block nets will prevent the escape of fish during the abundance estimation. Sampling will be conducted in an upstream direction from the downstream block net to the upstream block net.

Electrofishing will be conducted using a streamside or barge electrofishing unit with three leads. A minimum available power of 2,500 watts will be used to provide an adequate electric field and to maintain comparability to previous sampling. Settings on the unit (frequency, pulse width, and voltage) will be adjusted to provide adequate field strength for polarization and anesthesia of fish based on site-specific conditions. A crew of no less than five persons will be used. At least three individuals will operate dip nets to collect anesthetized fish. Electrofishing will generally be conducted as described by Reynolds (1983). Population abundance will be estimated from multiple removal sampling or mark-recapture . Multiple removal sampling will be based on a minimum of three removal passes. Population estimates will be based on age-class for salmonids and lifestage for other fish. Multiple-removal data will be analyzed as described in Section 2.5, below. Mark-recapture was the approach used for the majority of electrofishing sites sampled for the Exhibit E studies (Edison 1991). This approach will be the preferred approach for studies conducted under this plan.

Captured fish will be transferred to a holding pen outside of the sampling area for processing. All captured fish will be identified to species and classified as to lifestage. Fish will be measured to the nearest millimeter fork length. Individual weights from a representative sample of the catch will be measured to the nearest gram. The representative sample will consist of at least 10 fish (if available) of each species and life stage encountered per station. Rainbow trout will be examined and characterized as either wild or hatchery trout. If Kern River Rainbow Trout (KRRT) are stocked in the NFKR, as a result of the restoration activities proposed in the Upper Kern River Management Plan, any rainbow trout collected will be checked for appropriate marks, clips, or tags. Any marked KRRT collected will be noted. Age and growth of salmonids and centrarchids will be evaluated using standard aging techniques. For each segment, we will remove scales from 10 fish at each age class for each species to be aged. These scales, taken from above the lateral line and approximately midway down the length of the dorsal fin, will be collected along with species, length, date, and site of capture. If mark-recapture is used to estimate population abundance, captured fish will be fin-clipped. An adipose clip will be used to mark the fish for mark-recapture unless this mark is in use by CDFG for trout in this river. Fish captured will be retained in live nets and returned to their sampling unit after they are processed.

Tissue clipped from the fins of rainbow trout will be placed in blood vials and made available to the CDFG for possible deoxyribose nucleic acid (DNA) analysis. Over the course of the license term of the KR3 Project, CDFG and the USFS will be working to restore the KRRT; and DNA analysis may be used to identify the extent to which KRRT have been re-established.

Routine observations are planned of habitat and physical conditions in the specific areas sampled. These observations include physical measurements of water temperature, specific conductance, and dissolved oxygen. Water transparency will be characterized, habitats sampled will be measured for length and width, photographs will be taken, and other data collected (Platts et. al. 1983). In addition, observations will be made to include characterization of each habitat unit sampled. These observations will include characterization of substrate and depth, riparian conditions, and the presence of woody debris or other cover. These data will provide useful information for characterizing sampling conditions between monitoring periods.

2.4.1.2 Direct Observation

Deeper water habitats will be sampled through direct observation and visual counts. Snorkel surveys will be conducted to sample one or more contiguous deeper water habitat units at each sampling site.

Each sample unit will be stratified into swimming lanes parallel to the direction of stream flow using weighted rope as lane markers. Underwater clarity will determine lane width (Hillman et al. 1992) and will be measured prior to installing lane markers. Stream flow velocity and depth in some sample units may exceed the divers' ability to crawl along the bottom or swim at the water surface. In these units, pull ropes for assisting upstream movement of divers will be used. One rope (main rope) will be positioned at the uppermost boundary of the sample unit, perpendicular to the flow. Pull ropes (number of pull ropes will depend on the number of divers) will be attached to, and spaced evenly along, the main rope and allowed to float at the water surface parallel with the flow. The pull ropes will extend from the main rope downstream to about the lowermost boundary of the sample unit. Divers will use the pull ropes to aid their movement upstream. Lane markers, and if necessary pull ropes, will be positioned at least two hours prior to each direct underwater observation survey. This delay should minimize the influence of disturbance on the fish community (Hankin and Reeves 1988).

Direct underwater observation methods will be used to identify and count fish. Methods will generally be similar to those presented in Griffith (1972), Platts et al. (1983), Hicks and Watson (1985), Hankin and Reeves (1988), and Hillman et al. (1992). Surveys will be done between 0900 to 1600 hours (Hankin and Reeves 1988) to maximize the likelihood that light intensity will be suitable for observing fish. We will not survey on overcast days (Platts et al. 1983).

Divers using mask and snorkel will enter slightly below the downstream end of the sample unit (Hankin and Reeves 1988). They will move directly across and slightly

below the lowermost boundary of the sample unit into their designated swimming lane. When in position, the divers will move upstream to the lowermost boundary of the sample unit. From a fixed position and prior to moving upstream (Campbell and Neuner 1985), the divers will look ahead to locate fish on the fringe of vision (Platts *et al.* 1983). The coloration of fish allows them to blend into the surrounding background. Because of this, looking ahead from a fixed position allows the divers to see fish that may not have been noticed if the divers had been simultaneously moving about and looking for fish. Divers will identify and count fish in their lane while moving slowly upstream at a uniform, even, pace with no abrupt movements. Fish will be counted as they pass below or to the side of an observer. Cover for fish such as interstitial spaces between substrate particles, woody debris, bubble screen, crannies in bedrock and along stream margins will be inspected closely for concealed fish (Fausch and White 1981; Hicks and Watson 1985). We will follow the methods presented in Hicks and Watson (1985) when identifying and counting fish in habitats where the bottom cannot be seen from the surface. One diver will dive while the others remain at the surface. Once the diver returned to the surface, the diver to the near right will dive while the others remain at the surface. After each diver has surveyed the pool bottom in their lane, they will move upstream. The procedure will be repeated until the pool becomes shallow so the bottom could be seen from the surface. A bank-side observer will monitor and orally maintain diver distribution and sampling rate.

Due to pockets of high water velocities, or channel morphology, diver movements may become influenced and the dive line may become interrupted. As a result, the dive team may not move upstream uniformly in an even line across the stream, and divers moving ahead of others may startle fish. Startled fish may not be observed or counted by divers, and fish counts may be influenced and inaccurate. A bank-side observer will monitor and orally maintain diver distribution and sampling rate. If the bank-side observer notices that the dive line is not even, or if movements are not methodical, fish count data for the particular unit will not be used to estimate fish abundance. The sample unit then will be resampled two hours later. This delay should minimize the influence of disturbance on the fish community.

Hillman et al. (1992) used block nets to isolate sample units thereby preventing fish movement into or out of the unit during underwater surveys. Fish startled during direct underwater observations may swim ahead of the observers, and even leave the sample unit. During our surveys, if fish are not prevented from moving upstream either by a waterfall, cascade, or channel morphology, additional divers (depending on wetted channel width) will position themselves at the uppermost boundary of the sample unit in the thalweg. The diver will enter the upper end of the sample unit at the stream margin slowly with no abrupt movements. The divers will identify and count fish leaving the unit. These data will be tallied accordingly.

Fish lengths will be estimated by comparison with a fish length calibration cord. The calibration cord is a piece of thin diameter rope with size length categories marked on it.

In addition to the fish length calibration cord, all divers will be experienced in estimating fish lengths, so estimates of fish length will be accurate.

Hankin and Reeves (1988) recommend that visual fish counts be calibrated using electrofishing techniques. Three shallow pool habitats that can be electrofished effectively will be used to calibrate visual counts. This should provide information regarding the relative comparability of the two approaches and the effectiveness of the direct observation method.

Physical habitat information will be collected at each sample unit. Air and water temperatures will be measured at each sample unit as will specific conductance and dissolved oxygen. These will be recorded along with the time of day. Underwater clarity will be measured at each dive sample unit using a standardized technique (e.g., Platts et al. 1983). A small object (about 75 mm total length) similar in size and shape to a small trout will be placed in the river. The distance at which the object in the stream disappears from a divers view will be measured and recorded. The length, and average width (Platts et al. 1983) of each sample unit will be measured and recorded. Photographs will be taken of each sample site to document physical characteristics. In addition, observations will be made to include characterization of each habitat unit sampled. These observations will include characterization of substrate and depth, riparian conditions, and the presence of woody debris or other cover.

Divers will record fish species and size in a standardized matrix on wrist-mounted underwater dive slates made of Plexiglas. At the end of each dive, the data will be transferred from the dive slates to the field notebook, and the dive slates wiped clean. The fish counts will be stratified by fish species and size length distribution (25.0 mm to 75.0 mm; 76.0 to 175.0 mm; 176.0 mm to 305.0 mm; 306.0 mm to 405 mm; and, greater than 405.0 mm). Divers will record counts of fish from a fixed, still, position. This will decrease the likelihood that moving fish will be missed while counts are being recorded.

2.5 DATA ANALYSIS

2.5.1 VISUAL COUNTS

Estimates of fish species abundance will be calculated using equations presented in Hankin and Reeves (1988). Fish species abundance will be estimated and displayed by size class (25.0 mm to 75.0 mm; 76.0 to 175.0 mm; 176.0 mm to 305.0 mm; 306.0 mm to 405 mm; and, greater than 405.0 mm), habitat type, and segments.

2.5.2 ELECTROFISHING

Population estimates will be computed for each station using maximum likelihood equations (USFS's MICROFISH program) (Van Deventner and Platts 1986). Total biomass will be estimated for each station by multiplying the population estimate for each age class by the mean weight of fish in each age class sampled. SYSTAT, a microcomputer statistical package (Wilkinson 1987) will be used to compute length-

weight regressions from field data. Growth rates and biomass of fish for each age class will then be estimated through application of these regressions.

2.5.3 COMPARISONS

Comparisons will be made of populations of fish between each round of sampling and with data collected for the Exhibit E and/or other monitoring programs. Trends will be examined graphically. These trends include abundance over time, fish community makeup, age-structure, growth, and fish community characteristics at each sampling station. To the extent sufficient data are available, statistical comparisons of abundance and trends will be made. It may not be feasible to make such comparisons until after the second round of monitoring.

Factors affecting population and community trends will be assessed based on the information collected under this program and other data obtained from other monitoring programs in the basin. Comparisons with changes in hydrological conditions, enhancement measures, changes in management practices, and habitat characterizations will be included. Comparisons with known limiting factors will be addressed. As studies are completed under the articles of the new project license, these results will be used to assist with data interpretation and the analysis of data trends.

3.1 REPORTS

According to License Article 411, the report of the results of fish monitoring must be filed within 120 days after the completion of each sampling. Each report will describe that year's sampling effort including the locations sampled, distribution of fish, fish abundance, age structure and growth of trout. The results of the first monitoring trip will be compared with data collected in support of the Exhibit E. Specific note will be taken of the abundance of wild trout, population structure of wild trout, and size and distribution of other native fish. Future monitoring efforts will be compared to the results of the first monitoring effort. Trends will be assessed. Habitat information and other data collected by other monitoring programs will be incorporated in the assessment of each round of monitoring.

Data obtained during the monitoring study will be attached to the report to the Upper Kern River Fishery Resource Enhancement Trust Fund signatories and the Park Service. Data will be made available on PC-compatible diskette, if requested by the resource agencies.

3.2 SCHEDULE

Previous sampling efforts conducted for the Exhibit E were conducted during September. Under the previous license, minimum flows during September were 70 cfs for normal years and 65 cfs for dry years. Under the new license, the minimum release flow for September is 100 cfs under all water-year types. The higher flows during September may affect the efficiency of sampling. The resulting differences may affect the interpretation of results, if comparisons are made to data from prior years. Under the current license, minimum release flows during October are 80 cfs. This flow would provide sampling conditions more similar to previous studies. However, since water temperatures drop during the fall, sampling may be affected by lower temperatures. This plan proposes that sampling be conducted in early October, soon after the reduction in flow to 80 cfs. This would provide similar flow and temperature conditions to the previous studies.

The first monitoring effort would be conducted in early October, 1997. This would be followed by a monitoring effort every five years subsequent to that date for the term of the license. Starting in October, 1997 would limit the time elapsed since the last sampling of these areas to six years (1991 was the full last survey in support of the Exhibit E).

Based on a sampling effort that concluded during October, 1997, the report would be due to the Trust Fund signatories by the end of February, 1998. Subsequent monitoring

reports would be submitted at five-year intervals, within 120 days following the conclusion of the monitoring effort.

4.0
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APPENDIX A

INITIAL RESOURCE AGENCYCONSULTATION

APPENDIX A
PRELIMINARY AGENCY CONSULTATION

Telephone Conversation Record

March 11, 1997.

Recorded by: Wayne Lifton

Conversation with Matt Lechner USFS

Regarding: Kern River No. 3 Fish Monitoring Plan

I called Mr. Lechner to discuss the Kern River No. 3 Hydroelectric Project Fish Monitoring Plan. We discussed the FERC requirements for fish monitoring and I summarized the draft sampling plan for Mr. Lechner. Mr. Lechner wanted to know how we planned to address native minnows in the sampling plan. I responded that we planned a sampling station downstream of Hospital Flat as requested by the US Forest Service in its 4(e) conditions. In addition, all native minnows would be identified, measured and recorded. We discussed scale and tissue sampling and plans to restore the Kern River rainbow trout. We discussed who would have custody of any tissue samples collected. I told him that we would plan to turn over specimens to the USFS or CDFG. He thought that Dr. Jennifer Nielsen at Stanford University's Hopkins Marine Station might be an appropriate person to receive the samples. I told Mr. Lechner that I would discuss this with CDFG. Based on our discussion, Mr. Lechner expressed the opinion that the plan sounded fairly complete.

Telephone Conversation Record

March 12, 1997.

Recorded by: Wayne Lifton

Conversation with Jerry Staley CDFG

Regarding: Kern River No. 3 Fish Monitoring Plan

I called Mr. Staley to discuss the Kern River No. 3 Hydroelectric Project Fish Monitoring Plan. We discussed the FERC requirements for fish monitoring and I summarized the draft sampling plan for him. Mr. Staley indicated that he thought that it would be important to differentiate between hatchery and wild trout when identifying fish in the field. I agreed with him and told him that we had incorporated this procedure in the draft monitoring plan. Mr. Staley also suggested that one of the sampling stations that is scheduled to be located upstream of Fairview Dam should be located further upstream. He stated that he would like to see a sampling station upstream of the Johnsondale Bridge in the special regulation section. He said that sampling in that area would provide information regarding a self-sustaining wild trout population that was not subject to the effects of hatchery trout and very high fishing pressure. We talked about how this would connect with the project, being so far upstream, and difficulties with sampling. Mr. Staley said that he thought the draft plan sounded reasonable and would review it when it arrived.

APPENDIX B

DRAFT PLAN CONSULTATION WITH RESOURCE AGENCIES

APPENDIX B
DRAFT PLAN CONSULTATION WITH RESOURCE AGENCIES

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
REGION 4
1234 East Shaw Avenue
Fresno, CA 93710
(209) 243-4014

June 17, 1977

Ms. Candace Irelan
Hydro Generation, GO 1,
Room 162
Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, California, 91770

Dear Ms. Irelan:

SCE Kern River No. 3 Hydroelectric Project, FERC No. 2290
Department of Fish and Game Comments
Draft Fish Monitoring Plan

We have reviewed the Draft Fish Monitoring Plan (Monitoring Plan), as provided pursuant to the FERC's requirements under Article 411 of the Project No. 2290 License. We believe the draft Plan adequately fulfills the stated requirements; particulary when it is considered in the broader context of the Upper Kern Basin Fishery Management Plan, as earlier developed by State and Federal wildlife and land management agencies, Edison, and the public. We believe the subject Monitoring Plan will provide the needed basis for evaluating the intended outcomes of the Project 2290 FERC License. Its results will also articulate with and support the broader, watershed-wide evaluations needed in implementing the above multi-agency initiative.

In jointly planning the Project fishery studies and mitigation features, we found it very difficult to establish separate, site-specific fishery attainment goals for the Project-affected (12-mile) reach of the Kern River. The reach has considerable physical diversity, given that the Project intake is at an elevation that seasonally experiences natural water temperatures which are "transitional", and at times exceed the comfort levels of cold-water species. In that situation, it is difficult to decide what physical and biological parameters to bench-mark and monitor, and/or what intensity of assessments to conduct, if the reach is considered by itself. We believe the draft Monitoring Plan assumes an appropriate scope of evaluation, in that regard.

It is important to remember that the major factors affecting the fish populations and recreational fishery probably occur outside the Project area. As such, the Project-required monitoring should be just one part in a broader, basin-wide fishery assessment program. It is intended that other monitoring programs will take place, under the Upper Kern Basin Fishery Management Plan, which will contribute documentation of the fishery status and opportunities located in areas outside the Project No. 2290 boundaries. It is intended that the Fishery Enhancement Trust Fund, sponsored by the Kern River No. 3. Project, will contribute some of the long-term financing for that multi-agency cooperative monitoring. Together, these assessments, will support a holistic approach to fishery improvement, which will promote the broadest possible benefits from the Project No. 2290 License provisions. We consider this approach very desirable, and we believe the draft Monitoring Plan, as presented, is well-designed to assess and guide the portion of the fishery improvement program that is affected directly by the subject Project.

We appreciate the opportunity to review the subject Monitoring Plan. If you or the FERC staff have any questions, please contact us at your earliest convenience. Inquiries should be directed to Mr. Dale Mitchell, Senior Environmental Specialist Supervisor, at the above address and telephone number.

Sincerely,

Dale F. Mitchell

for/ George D. Nokes
Regional Manager

United States Department Agriculture | Forest Service | Sequoia National Forest | 900 West Grand Avenue
Porterville, CA 93257-2035
(209) 784-1500
(209) 781-6650 TDD

FILE CODE: 2770

DATE: June 12, 1997

Southern Calfiornia Edison Company
P.O. Box 800
2244 Walnut Grove Avenue
Rosemead, California 91770

Attn: Gary Dudley:

The Sequoia National Forest (SQF) agrees with the recommendations in the report "Draft Fish Monitoring Plan Kern River No. 3 Project" prepared by Entrix, Inc. (project # 506602). This fish monitoring plan is a license condition for the Southern California Edison Kern River No. 3 Hydroelectric Project, FERC Project No. 2290.

Again, thank you for the opportunity to comment on the information and studies in this licensing so that the Forest, FERC, other agencies and SCE have the information required to make informed decisions.

Please contact Erik T. Ostly at this office (209) 784-1500 ext. 1136, if you have questions or need additional information.

Sincerely,

ERIK T. OSTLY
FERC Coordinator

cc:cmrd

United States Department of the Interior

NATIONAL PARK SERVICE

SEQUOIA AND KINGS CANYON NATIONAL PARKS
THREE RIVERS, CALIFORNIA 93271

IN REPLY REFER TO:

N1423

April 24, 1997

Ms. Candace Irelan
Southern California Edison
P. O. Box 800
244 Walnut Grove Ave.
Rosemead, California 91770

Dear Ms. Irelan:

We have reviewed Southern California Edison's draft plan to monitor fish populations in the North Fork Kern River. In general, the study proposal looked reasonable and complete, but we do offer a few suggestions and comments.

Page 2-3: We concur with the suggestion that one of the sampling stations be upstream of Johnsondale Bridge. This site should provide valuable information for interpreting and perspective in assessing the downstream sites.

Page 2-4, 3rd Paragraph: You propose using 0.125 inch block nets. I would consider using a larger mesh. These nets will work fine in slow flowing water with no organic matter on the substrate or leaf fall in the water column. Leaf fall and organic matter kicked up by the electrofishing crew will quickly clog nets causing them to fail. Also a fine mesh works poorly in a stiff current. The effectiveness of a block net on small fish is questionable anyway, and small fish usually do not seem to move far.

Page 2-4, 4th Paragraph, Multiple Removal versus Mark-recapture: Recommend going with one or the other, but you do not want to use one method in 1997 and another in five years if you are going to be comparing the data. Make a decision now based on what will work best at those sites.

Pages 2-6 through 2-10: We do not have any experience with direct observation, but we do have staff that spend considerable time in the water. It has been our experience that sunfish will stay put when approached by divers, but trout and suckers will often flee, sometimes herding toward the head of a pool, then rapidly breaking in all directions to escape. Adding a bunch of rope and divers to the water may make the fish very skittish. We are not suggesting that the method is flawed, but it may be important to have a very experienced crew. Of course, that is also true for the electrofishing.

Page 2-9, 4th Paragraph: We question how well a calibration with one shallow pool can be applied to deeper pools. Every pool is unique, and use of shallow pools is often different from deep pools. We have seen small shallow pools with numerous fish and large pools that are piscine deserts. It is the habitat quality and other environmental factors that makes the difference. Do not expect direct counts to provide data that can be interchangeable with electrofishing data. Be more concerned about consistency in you methodology and experience of your crews.

Page 3-1: We suggest giving serious thought to time of year. We are not intimately familiar with events in that area, but moving the date from September to October may mean colder water for divers, increased chance of early fall storms that cause flooding, and possibly more leaf fall to compromise block nets.

Thank you for this opportunity to review your draft monitoring plan. We hope that our comments are useful. If you have any questions, please contact our Fish and Wildlife Biologist, Harold Werner at (209) 565-3123.

Sincerely,

Michael J. Tollefson
Superintendent

cc:
Mietek Kolipinski, PGSO
Stan Stephens, CDFG
Matt Lechner, USFS
SNRM Office, SEKI

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

IN REPLY REFER TO:

June 11, 1997

Mr. C.E. Miller
Manager Hydropower Generation
Southern California Edison
P.O. Box 800
2244 Walnut Grove Ave.
Rosemead, California 91770

Subject: Draft Fish Monitoring Plan, Kern River No. 3 Hydroelectric Project, FERC No. 2290, Kern County, CA

Dear Mr. Miller:

This responds to your April 16, 1997, letter requesting Fish and Wildlife Service (Service) review of the draft study plan (plan) prepared by Southern California Edison (Edison) in compliance with Article 411 of the New License, requiring Edison to monitor fish populations in the North Fork Kern River. We offer the following comments for your consideration.

The plan generally appears to address the requirements of Article 411. There are a few additions that are needed to clarify the purpose of the study and application of study results. The plan should include an introductory section that provides background on the purpose of the study and how results will be used to measure success of implemented measures. Some additional details about the quality and quantity of habitat in the selected study reaches would be useful since such conditions may change during the study periods and influence fish population study results. It would also be useful to describe some of the habitat deficiencies that may be corrected with planned improvement measures. The methodology section should describe how the fish populations will be compared and what criteria will be used to determine success or failure of the improvement measures employed.

Since the fish population monitoring is limited to five-year intervals, it will be important to gather as much pertinent physical, chemical, and biological data on the study area as feasible to help explain changes that may occur. It may be prudent to research and prepare a list of pertinent ongoing environmental data sources that are independent of Kern No. 3 studies.

Thank you for providing us with the opportunity to review the document. If you have any questions please contact Ms. Susan Boring of our Energy and Power Branch at (916) 979-2117.

Sincerely,

for Wayne S. White
Field Supervisor

cc: ARD, KCE, Portland, OR
Wayne Lifton, Entrix
Jim Canaday, SWRCB, Sacramento, CA
Matt Lechner, Sequoia NF, Porterville
Dir., CDFG, Sacramento
Reg. Mgr., CDFG, Reg. IV, Fresno, CA
FERC, San Francisco
FERC, Washington, D.C.