CHAPTER 1: INTRODUCTION

Listing History

On November 7, 1985, the California-Nevada Chapter of the American Fisheries Society (AFS) petitioned the National Marine Fisheries Service (NMFS) to list the Sacramento River winter-run chinook salmon as a threatened species pursuant to Section 4(b)(3) of the Endangered Species Act (ESA) (55 FR 46515, Table I-1)[1]. As stated in the ESA, a threatened species is defined as one which is not yet endangered but is likely to become so within the foreseeable future. An endangered species is one which is in danger of extinction throughout all or a significant portion of its range. NMFS reviewed this petition and announced on February 13, 1986 that substantial information existed which potentially warranted the formal listing of winter-run chinook (51 FR 5391). A 12-month review was initiated to assess the status of the population with information being provided from the petitioner, the State of California, Federal agencies, and the public.

On February 27, 1987, NMFS concluded that the Sacramento River winter-run chinook salmon was a species in the context of the ESA and that the run had declined substantially--more than 97% over a period of less than two decades (52 FR 6041). The primary causes of the decline were considered to be the construction and operation of the Red Bluff Diversion Dam (RBDD), the adverse temperature conditions created by the operation of Shasta Dam (particularly in dry years), and a variety of other human activities that collectively degraded spawning and rearing habitat. NMFS concluded, however, that the restoration and conservation efforts being implemented or planned by State and Federal resource agencies could recover the population without proceeding with a formal listing. Subsequently, the Sierra Club Legal Defense Fund (SCLDF), on behalf of AFS, filed suit on February 3, 1988 in the U.S. District Court against the Federal government for failing to list the winter-run chinook. The SCLDF argued that because the run was in fact biologically threatened, the Federal government under the ESA was obligated to list the species, regardless of any management plan for recovery.

Similarly, the Sacramento River Preservation Trust and the Tehama Fly Fishers petitioned the California Fish and Game Commission (FGC) on August 7, 1986 to protect the winter-run chinook under the California Endangered Species Act (CESA). The FGC first rejected the petition in June 1987, but after environmental and sportfishing groups filed suit in State court, they accepted the petition in February 1988, and granted "candidate" status under CESA for one year to allow for further review. On May 20, 1988, the California Department of Fish and Game

[1] The National Marine Fisheries Service publishes in the Federal Register (FR) and is cited here as follows: volume, FR, page number. All Federal Register citations in this document are authored by the National Marine Fisheries Service, and are cited as such in the bibliography.

(CDFG), the U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service (USFWS), and NMFS formalized their conservation efforts to rebuild the winter-run chinook population by signing a Cooperative Agreement to implement the Ten-point Winter-run Restoration Plan (referred to in 53 FR 49722). This agreement specified measures to be implemented voluntarily to improve habitat conditions for the run, restrict in-river fishing, and develop a hatchery enhancement program (Table I-2). Meanwhile, the resource agencies expressed concern as drought conditions persisted. Water quantity and water quality forecasts made by the USBR indicated that river temperatures might reach levels lethal to developing winter-run chinook eggs. Resource agencies recognized that conservation measures in the Ten-point Plan might not be adequate during prolonged drought conditions. On May 26, 1988, NMFS agreed in court to review its decision to not list the run and to evaluate the adequacy of the Ten-point Plan for protecting winter-run chinook during drought conditions. This stipulated agreement settled the Federal suit over the salmon.

On June 2, 1988 (53 FR 20155), NMFS formally announced its intent to reconsider its decision and opened a public comment period to ensure that all information on the status of the run and factors affecting it were available for review. Following this review, NMFS concluded on December 9, 1988, to uphold its original decision to not list the winter-run chinook. Listing was considered inappropriate because the status of the population had not deteriorated since the original determination. Also, the Ten-point Plan was being implemented and unprecedented actions were being carried out to minimize the adverse effects of the drought (53 FR 49722). Similarly in the following year, the CDFG concluded its 12-month status review and recommended to the FGC on March 3, 1989, that winter-run chinook salmon not be listed. The FGC concurred based on the following: 1) the steady population level through much of the 1980s at about 2,000 fish, 2) the potential success of the Ten-point Plan, particularly the Coleman National Fish Hatchery propagation plan, and 3) the lack of information substantiating that serious threats existed leading to the population's extinction or threatening its existence.

For undetermined reasons, the 1989 run returned at much lower levels than expected. Between 1982 and 1988, the run-size had varied around a mean of 2,382 fish. The 1989 run-size was estimated at about 533 fish, roughly 75% less than average run-sizes during the past several years. Based on the low return of fish in 1989, and because the USFWS hatchery program for augmenting natural production was still developmental and not likely to produce substantial numbers of juvenile winter-run chinook for several years, the CDFG reversed its position and recommended that the FGC list the winter-run as a threatened species under CESA. The FGC voted not only to list the run but to list it as endangered rather than threatened. The run was formally listed as endangered under CESA in August 1989.

NMFS was also concerned that the 1989 run-size was so low, and published an emergency rule on August 4, 1989 to list winter-run chinook as a threatened species (54 FR 32085). A

proposed rule to list the species as threatened was published on March 20, 1990 (55 FR 10260). On April 2, 1990, the emergency rule of August 4 was extended to ensure continued protection of the run under the ESA while the final rule was developed (55 FR 12191). The final rule listing the run as a threatened species under the ESA was published on November 5, 1990 (55 FR 46515).

On June 5, 1991, NMFS received a petition from AFS to reclassify the status of winter-run chinook in the Sacramento River from threatened to endangered under the ESA. At the time, data indicated that only 88 to 200 adults would return to spawn in 1991. This range was well below the effective population size of 200 adults which NMFS had considered adequate to avoid irretrievable genetic loss in the population (52 FR 6041). Pursuant to the ESA, NMFS reviewed the petition and determined that it contained substantial information indicating that the petitioned action might be warranted. On November 7, 1991, NMFS announced its intention to conduct a status review of the run to determine whether reclassification was appropriate (56 FR 56986). NMFS solicited information concerning the status of the run and, subsequently, conducted a status review to evaluate the condition of the population.

A proposed rule to reclassify the species from threatened to endangered was published on June 19, 1992 (57 FR 27416). In the proposed rule, NMFS recognized that the population of winter-run chinook salmon population had dropped by almost 99% over a 25-year period (1966-1991), and that despite conservation measures to improve habitat conditions, the population continued to decline. The final determination was delayed on June 4, 1993, to obtain and evaluate additional information on the 1993 spawning run (58 FR 31688). On September 10, 1993, NMFS reopened the comment period on the proposed rule after receiving new information that the winter-run chinook spawning run size was 267 adults for 1993 (58 FR 47710). This represented a substantial decline in one generation from the 1990 run-size estimate of 425 adults, and a serious decline from the 1992 estimate of 1,122 adults. On January 4, 1994, NMFS published a final rule to reclassify winter-run chinook salmon as endangered (59 FR 440) based on: 1) the continued decline and increased variability of run sizes since its listing as a threatened species in 1989, 2) the expectation of weak returns in certain years as the result of two small year classes (1991 and 1993), and 3) continuing threats to the population. When the winter-run chinook was initially listed as threatened, the run was conferred the same protection under the ESA as an endangered species. Hence the new status did not affect the level of protection for winter-run chinook, but more accurately reflected the status of the population.

Designation of Critical Habitat

The ESA requires designation of critical habitat at the time a species is listed, unless the Secretary of Commerce determines that the designation would be detrimental to the species' continued existence or that the limits of critical habitat are not determinable. On August 4, 1989, concurrent to the emergency listing of the winter-run chinook, NMFS designated critical habitat for the population (54 FR 32085). As an emergency designation, only a limited evaluation of the habitat requirements for winter-run chinook was conducted. The critical habitat included the portion of the Sacramento River from the RBDD, Tehama County (River Mile 243) to Keswick Dam, Shasta County (RM 302) including the adjacent riparian zones, the water in the river, and the river bottom. This designation encompassed that portion of the river in which suitable conditions could be maintained for spawning, incubating eggs, and rearing juvenile fish.

A second emergency ruling was published on April 2, 1990, to provide for continued protection of critical habitat for winter-run chinook as the formal listing process was not yet complete (55 FR 12191). This second ruling for designation of critical habitat was considered effective until the final listing was complete. As required by the ESA, NMFS conducted an analysis of the economic and environmental impacts associated with designating critical habitat (Hydrosphere 1991, BioSystems 1991). According to the ESA, an area may be excluded from the critical habitat if NMFS determines that the overall benefits of exclusion outweigh the benefits of conserving the areas; however such areas cannot be excluded if such an action risks extinction of the species.

On August 14, 1992, NMFS published a proposed critical habitat designation for the Sacramento River winter-run chinook salmon (57 FR 35526). The habitat proposed for designation included: the Sacramento River from Keswick Dam, Shasta County (RM 302) to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay to the Golden Gate Bridge (Figure 1-1). Within the Sacramento River, this designation included the river water column, the river bottom (including those areas and the associated gravel used by winter-run chinook salmon as spawning substrate), and the adjacent riparian zone used by fry and juveniles for rearing. In the areas westward from Chipps Island, including San Francisco Bay to the Golden Gate Bridge, this designation included the estuarine water column and essential foraging habitat and food resources utilized by winter-run chinook as part of their juvenile emigration or adult spawning migration.

Although considered important, the proposed critical habitat did not include the open ocean habitat used by winter-run chinook because degradation of the open ocean did not appear to have significantly contributed to the decline of the species, and our knowledge of the species

ocean distribution was very limited. Existing laws and regulatory mechanisms were considered adequate to provide the necessary level of protection in those areas. Within inland waters, NMFS did not propose to include specific areas outside the geographical area presently occupied by winter-run chinook. NMFS addressed the possibility of removing Shasta and Keswick dams on the Sacramento River to reopen former upriver habitat, but concluded that proper management of existing habitat was sufficient for the survival and recovery of the species. In addition, the Central Delta was not included as part of critical habitat because survival of juvenile winter-run chinook was thought to be low in that part of the Delta due to the operation of the State and Federal pumping facilities, and survival of juveniles could be maximized more readily by taking actions to keep rearing and outmigrating juveniles in the mainstem Sacramento River to the greatest extent possible. Public comments on the critical habitat designation were solicited at the time of this proposed ruling.

On June 16, 1993, the final rule designating critical habitat was published (58 FR 33212). The habitat for designation was identical to that in the proposed ruling except that critical habitat in San Francisco Bay was limited to those waters north of the San Francisco/Oakland Bay Bridge. The designation of critical habitat identifies areas considered essential to the species. All government agencies or private groups proposing activities within these areas must consult with NMFS through Section 7 or Section 10 of the ESA to evaluate how their activities may be conducted in the interest of protecting the winter-run chinook's critical habitat.

Need for Recovery Plan

A recovery plan is needed to identify and set priorities for actions necessary to ultimately restore the Sacramento River winter-run chinook salmon as a naturally sustaining population throughout its present range. More immediately, a plan is needed which identifies actions to prevent any further erosion of the population's viability and its genetic integrity.

Pursuant to Section 4(f) of the ESA, a recovery plan must be developed for species listed as endangered or threatened, and this plan must be implemented unless it is found not to promote the conservation of the species. A recovery plan must include the following:

- a description of site-specific management actions necessary for recovery,
- objective, measurable criteria, which when met, will allow delisting of the species, and
- estimates of the time and cost to carry out the recommended recovery measures.

The NMFS is charged with implementing the ESA for anadromous fishes and is responsible for promoting the recovery of winter-run chinook. To develop the most effective recovery

program, NMFS established the Sacramento River winter-run chinook salmon recovery team which consisted of biologists from NMFS, USFWS, CDFG, and the academic community (Table I-3). The team developed its draft recovery recommendations using a strategy of identifying problems and corrective actions to address the problems. NMFS subsequently developed this draft recovery plan using the recovery recommendations and analysis provided by the team.

The draft recovery plan is divided into several chapters. The status of the winter-run chinook population and those habitats important to the population are described in Chapter 2. Chapter 3 identifies existing factors that affect abundance or adversely affect or impede the recovery of winter-run chinook. Chapter 4 of the draft plan describes recovery goals and objective, measurable criteria to assess how well the population is responding to recovery actions, and which can be used to make decisions about delisting the species. Chapter 5 of the plan recommends interim actions to begin rebuilding the winter-run chinook population, and long-term actions which require more extensive planning to ensure the sustained recovery of winter-run chinook. Finally, Chapter 6 presents an implementation schedule which identifies and sets priorities for the recovery actions, and provides estimates of the time required for completion. This schedule will be used to direct and monitor implementation and completion of these recovery tasks. It will also be used to justify budget requests for recovery efforts.

Based on the recovery team's recommendations, NMFS has concluded that no single solution is likely to lead to the recovery of Sacramento River winter-run chinook salmon. Specific factors have been identified as major causes of the decline of winter-run chinook, such as elevated water temperatures in the upper Sacramento River and impediments to upstream and downstream migration at RBDD. However, there are a wide range of factors that affect winter-run chinook survival, and they must be addressed comprehensively in order to rebuild the population and promote its recovery. The recovery actions must also be planned and implemented to ensure the best use of available resources. Immediate benefits are expected from actions that can be implemented immediately, but many other actions will require substantial planning and lead time. For this reason, recovery of the population will likely occur gradually over a period of years. NMFS is confident that implementation of this plan represents a sound strategy for the sustained recovery of winter-run chinook salmon.

Implementation of these actions will involve a coordinated effort by NMFS and other federal agencies, State and local governments, private industry, conservation organizations, and the public. Recovery actions should be implemented through: (1) sections 7(a)(1) and 7(a)(2) of the ESA where federal agencies are involved, (2) section 10(a)(1)(A) of the ESA for research and enhancement activities; and (3) section 10(a)(1)(B) of the ESA where state or private entities are involved. NMFS believes that many of the actions identified in this draft plan are sufficiently detailed to warrant immediate consideration by Federal agencies consulting pursuant to section 7 of the ESA, or by State agencies or private entities pursuing section 10(a)(1)(B) permits pursuant

to the ESA.

NMFS will provide public notice and an opportunity for public comment prior to the final approval of this recovery plan. The final recovery plan will allow for flexibility so that as new information is developed, recovery actions may be reconsidered or new actions added.

Other Endangered Species

The ESA is designed to recover individual species, however, since individual species are part of a functioning ecosystem, the recovery of winter-run chinook needs to be considered in the broader context of ecosystem restoration and conservation. The decline of winter-run chinook has coincided with the decline of many other native species and natural communities in the Sacramento River system (Appendix Tables A-1 and A-2). Natural communities are distinct, identifiable, and reoccurring assemblages of organisms which are dependent on similar environmental parameters for their existence (Ellison 1984). In the Sacramento drainage, Moyle and Williams (1990) concluded that 46% of the native fish stocks were extinct, endangered, or in need of special protection. A review of the California Natural Diversity Database identified a total of 99 State and Federal candidate, proposed, and listed plants and animals, and CDFG species of special concern which occur within the present habitat range of the Sacramento winter-run chinook salmon[2]. These included 25 species of birds, 41 species of plants, 10 species of fish, 9 species of insects, 6 species of mammals, 3 species of amphibians, 2 species of reptiles, 2 species of snails, and 1 species of arachnid. These statistics reflect the severely degraded health and reduced biodiversity of the ecosystems upon which the Sacramento River winter-run chinook salmon depends.

In preparing this plan, NMFS has endeavored to develop recommendations that will achieve recovery of the Sacramento River winter-run chinook salmon through restoration of the interlinked and interdependent terrestrial and aquatic ecosystems in the Sacramento River and Bay/Delta systems. In so doing, it is hoped that implementation of the winter-run chinook salmon recovery actions will assist in conserving and recovering other fish and wildlife populations which have declined.

[2] Habitats reviewed included both the river channel and one-mile of riparian and upland habitat to either side of the shoreline of the Sacramento River, the Sacramento-San Joaquin Delta, and the San Francisco Bay Estuary.

Figure I-1. Map depicting Sacramento River winter-run chinook salmon critical habitat (57 FR 35526)

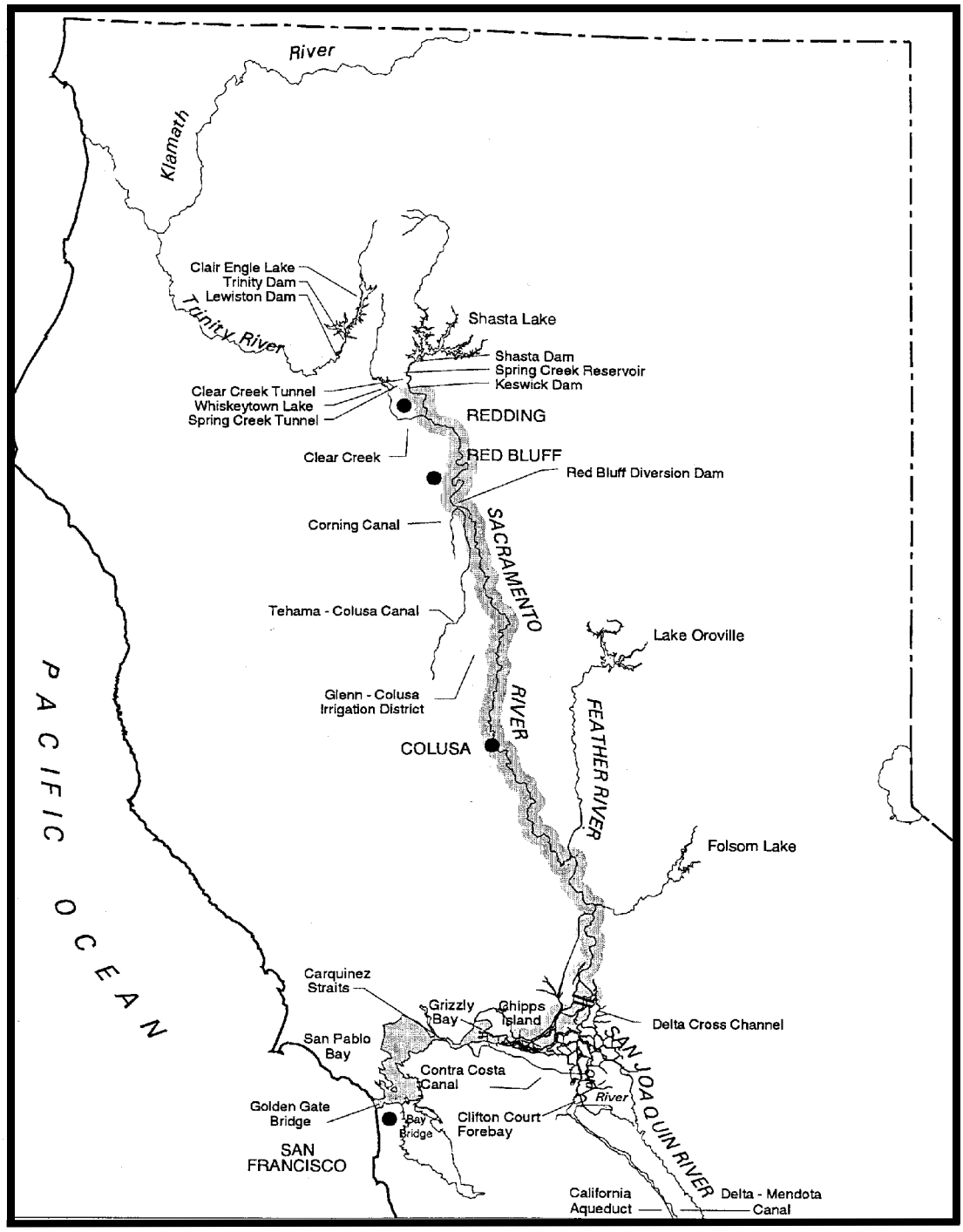

Table I-1. Chronology of Administrative Actions Relevant to Adding the Sacramento Winter-run Chinook Salmon to the U.S. List of Threatened Species.

Date	Action	Reference
October 13, 1985	California-Nevada Chapter of the American Fisheries Society petitions the National Marine Fisheries (NMFS) to list the winter-run chinook salmon in the Sacramento River of California as a threatened species.	American Fisheries Society, 1985
February 27, 1987	NMFS determines that a proposed listing of the winter-run chinook salmon in the Sacramento River is not warranted.	52 FR 6041
December 8, 1988	U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and the California Department of Fish and Game sign the 10 Point Recovery Plan Cooperative Agreement.	53 FR 49722
June 2, 1988	NMFS announced its intent to reconsider its earlier decision not to list the species under the ESA.	53 FR 20155
August 4, 1989	NMFS promulgates an emergency rule listing the species as threatened under provisions of the ESA. Rule to remain in effect until April 2, 1990.	54 FR 32085
March 20, 1990	NMFS announces that it is proposing to list the winter-run chinook salmon as a threatened species under the ESA. Comments on the proposed listing due May 4, 1990.	55 FR 10260
April 2, 1990	NMFS publishes a new emergency rule to list the winter-run chinook salmon in the Sacramento River as a threatened species under the ESA. Procedural action to avoid a hiatus in the protection of the species until the formal listing process is completed. Emergency rule also designates critical habitat in a portion of the Sacramento River from Red Bluff Diversion Dam (River Mile 243) to Keswick Dam (River Mile 302).	55 FR 12191
November 5, 1990	NMFS formally lists winter-run chinook salmon in the Sacramento River as a threatened species under the ESA.	55 FR 46515
November 7, 1991	NMFS receives petition from the California-Nevada Chapter of the American Fisheries Society requesting that the classification of winter-run chinook salmon of the Sacramento River be changed from threatened to endangered. Comment period extends to December 9, 1991.	56 FR 56986

Date	Action	Reference
June 19, 1992	NMFS determines that the winter-run chinook salmon in the Sacramento River should be reclassified as an endangered species under the ESA. Comment period extends until August 18, 1992.	57 FR 27416
August 14, 1992	NMFS proposes to designate critical habitat for the Sacramento River winter-run chinook salmon. The habitat proposed for designation includes (1) the Sacramento River from Keswick Dam to Chipps Island, (2) all waters from Chipps Island westward to Carquinez Bridge, (3) all waters of San Pablo Bay, and (4) all waters of San Francisco Bay to the Golden Gate Bridge. Comment period extends to October 13, 1992.	57 FR 35526
June 4, 1993	NMFS proposes to delay for up to 6 months its final determination on whether to reclassify the winter-run chinook salmon of the Sacramento River from threatened to endangered.	58 FR 31688
June 16, 1993	NMFS formally designates critical habitat for the winter-run chinook salmon of the Sacramento River.	58 FR 33212
September 10, 1993	NMFS reopens the comment period on the proposed rule to reclassify winter-run chinook salmon, after receiving new information on the 1993 spawning run size.	58 FR 47710
January 4, 1994	NMFS formally reclassifies winter-run chinook of the Sacramento River as endangered under the ESA.	59 FR 440

Table I-2. The 1988 Ten-point Program to Restore Winter-run Chinook Salmon in the Sacramento River (53 FR 49722).

Action Item	Description
1	Raise Red Bluff Diversion Dam gates from December 1 to April 1.
2	Develop production of winter-run chinook salmon at Coleman National Fish Hatchery.
3	Restore spawning habitat in the Redding area.
4	Develop measures to control squawfish populations at Red Bluff Diversion Dam.
5	Restrict in-river fishing.
6	Develop water temperature control for warm water years.
7	Correct Spring Creek pollution.
8	Correct passage and ramping problems from Anderson-Cottonwood Irrigation District dam.
9	Correct entrapment of adults at Keswick Dam stilling basin.
10	Continue to expand studies on winter-run chinook salmon.

Table I-3. Sacramento River Winter-run Chinook Recovery Team and Background

Terry J. Mills, Team Leader	California Department of Fish and Game, Sacramento, California. Central Valley Salmon and Steelhead Restoration Coordinator for the State. Involved in restoration planning efforts for Central Valley salmon and steelhead, and the development, funding, evaluation, and implementation of habitat restoration projects for salmon and steelhead. Representative on various State and Federal committees. Formerly conducted field studies of salmon and steelhead in the Eel River, Trinity river, South Fork Trinity River and Klamath River.
Louis Botsford, Ph.D.	Professor of Wildlife, Fish and Conservation Biology. University of California Davis. Specialist in mathematical models for population problems involving harvest and endangered species. Involved in endangered salmon modeling on the Columbia River; striped bass committee of Central Valley Project Improvement Act; reviewing overfishing of federally managed fish stocks; and the Plan for Analysis and Testing of Hypothesis (PATH) for endangered Columbia River salmon stocks
Dennis Hedgecock, Ph.D.	Geneticist. University of California Davis and Bodega Marine Laboratory. Research interests include conservation, evolutionary, population and quantitative genetics of aquatic organisms. Member of winter-run chinook captive broodstock committee, chair of its genetic subcommittee and member of its technical and budget subcommittee. Participant in the coastwide consortium for genetic stock identification of Pacific salmon.
Phil Hedrick, Ph.D.	Professor of Zoology. Arizona State University, Tempe, Arizona. Research interests include conservation biology and evolutionary genetics. Member of the red wolf recovery team and Board of Editors of Conservation Biology.
Robert Kope, Ph.D.	Research Fishery Biologist. National Marine Fisheries Service, Seattle, Washington. Former representive on Klamath River Technical Advisory Team and alternative on the Pacific Fishery Management Council's Scientific and Statistical Committee. Member of Biolgoical Review Team's for coastwide status reviews of pink, chum, coho and chinook salmon.
Jim Smith	Fishery Biologist, Project Leader. U.S. Fish and Wildlife Office, Northern Central Valley Fishery Resource Office, Red Bluff, California. Involved in Fish Passage Action Program for the Red Bluff Diversion Dam.
Roger Wolcott	Water Quality Specialist. Retired. National Marine Fisheries Service. Former Winter-run Chinook coordinator. Formerly involved in developing the Bay-Delta Accord; establishing water temperature criteria in the upper Sacramento River; and drafting legislation for the Central Valley Project Improvement Act, Trinity River Restoration Act, and the Klamath River Restoration Act.

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