RESTORING THE BALANCE

California Advisory Committee on Salmon and Steelhead Trout

1988 ANNUAL REPORT

NOTE TO READERS

This electronic version of *Restoring the Balance* is presented to provide background on salmon and steelhead restoration efforts in California. Originally published 11 years ago, report contents remain valid, though much has been accomplished since then. The Department of Fish and Game has received numerous requests for reprinting the report, but funding is lacking. We hope that making the document available for download will at least partially meet the demand for reprinting.

The California Advisory Committee on Salmon and Steelhead Trout, author of *Restoring the Balance*, was established in its present form by the Legislature in 1983, as described in the report. This stakeholder group is charged with making recommendations to the Department of Fish and Game and the California Legislature for restoration of salmon and steelhead resources throughout California. The members serve without compensation and represent working men and women drawn from a cross-section of California's citizenry. They devote many hours to committee work and provide valuable advice. Members are appointed by the legislative Joint Committee on Fisheries and Aquaculture, following consultation with the Department of Fish and Game and the Fish and Game Commission. The Department of Fish and Game reimburses members for expenses incurred while conducting committee business and provides administrative and clerical support. You may contact the Department of Fish and Game at, 916-654-5628 or 916-654-6505, for additional information on the advisory committee.

Since publication of the report in 1988, progress has been made toward restoration of salmon and steelhead resources, notably:

- **Enactment of the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act**
  This law, a version of which appears herein, took effect late in 1988 as urgency legislation. It provided the basis for the current Department of Fish and Game salmon and steelhead restoration program. The act is codified in sections 6900-6924 of the Fish and Game Code of California.

- **Enactment of the California Wildlife, Coastal, and Park Land Conservation Act of 1988 (Proposition 70**)
  California voters approved this initiative in 1988. Among its numerous provisions was appropriation of $10 million to the Department of Fish and Game for salmon stream restoration and enhancement in accordance with recommendations of the California Advisory Committee on Salmon and Steelhead Trout and the Commercial Salmon Trollers Advisory Committee. Over the past 10 years, numerous projects throughout California, have been recommended, including over $2 million in projects and equipment for restoration in the Central Valley. All Proposition 70 funds have been recommended for expenditure and most projects have been completed.

- **Enactment of the Central Valley Project Improvement Act (Federal. Title 34 of Public Law 102-575)**
  This act became law by signature of President George Bush late in 1992, and a draft Programmatic Environmental Impact Statement was released earlier this year. The act provides funding, through assessment of a surcharge on subsidized water deliveries made to water contractors served by the Central Valley Project, for salmon and steelhead restoration in areas of the Central Valley affected by operations of the Central Valley Project.

- **Enactment of Proposition 204**
  This initiative measure was approved in 1996. It provides significant funding through general obligation bond sales, to enable California to meet its cost-share requirement for implementation of projects authorized under the Central Valley Project Improvement Act.

- **Enactment of SB 271, Creating the Salmon and Steelhead Trout Restoration Account**
  This legislation, which took effect in 1997, can provide $8 million annually through fiscal year 2002/2003 for salmon and steelhead restoration in coastal drainages exclusive of the Central Valley. This landmark legislation, introduced by Senator Mike Thompson, provides significant funding for watershed restoration planning and project implementation on coastal streams.

- **Doubling of the Department of Fish and Game Budget since 1988**

- **Installation of a release water temperature control device on Shasta Dam, as called for in the report**

- **Progress made on finding a solution to fish screening problems at the Glenn-Colusa Irrigation District diversion near Hamilton City, as well as other water diversions in the Central Valley drainage**

- **Adoption by the Department of Fish and Game of a genetics policy concerning salmon and steelhead. It is printed in the *California Salmon Stream Habitat Restoration Manual*, available from the Department of Fish and Game at 916-653-2459, or for download from the Inland Fisheries Division web site, http://www.dfg.ca.gov/ifd/index.html**

We hope that you find *Restoring the Balance* informative and useful. Please bear in mind that it is old, and that contact persons or telephone numbers in it may no longer be current. We encourage you to contact Department of Fish and Game staff if you have questions.

RESTORING THE BALANCE

1988 ANNUAL REPORT

prepared by

THE CALIFORNIA ADVISORY COMMITTEE ON SALMON & STEELHEAD TROUT

PHOTO: BUREAU OF RECLAMATION

Not long ago, California's rivers ran free, down courses carved by the elements and time. The rivers teemed with salmon and steelhead—and some fish that exist now only in history.

As California emerged from her frontier days, patterns as old as the Ice Age were shattered and the very survival of some species was challenged. Nearly every river was tamed and harnessed. Forests were denuded for lumber, mountains were moved for highways and gravel was mined from the ancient river beds.

For some, this has only been progress toward prosperity. But the price of this prosperity, for salmon and steelhead trout, has been decline and near demise.

Although there is little time to act, we have considerable hope. In recent years, some new partnerships have been forged to help these fisheries. It is an alliance of many partners: anglers, commercial fishermen, Native Americans, legislators, the state's courts, fisheries professionals and many caring citizens.

Their efforts have brought California to a crucial crossroad in the stewardship of her public trust resources. The time for bold action is now. It is imperative to reverse the trend of decline and restore a balance so vital to the salmon and steelhead trout resources.

DEDICATION

This report is dedicated to the many Californians who have struggled over the years to bring balance and intelligence to the use of the state's natural resources. Without their foresight and their persistence, our migratory fish would have disappeared long ago.

We are especially grateful to the five members of our predecessor Citizens Advisory Committee on Salmon and Steelhead Trout, named below. Each man devoted his life, until its end, to the conservation and restoration of salmon and steelhead trout. They have left a special gift to future generations of Californians. It has been a privilege to join our efforts with theirs.

WILLIAM F. GRADER
JOSEPH PAUL
VERNON J. SMITH
JOHN PELNAR
EDMUND KOHLHAUF

PHOTO: DEPARTMENT OF FISH AND GAME

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Mr. Peter Bontadelli, Director
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1416 Ninth Street
Sacramento, California 95814

Dear Senator Keene and Director Bontadelli:

The California Advisory Committee on Salmon and Steelhead Trout, established by Senate Joint Resolution 19 in 1983, wishes to submit this report of its findings and recommendations.

California's salmon and steelhead trout resources have declined steadily for the last three decades due to degradation of stream habitat and decreased survival of juvenile fish. These once-great fisheries are now at a crucial crossroad. There is an urgent need for an explicit state policy to halt the decline and initiate an aggressive restoration program. Such a plan is contained in the provisions of Senate Bill 2261.

Recovery of the resource will also be assisted by Senate Bill 2390, which addresses major fish screen issues and by Senate Bill 1335, which provides greater fisheries protection in the Forest Practice Act. Senate Joint Resolution 43 underscores a concern expressed in all of our reports regarding fisheries conservation and the operation of the Central Valley Project.

We are convinced that it *is* possible to restore balance to our salmon and steelhead trout resources and we look forward to helping you implement the restoration program.

Sincerely,

Earl H. Carpenter

EARL H. CARPENTER, Chairman
California Advisory Committee
on Salmon and Steelhead Trout

LETTER OF TRANSMITTAL

EXECUTIVE SUMMARY

The California Advisory Committee on Salmon and Steelhead Trout was created by the state Legislature in 1983 to develop a strategy for the conservation and restoration of salmon and steelhead trout resources in California. The Advisory Committee is patterned after a similar citizens' committee appointed 18 years ago. That group contributed substantially to the protection of the state's fish life. The present Advisory Committee consists of 11 members and their working alternates, representing the commercial fisheries, sportfishing organizations, fisheries science, Native Americans and the general public.

To streamline its investigations, the Advisory Committee divided the state's "salmon and steelhead country"—the Central Valley and the coastal streams, from Oregon to Los Angeles—into 11 stream-group regions. It then enlisted literally hundreds of knowledgeable Californians to help identify salmon and steelhead conservation problems and restoration opportunities, watershed by watershed. Advisory Committee members researched conservation laws, water use policies, principles of conservation economics, hatchery practices, genetic preservation issues and the need for research, information and conservation education programs. Close scrutiny of the state's natural salmon and steelhead stocks confirmed that spawning runs have declined significantly in all California streams during the last 30 years; spawning runs have disappeared completely from many. Not surprisingly, the reduction in spawning runs has yielded lower fish populations, despite the contribution made by hatchery stocks. The state's average annual king salmon population—the number of adults caught both at sea and in rivers, plus the number that escape to their home streams to spawn—has declined to only one million fish. Adult steelhead trout number less than 250,000. Silver salmon have plummeted to 100,000 adults.

This trend of decline is the cumulative result of nearly a century of water and land use practices and policies that have favored development of other natural resources over the conservation of fish. The complex ecological balance in each creek and stream, wrought by nature over the ages, was recklessly disrupted when dams were constructed, forests logged, and mountains moved in the name of progress. Salmon and steelhead trout populations, which were once so abundant, must now be nurtured and the natural balance must be restored.

A deepening concern for the environment has awakened new attitudes about stewardship of the state's salmon and steelhead trout resources. This, combined with broader economic approaches and successful restoration techniques, offers solid hope that the natural balance vital to salmon and steelhead survival can be restored. Recent projections are that the state's present salmon and steel-

'A reasonable goal would be to double statewide production by 2010... This doubling would strengthen the state's economy by generating 85000 new jobs and increasing business revenues by $150 million a year.

"In most [water] project decision-making, no economic values have been given to downstream fish life..."

head stocks can be doubled within 20 years. This doubling would yield a statewide benefit of $150 million a year and, overall, would be worth $6 billion to California citizens and businesses.

To accomplish this, vigorous efforts must be made to address key problems destroying the fisheries. This will involve a focused, well-managed program of habitat protection and repair. It will require changes in water allocation policies and practices so that adequate stream flow and appropriate water temperatures are provided for salmon and steelhead trout during critical times of year. And it will rely on innovative education programs that inspire a populace to be aware, to care.

The Advisory Committee offers more than 100 findings and recommendations in this report aimed at rebuilding salmon and steelhead stocks. Of these, the following recommendations are of major consequence and are central to the restoration program:

- The Legislature should declare it to be the policy of the state to double California's salmon and steelhead trout resources. It should direct the Department of Fish and Game to prepare a detailed program, including funding needs, staffing requirements and the changes in law necessary to achieve the policy.
(See Senate Bill 2261, page 53.)

- The Legislature should amend the state's Forest Practice Act to give greater emphasis to the protection of water quality and other factors necessary for salmon and steelhead survival.
(See Senate Bill 1335, page 57.)

- The Legislature's Joint Fisheries and Aquaculture Committee should inform the State Water Resources Control Board that the present streamf low allocated by law for the survival of juvenile salmon migrating through the Sacramento-San Joaquin rivers Delta is inadequate. Adequate streamf low for salmon survival must be allocated in the Board's 1990 Bay-Delta water quality plan and water rights decision.

- The Legislature should memorialize Congress to instruct the U.S. Bureau of Reclamation to suspend its present Central Valley Project water marketing program until the State Water Resources Control Board has adopted improved water quality standards for the San Francisco Bay-Delta estuary. Without this new standard, it is uncertain how much, if any, additional water can be removed from the Sacramento and San Joaquin rivers without doing irreversible harm to fishlife.
(See Senate Joint Resolution 43, page 58.)

- The Department of Fish and Game should step up its enforcement of state laws that require stream diversion owners to construct and maintain fish screens. The loss of juvenile salmon and steelhead to unscreened and inadequately screened diversions has become intolerable; changes must be made to improve the enforceability of screen law provisions.
(See Senate Bill 2390, page 56.)

These recommendations are the heart of a recovery program that *will* work. Salmon and steelhead trout are among California's mosi precious natural treasures. They are a challenging and exhilarating gamefish. They are a popular and nourishing source of food. They are a vital link in a finely-tuned ecosystem. And, because of their well-known life requirements, they are also an excellent gauge by which to measure the successful stewardship of California's natural resources legacy.

INTRODUCTION

This report was prepared by a citizens' committee appointed by the California Legislature to inquire further into the reasons for the continued decline of the state's salmon and steelhead trout resources. The Advisory Committee's charge has been to develop a management strategy for the Legislature and the Department of Fish and Game to reverse the decline and restore these fisheries to maximum production.

The present Advisory Committee was patterned after a predecessor group that worked from 1970-1975. This first Advisory Committee successfully advocated several changes in California law and administrative policy that have directly assisted the conservation of salmon and steelhead trout.

In 1976, when Congress adopted the national Fisheries Conservation and Management Act, it appeared that federal and state conservation agencies had been given important new tools with which to protect fish life. This new national program—to be carried out on the west coast by a four-state Pacific Fishery Management Council—offered some hope that fishery conditions would improve.

Unfortunately, the decline of salmon and steelhead trout populations and the loss of vital stream habitat continued in California. It was unrelieved in any measurable way by the 1976 federal act.

Responding to the urgent need for decisive action, the Legislature reestablished the Advisory Committee in 1983, with the clear directive of devising a management strategy to reverse the decline and restore balance to the salmon and steelhead resource.

In order to address this task, the Advisory Committee members divided California's vast coastal and interior areas into 11 watershed or river basin study groups. The Advisory Committee then recruited hundreds of knowledgeable Californians to assist in identifying salmon and steelhead conservation problems and opportunities, watershed by watershed.

The findings and recommendations in this report represent several years of investigation. They incorporate the work of the watershed groups, special studies conducted by Committee members or specialists under contract, and discussions with fishery professionals and concerned citizens.

It is difficult to condense such extensive research and so many reports into one slim, easy-to-understand document; consequently, the findings and recommendations articulate only the most fundamental and pressing of these concerns. A more thorough discussion of these and other problems may be found in the documents cited in the appendices. If items are missing, it is because of the constraints of time, not a lack of importance.

The issues that affect California's salmon

"This trend of decline is the cumulative result of nearly a century of water and land use practices and policies that have favored development of other natural resources over the conservation of fish..."

PHOTO: EARL CARPENTER

and steelhead trout resource are varied, interrelated and substantial. Of these, several continued to surface throughout the Advisory Committees investigations. They are matters of special urgency that *must* be addressed immediately. Resolution of these issues will provide the solid and positive foundation envisioned for California's salmon and steelhead trout recovery program. Summarized here, they will be discussed, in depth, throughout the report:

1)The state must adopt an overall plan for the conservation and restoration of the salmon and steelhead trout fisheries. This program should include explicit goals, a timetable for completion, adequate funding and opportunities for citizen involvement. Such a program has been offered in Senate Bill 2261. (Full text of SB-2261, page 53.)

2)Stream protection provisions of the California Forest Practice Act must be strengthened. Senate Bill 1335, now pending before the State Assembly, gives needed emphasis to fish habitat and water quality in the Forest Practice Act.
(Full text of SB-1335, page 57.)

3)The Delta salmon stream flow protection standard established by the State Water Resources Control Board in 1978 is too low and must be increased. The Joint Legislative Committee on Fisheries and Aquiculture should bring this matter to the immediate attention of the Water Board.

4)The U.S. Bureau of Reclamation's Central Valley Project current water marketing program is premature and must be suspended until the streamlow needs of fish are determined. The Legislature should ask Congress to direct the Bureau to suspend this program so damaging to fish life. (See Senate Joint Resolution 43, page 58.)

5)The loss of juvenile salmon to unscreened or inadequately screened irrigation diversions has reached intolerable levels. The Department of Fish and Game must enforce fish screen laws more vigorously. The Department's efforts will be aided and strengthened by Senate Bill 2390, now being considered by the Legislature. (Full text of SB-2390, page 56.)

"There is now greater concern with the state's responsibilities to protect the public trust resources..."

AUTHORIZATION

The California Advisory Committee on Salmon and Steelhead Trout was formed to investigate and address the problems facing the salmon and steelhead trout resources. It was reestablished by the Joint Committee on Fisheries and Aquaculture, in consultation with the Fish and Game Commission and the Department of Fish and Game, pursuant to Resolution Chapter 141 of the Statutes of 1983. The Advisory Committee was later modified by Chapter 1686 of the Statutes of 1984.

The eleven members of the Committee (and their alternates) have practical knowledge of and experience in the following areas:

a) Commercial Salmon Industry—four representatives
b) Inland/Ocean Fisheries Sports-men's Groups—four represen-tatives
c) Native American Interests—one representative
d) Biologist—one representative
e) Public Interests—one representative

ORGANIZATION OF REPORT

The 1988 Annual Report is divided into two major sections. In the first, the Advisory Committee presents most of its recommendations for legislative action during 1988. The recommendations are preceded by background information and specific findings that support the requested actions. It also provides a text of legislation proposed for the current legislative session.

The second section begins with a map of California defining eleven river basins of importance to salmon and steelhead trout. The ensuing text offers a summary of the most pressing conservation problems in each area, followed by the appropriate recommendations for action. Some recommendations are restated from the first section; however, in most cases, new recommendations of local importance are also offered.

The second section is followed by the conclusion, a list of appendices and selected references. The appendices of source documents was developed by the Advisory Committee; they provide a technical foundation for much of this report. The items listed in the appendices are available for purchase.

"Restoration of this once-strong fisheries resource is a sound financial investment, one that can provide significant economic benefits to society..."

SECTION ONE:

FINDINGS AND RECOMMENDATIONS

STATUS OF THE RESOURCE

A question of survival, a need for immediate action...

PHOTO: PETER PALMQUIST COLLECTION

Salmon and steelhead trout are part of every Californian's legacy.

PHOTO: PETER PALMQUIST COLLECTION

Salmon have always been prized as food.

Early California — A time of abundance and balance

As with all living things, it nas always been a question of survival for salmon and steelhead trout. These native fishes evolved with the California landscape. Their complex life histories reflect the area's seasons, streams, land forms and natural variations. *Their survival is tied inextricably* to *water.*

Salmon and steelhead reach maturity at sea and return to the rivers to spawn. Young king salmon spend the early weeks of their inland lives in rivers and streams, move quickly to coastal estuaries and then, to the ocean. Silver salmon and steelhead trout move downstream more slowly, taking at least a year to reach saltwater.

The upstream migrations of mature fish and the downstream migrations of their young were determined ages ago by the pattern of California's winter rains and springtime snow-melts, by the chilling of streams in the winter months and their warming during the spring. Everything is tied to these cycles. The fertility of the eggs carried within the females depends upon the temperatures of the streams. The vitality of the young fish hinges on the sufficiency of their food — aquatic insects and other small creatures — which is determined, in turn, by stream temperatures and other factors.

In the course of California's natural evolution, variability in stream flow and water temperature patterns shaped the differences in salmon and steelhead. Fish with the strength to travel far upstream, to the cool headwaters, could reproduce successfully even when the rains arrived late. Young fish insensitive to rising springtime temperatures might perish in early-season droughts, while those with keener responses would move safely downstream to complete their life cycle.

In this way, different regions of California evolved different races' of fish, which entered the streams at different times to spawn. A catastrophe might eliminate one spawning run, but nature had prepared another run, days or weeks behind it, to fill that special niche reserved for salmon and steelhead trout.

In this niche, salmon and steelhead are critical to the ongoing balance of their ecosystem. Aquatic insects and larvae provide food for salmon and steelhead, and these fishes, in turn, become sustenance for animal life ranging from caddis flies to bears. Salmon and steelhead are nature's harbingers. *If* these *fishes are threatened, the health of their ecosystem is equally at risk.*

Salmon and steelhead were also important to California's Native Americans, who used them for food and ritual purposes. Dried fish and shells were common commodities along coastal and interior trade routes. The use of fish weirs, spears. gill and dip nets are well-documented Indian traditions.

When Europeans arrived on the California frontier, they were fascinated by the great runs of spawning salmon and steelhead. Travelers attempting stream crossings re-

ported that their horses were frightened out of control by huge, aggressive fish intent on protecting their streambed spawning sites.

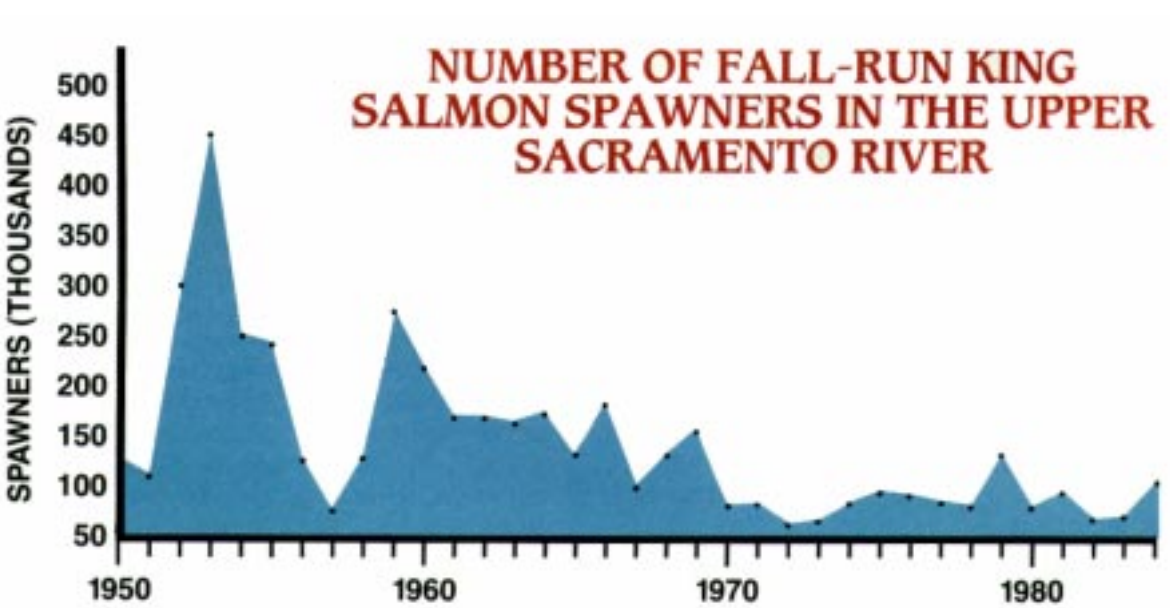
The natural balance is disrupted

The first great threats to this resource came with the discovery of gold. Panning for the precious metal gave way to hydraulic mining, which permanently destroyed miles of critical spawning grounds. As modern California emerged in the late 1800's, salmon and steelhead began to face new, seemingly insurmountable problems in their age-old struggle to survive.

By 1881, increasing numbers of fish were being harvested to feed the state's burgeoning population and to supply the salmon canneries and salteries along the north coast and the San Francisco Bay area. State officials grew concerned that not enough salmon and steelhead were able to spawn. In response, they banned commercial netting on Saturdays and Sundays so that some fish might reach their home stream spawning grounds. The ensuing confrontations between fishermen and the state fish patrols, described so colorfully by California author Jack London, characterized early salmon and steelhead conservation efforts.

During the 1930's and 1940's, efforts to conserve fish through harvest regulations were overwhelmed by the devastating effects of economic growth and development. Californians tamed and cultivated the countryside, harnessed rivers for crop irrigation and hydroelectric power, and developed land for roads, homes and recreation. Huge dams were constructed, vast tracts of timber were removed and whole mountains were pushed aside for highways.

Today, the cumulative effect of these activities threatens to end the salmon and steel-heads ancient struggle to survive. Not long ago, California salmon and steelhead resources seemed limitless. Now, those fish populations have withered and some have become extinct. California must aggressively confront the problems challenging salmon and steelhead survival. It is not too late to restore and protect this natural heritage. *The time to act is now*



(R.R. Reisenbichler. See Selected References.)

FINDINGS AND RECOMMENDATIONS:

STATUS OF THE RESOURCE

● Salmon and steelhead runs have declined precipitously throughout the state in recent decades. Since 1945, king salmon runs on the San Joaquin River have dropped by 90% and a similar decrease has occurred on the Trinity River in the last 20 years. Most other rivers have seen a substantial deterioration of king salmon runs. Similar declines have affected most north coast steelhead runs. Silver salmon runs have also fallen by 80% to 90% of the 1940's level.

● Total production of king salmon now averages only one million adult fish annually, according to Department of Fish and Game records. Statewide production of steelhead has dropped to just 240,000. Silver salmon production is approximately 100,000.

● The way land is used today directly affects the quantity and quality of water available for salmon and steelhead. Agricultural diversions leave inadequate stream flow for fish. Water releases from reservoirs alter natural river temperatures. Vital fisheries habitat is damaged or lost due to logging, grazing and mining practices, land development, road construction and other activities. If California's population increases from 27 million to the 35 million projected by the year 2010, plans must be made now to *protect* the fisheries from harmful land use activities and to *enhance* this resource to meet the needs of the growing population.

● Advisory Committee investigations indicate that recovery of fisheries production levels is possible; a reasonable goal would be to double statewide production by 2010. This would be accomplished by improving in-stream production and eliminating manmade factors that kill juvenile fish. Doubling statewide production would yield two million king salmon, approximately 500.000 steelhead and about 200,000 silver salmon. This doubling would strengthen the state's economy by generating 8,000 new jobs and increasing business revenues by $150 million a year.

ACTION: The Legislature should declare the policy of the state to restore and protect the salmon and steelhead resources. The policy should prohibit any further loss of fisheries habitat, emphasize the improvement of in-stream habitat and eliminate man-made factors that kill juvenile fish. It should regard fish production as a co-equal objective of water development and land management, rather than as a constraint upon development—as it is now perceived.
(See text SB-2261, page 53.)

ACTION: The Legislature should declare it state policy to double the present levels of salmon and steelhead trout production by the year 2010, following the guidelines articulated in SB-2261.

ACTION: SB-2261 now provides $125,000 to begin development of the initial elements of the restoration program. The Legislature should also provide for the necessary long-term funding and staffing needed to double salmon and steelhead stocks.

● The Sacramento River once provided four strong seasonal runs of spawning king salmon. All four runs have declined and the winter-run has fallen precipitously from 40.000 to 2,000 spawners in the past 20 years. Only the early fall-run is still substantial, and its spawning numbers have fallen – 425,000 (1959) to 185,000 (1987). Consistent with the salmon trends, steelhead spawning in the upper Sacramento River has

dropped from 17,500 to 2,000 during the past 20 years. Because of these sharp declines in natural spawning due to dams, diversions and the resulting poor stream flows, the American Fisheries Society (an organization of fisheries professionals) has petitioned the Secretary of Commerce to list the winter-run king salmon as 'threatened" under provisions of the federal Endangered Species Act. If listed, all federal agencies would be obligated, by law, to assure that their actions would not jeopardize the winter-run. Regardless of whether this listing occurs, the respective agencies *must* be required to implement the 10-point program they willingly adopted in 1986.

ACTION: The Legislature should memorialize Congress to direct the Secretaries of Interior and Commerce to fully implement the 10-point program already adopted by the respective agencies. Of these points, the following actions must occur immediately:

1) Lift the gates of the Red Bluff diversion dam during the months of peak spawning migration to provide spawners access to the upper river;
2) Fund the new winter-run facility planned for Coleman National Fish Hatchery to handle increased spawning;
3) Install a permanent temperature control device at Shasta Dam to prevent releases of warm water into the Sacramento River during critical stages of the salmon life cycle; and
4) Similarly direct the Environmental Protection Agency to expedite its efforts to correct the toxic metals problems occurring at Iron Mountain Mine on Spring Creek.

PHOTO: BUREAU OF RECLAMATION

THE STATUS OF THE RESOURCE

The Central Valley:

Salmon and steelhead survival has deteriorated due to inadequate stream flow provisions for fish life. Stream flow has been altered drastically by state and federal irrigation projects. which are supported by decades of laws that promote water diversion. The Department of Fish and Game manages the fisheries resource for which water is so vital, but it has no direct control over the allocation of stream flow.

Seventy-five percent (75%) of California's present instream salmon production and half (50%) of the state's remaining steelhead are now at risk because of inadequate stream flow provisions in the Sacramento-San Joaquin rivers Delta and the Trinity River. Testimony from the state's 1987 Bay Delta water rights hearings emphasized that too little water has been allocated for the survival of salmon and steelhead trout migrating through the San Francisco Bay estuary. Improved Delta outflow standards are needed not only for salmon and steelhead, but also for the protection of striped bass and maintenance of the food chain in the estuary.

Northwestern California:

The north coast region, noted for its highly unstable soils, has experienced 80% declines in both salmon and steelhead trout stocks since 1954. Stream flow and water quality have both been degraded by logging, gravel mining, grazing, irrigation diversions, road construction and land development projects. Here, too, the Department of Fish and Game attempts to protect the fishery resource but has little control over damaging land use practices in areas that border and affect streams. This critical stream and upland habitat is controlled by many state and federal agencies, corporations and individual landowners. Coordinated planning among these groups is limited.

The Central and Southern California Coast:

Silver salmon historically spawned in streams as far south as Monterey Bay, steelhead trout in streams as far south as Mexico! The exploitation of coastal streams for irrigation and domestic water supplies has severely reduced the number of streams that still support *annual* salmon or steelhead spawning runs. One of the largest annual steelhead runs in the area occurs in the Carmel River, which has plunged from 20,000 fish 60 years ago to fewer than 2,000 today.

Despite their remnant nature, the salmon and steelhead survivors along the central and southern coast are attracting growing public concern. Fisheries restoration efforts are now underway in the Monterey Bay streams, Carmel River, San Luis Obispo Creek, Santa Ynez River, Gaviota Creek and even Malibu Creek in Los Angeles County. There are many more streams in the region, *as far south as San Diego County* where fish populations can be restored. Sensitivity toward the environment has increased dramatically, for the same communities which exploited coastal streams for their growth are now populated by citizen groups that are working successfully to restore their local salmon and steelhead fisheries.

NOTE: Specific recommendations Regarding these areas will appear in the following sections.

WATER IS THE KEY

Inadequate allocation of stream flow and destruction of habitat leave the salmon and steelhead resource at great risk...

PHOTO: CALIFORNIA TROUT, INCORPORATED

Wiser use of water in California can res tore salmon and steelhead and *provide for towns and farms.*

PHOTO: BUREAU OF RECLAMATION

Friant Dam destroyed the San Joaquin River's spring-run salmon.

The principal problems causing salmon and steelhead trout declines can be tied to one vital issue: Water. For salmon and steelhead, water is home — a place with the qualities needed for spawning and rearing young fish. And water, in the form of stream flow, is also transportation — a means of allowing these unique fish to make seasonal upstream and downstream migrations integral to their life cycles.

Salmon and steelhead are threatened most by inadequate stream flows and the loss or degradation of habitat. The problems are a little different in the Central Valley and California's northwest, but the result is the same —poor survival and continued decline.

A problem of inadequate stream f lows

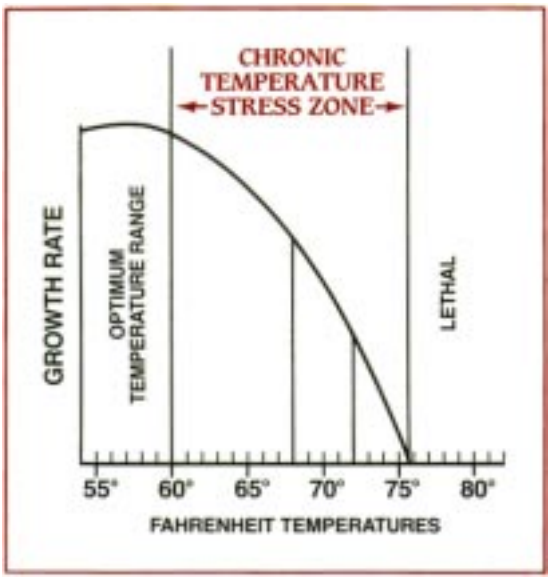
In the Central Valley, the salmon and steelhead trout resource is at risk. Virtually all salmon and steelhead rivers have been blocked by dams. This has reduced the amount of river available to migrating fish from 6,000 miles to a scant 300 miles — **a** *95% reduction from historic levels!* The remaining stream flow has been degraded by water management practices that lead to poor water quality.

The rivers of the Central Valley are now managed, unnatural waterways. They are controlled with computerized precision to prevent flooding. They are operated to make daily deliveries to irrigation districts. And they are regulated for the waterworks of towns and the powerplants of electric companies. The rivers of the Central Valley, clearly, are not managed for fish life. They are, in fact, managed in ways that destroy fish life by leaving inadequate stream flow and high temperatures detrimental to the successful migration, spawning, hatching and rearing of coldwater fish.

The destruction of the salmon and steelhead resources of the Central Valley, through the construction and operation of dams, is a tragic chapter in California's development. Shasta Dam blocked enormous upriver runs— hundreds of thousands of fish. The hatchery designed to mitigate for the lost habitat, Coleman National Fish Hatchery, has never functioned properly or come close to replacing the actual fish losses. The promised additional facilities at Coleman have not been built and hatchery biologists' recommendations to maintain natural spawning populations have been ignored. The U.S. Bureau of Reclamation's Friant Dam dried up the San Joaquin River and with it, an annual production of 300,000 salmon. The ladders at Red Bluff diversion dam have not worked and fish cannot reach their spawning grounds. The runs in the upper Sacramento River have dropped more than 75%. *The cumulative effects of these water management practices have placed Central Valley salmon and steelhead in jeopardy.*

The loss of vital fish habitat

While most of northwest California's rivers



(A.A. Rich & Associates. See Selected References)

flow relatively unimpaired, the largest salmon and steelhead watersheds have been damaged by a variety of land use practices, such as logging, gravel mining, grazing, irrigation, road construction and land development. Rainfall in this region is heavy; the hillsides are steep and the soil erodes easily. Heavy equipment disturbs the soil, as does the construction and maintenance of roads and trails for logging and other development activities.

Siltation smothers the gravel that salmon and steelhead use for spawning and fills the pockets and deep pools that juvenile and summer stocks need for feeding, resting and escaping predators. More water flows through sediment-laden gravel, leaving less stream flow for fish. The silt also prevents oxygen-rich water from reaching eggs and embryos, resulting in suffocation.

Logging often removes the shade vegetation next to streams, thus exposing stream water to heat from the sun. Water temperatures increase and even reach lethal levels (for fish) for extended periods during the summer months. This is especially critical for silver salmon and steelhead, which must remain in fresh water through the summer months.

Removal of trees and vegetation reduces the natural contribution of organic materials to the stream, another vital part of the salmonid's ecosystem. It decreases the availability of insects and other small creatures upon which young fish feed. And finally, it reveals them to their predators — including man.

Some responsible timber producers have demonstrated that timber harvesting can be conducted compatibly with stream protection activities essential for fish restoration. Multiple resource management can yield multiple benefits. In fact, optimum yields of both timber and fish are needed if the resource dependent communities of coastal California are to survive.

Grazing, gravel mining, road construction and urbanization of land have attracted less attention than timber harvesting issues. These activities lead to channel modification

Responsible timber harvesters protect stream side vegetation.

PHOTO: CALIFORNIA TROUT, INCORPORATED

and vegetation removal, which can be equally devastating to the fish. This disrupts downstream migration flows, leaves inadequate spawning and rearing flows and elevates water temperatures. The result, for salmon and steelhead, is decreased survival and continued decline.

An effort has been made to address these problems in northwest California during the last decade. A host of community-based stream restoration programs have started the healing process — and the results are promising. With nearly $25 million in assistance from the Legislature and commercial fishermen (through their voluntary Salmon Stamp program), methods have been developed to restore damaged habitat and restock the streams with salmon and steelhead. There are substantial problems remaining in this region, but money and hard work are producing restoration successes that offer reason for hope. The same combination of effort and funds is also demonstrating that restoration of spawning runs is still possible, even in the heavily urbanized coastal regions of central and southern California.

Over harvesting is not the problem

In short, inadequate stream flow and poor quality water consistently surface as the central causes of salmon and steelhead declines. Inappropriately, Over harvesting has often been cited as the cause of the fisheries decline, and its corollary, harvest curtailment, has been viewed as the solution.

The State of California regulates the number of salmon that may be harvested on the basis of how many returned in prior years to spawn. Spawning runs are determined by actual counts at ladders, racks or weirs. Their numbers are also estimated by counting the bodies of spawned out fish and noting streambed nests from the air. When spawning runs decline, sport and commercial harvest quotas are set lower in the hope more fish will escape the harvest and return to the rivers to spawn.

This was the states approach to conservation in 1881 and it appears the state continues to rely on harvest control as its principal tool for salmon conservation today. Adjusting the annual harvest is just one method of dealing with declines; other fishery conservation practices must be utilized for a more balanced approach to fisheries management. When the U.S. Bureau of Reclamation constructed Red Bluff diversion dam across the Sacramento River to divert flows to its Tehama-Colusa Canal, it interfered with the upstream movement of large salmon spawning runs. The dam has eliminated an estimated average of 114,000 spawners annually. Those spawners could have contributed 228,000 fish to the commercial and recreational fisheries each year—an amount equal to half of the current statewide catch!

When the first dramatic losses to Red Bluff diversion dam were observed in the 1960's, the Department of Fish and Game's reaction was to recommend drastic harvest curtailments. The winter-run king salmon continued to decline, from 40,000 spawners in 1964 when dam operations began, to less than 2,000 fish today. In 1986, the losses were deemed so critical that selective closure of the recreational fishery was recommended. This has been the only conservation" measure actually implemented from a 10-point federal/state emergency plan.

Harvest curtailments have become a stan-

"The Red Bluff diversion dam has destroyed over half of the upper Sacramento River king salmon spawning run in the past 20 years!"

PHOTO: CALIFORNIA TROUT, INC.

dard response to production declines. But it is a response that is neither adequate nor equitable. *Harvest curtailment deals only with the symptoms of the problem, while leaving the problem, itself, unattended.* It hurts the fishermen—those least responsible for the production declines—and fails to hold accountable those parties whose activities clearly impair fish survival. Water is the key; water diversion and damage are the problems. The dewatering of rivers and the loss or degradation of spawning and rearing habitat must be addressed for the balanced recovery program envisioned.

FINDINGS AND RECOMMENDATIONS

DAMS, DIVERSIONS, WATER ALLOCATION POLICIES

PHOTO: DEPARTMENT OF WATER RESOURCES

Diversions remove more than 50% of the historic fresh water inflow to the San Francisco Bay estuary.

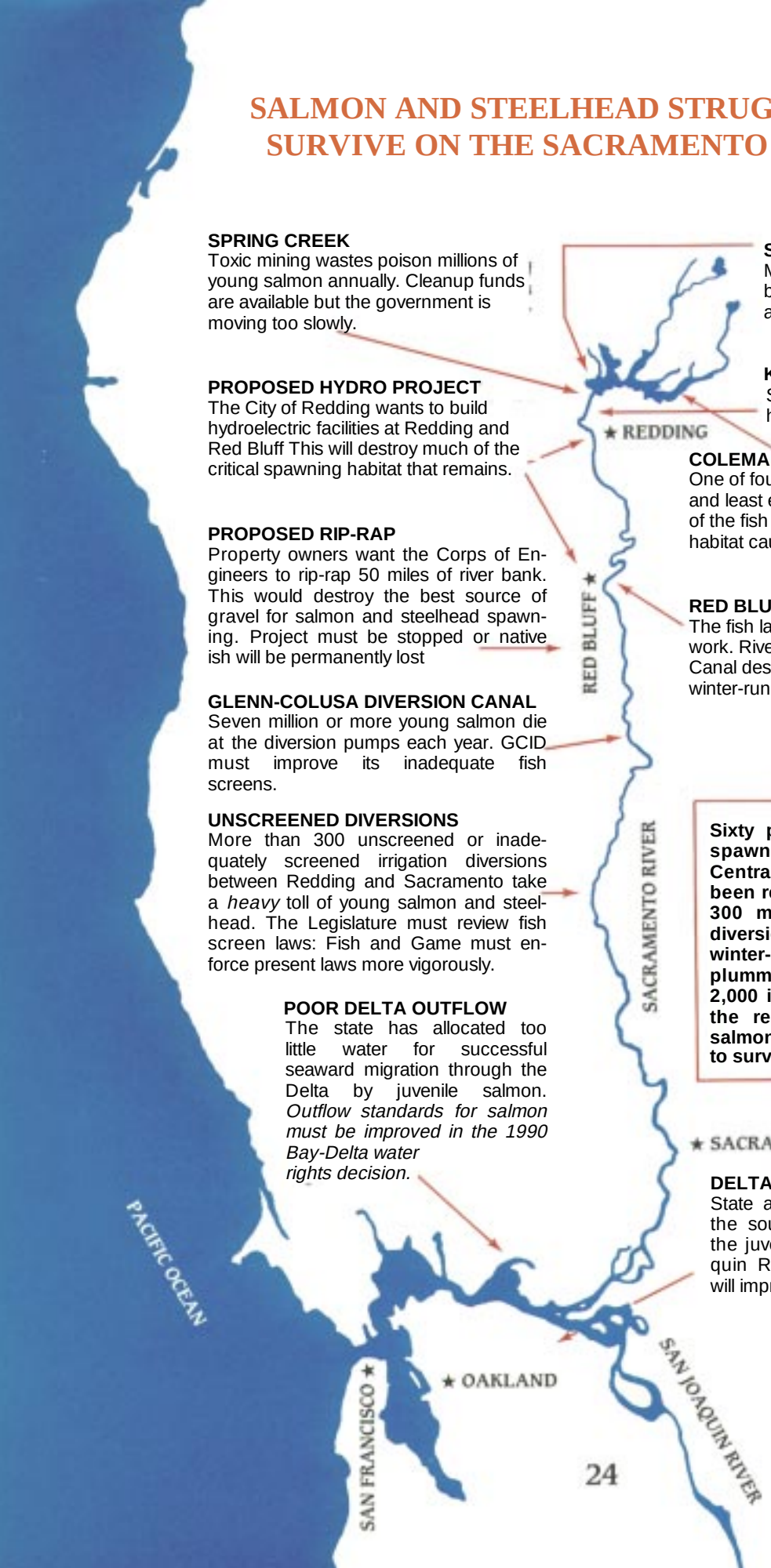
● The U.S. Bureau of Reclamation's 1988 claim that it has 1.1 million acre-feet of 'excess" water available for sale from the Central Valley Project to agricultural customers is false and violates previous federal commitments. In 1978, the Secretary of Interior stopped further water sales from the Project to assure that adequate water and water quality remained to meet the needs of fish and wildlife in the Central Valley. These needs have not yet been determined. Furthermore, declines in production show that Central Valley salmon and steelhead are not receiving adequate flows and are at great risk. *Water management policies must assure there is adequate stream flow for fish and wildlife.* Until such policies are adopted, there can be no excess water in the Central Valley Project.

● In 1980, the federal government agreed to restore 219,500 acre-feet of stream flow to the Trinity River. This agreement was made because 90% of the Trinity River's stream flow had been diverted to the Central Valley Project, virtually eliminating the fisheries resource. The U.S. Bureau of Reclamation is including this 219,500 acre-feet of water as part of its 1 .1 million acre-feet of "marketable reserve". This clearly violates the 1980 agreement and threatens salmon and steelhead restoration efforts on the Trinity River.

● The federal government has no proper fish protection facility at its pumping plant near Tracy. Each year, millions of fish die in the pumps, essentially negating upstream conservation efforts. Estimates from the Bay Delta hearings suggest that *up to 95% of the entire San Joaquin salmon production is lost to these pumps.* These huge annual losses contribute substantially to the ongoing decline.

● Similar deficiencies exist at the federal Red Bluff diversion dam. Because of inadequate ladders, fish have difficulty reaching their home stream spawning grounds. Since 1964, spawning in the upper Sacramento River is down an average of 114,000 fish annually.

SALMON AND STEELHEAD STRUGGLE TO SURVIVE ON THE SACRAMENTO RIVER



SPRING CREEK
Toxic mining wastes poison millions of young salmon annually. Cleanup funds are available but the government is moving too slowly.

PROPOSED HYDRO PROJECT
The City of Redding wants to build hydroelectric facilities at Redding and Red Bluff This will destroy much of the critical spawning habitat that remains.

PROPOSED RIP-RAP
Property owners want the Corps of Engineers to rip-rap 50 miles of river bank. This would destroy the best source of gravel for salmon and steelhead spawning. Project must be stopped or native ish will be permanently lost

GLENN-COLUSA DIVERSION CANAL
Seven million or more young salmon die at the diversion pumps each year. GCID must improve its inadequate fish screens.

UNSCREENED DIVERSIONS
More than 300 unscreened or inadequately screened irrigation diversions between Redding and Sacramento take a *heavy* toll of young salmon and steelhead. The Legislature must review fish screen laws: Fish and Game must enforce present laws more vigorously.

POOR DELTA OUTFLOW
The state has allocated too little water for successful seaward migration through the Delta by juvenile salmon. *Outflow standards for salmon must be improved in the 1990 Bay-Delta water rights decision.*

SHASTA DAM
Millions of eggs perish in gravels below the dam when water releases are too low, too warm, for spawners.

KESWICK DAM
Spawning migrations are blocked here and many adult fish die.

COLEMAN FISH HATCHERY
One of four area hatcheries, it is the oldest and least efficient. It produces only one-third of the fish required to mitigate for the loss of habitat caused by Shasta Dam construction.

RED BLUFF DAM
The fish ladders at this federal dam do not work. River diversions to the Tehama-Colusa Canal destroy young king salmon, especially winter-run juveniles.

Sixty percent of California's salmon spawn in the upper Sacramento River. Central Valley spawning habitat has been reduced from 6,000 miles to just 300 miles because of dams, water diversions, and poor stream flow. The winter-run king salmon has plummeted from 40,000 spawners to 2,000 in 20 years. Here are some of the reasons that Sacramento River salmon and steelhead are struggling to survive.

★ SACRAMENTO

DELTA PUMPS
State and federal project pumping from the south Delta destroys up to 96% of the juvenile salmon born in the San Joaquin River basin. Improved stream flow will improve salmon survival.

* Modified from the original provided by United Anglers of California.

● The federal Coleman National Fish Hatchery was built to reduce the impact of Shasta Dam on salmon and steelhead populations. The U.S. Bureau of Reclamation has not provided the funding for needed improvements and this facility has produced only one third of the fish required as mitigation.

● Releases of warm water from Lake Shasta into the Sacramento River threaten critical salmon and steelhead egg ripening, spawning, hatching and rearing except during years of high rainfall. River temperatures must be kept below 56 degrees Fahrenheit, especially during incubation. In 1987, warm water temperatures at Nimbus Hatchery, below Folsom Dam, caused substantial egg losses — between 40% and 70%. It is likely similar losses occurred among eggs deposited below Shasta Dam. This serious impact on survivability can be eliminated by installing a permanent temperature control device at Shasta Dam.

ACTION: The Legislature should memorialize Congress to direct the Secretary of Interior to do all of the following:

1) Suspend the current efforts by the U.S. Bureau of Reclamation to sell an additional 1.1 million acre-feet of water from the Trinity, Sacramento, American, and Stanislaus rivers;
2) Suspend the current applications by the U.S. Bureau of Reclamation to gain approval to use the State Water Project pumps to remove still more water from the Sacramento-San Joaquin rivers delta;
3) Complete the evaluation of Central Valley fish and wildlife resource water needs ordered by the Secretary of Interior on December 29,1978;
4) Provide the federal pumping plant in the Delta with a fish screen that works properly;
5) Correct the fish ladder and fish screen deficiencies at the federal Red Bluff diversion dam;
6) Complete the rehabilitation of Coleman National Fish Hatchery; and
7) Provide the federal Shasta Dam with a permanent temperature control device. (See Senate Joint Resolution 43, page 58.)

● In 1978, the State Water Resources Control Board, the state's water diversion regulatory agency, adopted a stream flow standard to aid the survival of juvenile salmon migrating down the lower Sacramento River. Recent studies by the U.S. Fish and Wildlife Service indicate the stream flow standard is far too low. The current standard must be improved. The amount of water planned for future removal by both state and federal water projects must be reduced to correct the existing inadequate flow standard.

ACTION: The Advisory Committee recommends that the Legislature's Joint Fisheries and Aquaculture Committee urge the State Water Resources Control Board to adopt an increased stream flow standard that will assure salmon survival throughout the Delta.

● The effort to maintain adequate stream flow for fish is also seriously hampered by the existing system for considering, granting and enforcing the conditions placed on water diversion permits. These activities are the responsibility of the State Water Resources Control Board (SWRCB). *More than 13,500 permits have been granted, but only 500 (less than 4%) have bypass flow requirements for the protection of fish life.* A recent survey conducted by the SWRCB indicated that more than 35% of the permittees were diverting more water than their rights authorize, indicating poor enforcement. Furthermore, there is the equivalent of only one staff person to handle all of the field inspections. This important program is clearly understaffed and underfunded. While the Department of Fish

and Game does not have direct enforcement authority in this area, it can assist by watching for and reporting all violations to the SWRCB, which should then take appropriate action.

ACTION: The Legislature should direct the State Water Resources Control Board to request funds, develop and implement a program that improves the process of reviewing, granting and enforcing water diversion permits so that adequate flows are maintained for the fisheries. The Board's commitment to this program should be a condition of legislative approval of the Board's 1988-89 budget.

- A statewide system should be established to continuously monitor required streamflows. Recording gauges should be installed below each dam or diversion on salmon and steelhead streams. The gauges should be operated by a neutral agency, such as the U.S. Geological Survey. Each year, the results should be published providing data about permit requirements and the performance of permittees. Based on this information, the Department of Fish and Game could then determine any adverse effects arising from these violations. Penalties could be assessed by the State Water Resources Control Board against specific violators, based on damages to the fisheries resulting from their negligence.

ACTION: The Department of Fish and Game should identify stream gauging priorities in the initial elements of the statewide salmon and steelhead conservation and restoration program described in Senate Bill 2261.

- In recent amendments to the Public Resources Code (Section 10002), the Legislature provided a framework for determining the stream flow requirements to maintain fish and wildlife (AB 723). It directed the Department of Fish and Game to determine these 'instream flow requirements". These are to be provided to the State Water Resources Control Board for consideration when allocating water rights. To date, the program has received only 25% of the funds the Legislature intended. Full support for this program is imperative so the Board will have the information needed to discharge its public trust responsibilities, including the reservation of adequate flows for fish and wildlife.

PHOTO: BUREAU OF RECLAMATION

The Bureau of Reclamation should quit marketing Central Valley project water. There is no surplus water to sell.

ACTION; The Legislature should direct the Department of Fish and Game to request the needed funds and to complete the stream flow needs assessment program.

- The Department of Water Resources (DWR) developed and operates the State Water Project. The DWR currently pumps two million acre-feet of water annually from the Delta, delivering it largely to agricultural customers in the San Joaquin Valley. The agency claims it needs an additional two million acre-feet of water. Further, the DWR labeled the 1987 call for more water for salmon in the

PHOTOS: DEPARTMENT OF FISH AND GAME

Department of Fish and Game crews struggle to rescue juvenile salmon and steelhead from *large irrigation diversions and to screen them out of smaller diversions. The loss of young fish to these diversions has reached intolerable levels. Stricter screen laws and consistent enforcement are essential.*

lower Sacramento River as "impractical" and "excessive," despite testimonies that demonstrate the need for an improved stream flow standard. *Until the State Water Resources Control Board acts to provide an adequate stream flow standard, further removal of water by any agency is premature.*

ACTION: The Joint Fisheries and Aqua culture Committee should advise the Department of Water Resources to review the testimony submitted to the Board regarding the need for an improved salmon protection standard; the DWR should then describe to the Joint Committee how that standard can be met.

● *Dysfunctional fish screens at river diversions statewide kill tens of millions of young salmon and steelhead downstream migrants each year.* There are more than 300 Unscreened or poorly screened diversions on the Sacramento River. The dysfunctional screen at the Glenn-Colusa Irrigation District plant alone accounts for the death of 20% (over seven million) of the Sacramento River's entire natural production of young king salmon! Similar problems on the Eel, Scott and Shasta rivers are also causing substantial losses each year. The Department of Fish and Game must vigilantly enforce existing state laws that require diversion owners to screen their diversions and to keep the screens in good working condition. Furthermore, legislation must be enacted to close loopholes in the fish screen provisions of the Fish and Game Code.

ACTION: The Legislature should direct the Department of Fish and Game to move rapidly to cite diverters with unscreened or inadequately screened diversions and require them to correct these problems promptly.

ACTION: The Legislature should review the 1957 fish screen laws provisions of the Fish and Game Code, particularly the provisions relating to the maintenance responsibilities of water diverters. Such a review is provided by Senate Bill 2390.
(See text of SB-2390, page 56)

● The state's basic water rights laws were drafted in California's pioneer years, when the fisheries resource was abundant. Most of these laws favor development; the existing fines and penalties for destroying wildlife habitat are inconsequential and are not in keeping with today's environmental protection standards. Penalties and fines are so low they do not act as a deterrent and they rarely cover the cost of restoration. In this sense, they actually encourage destruction of habitat because it is cheaper to pay the fine than to comply. Department of Fish and Game (DFG) wardens frequently spend long hours working to document these cases for the courts. Even when they win, the resource loses. The penalties and fines for such violations must be increased dramatically to more fairly reflect today's environmental consciousness and to derive benefits for the resource from DFG warden efforts.

ACTION: The Legislature should review Fish and Game Code habitat protection statutes. It should set fines and penalties that are in keeping with today's environmental protection standards, similar to those for toxic wastes and hazardous materials pollution.

● The salmon and steelhead resource is damaged by water diversion practices that destroy significant numbers of fish. California should follow the lead of other states, like Oregon, and draft laws that clearly prohibit use of water if it's to the detriment of the fisheries.

ACTION: The Legislature should amend the Water Code to declare that any stream diversion that destroys significant numbers of young salmon and steelhead trout constitutes an unreasonable use of water and is, therefore, prohibited by law.

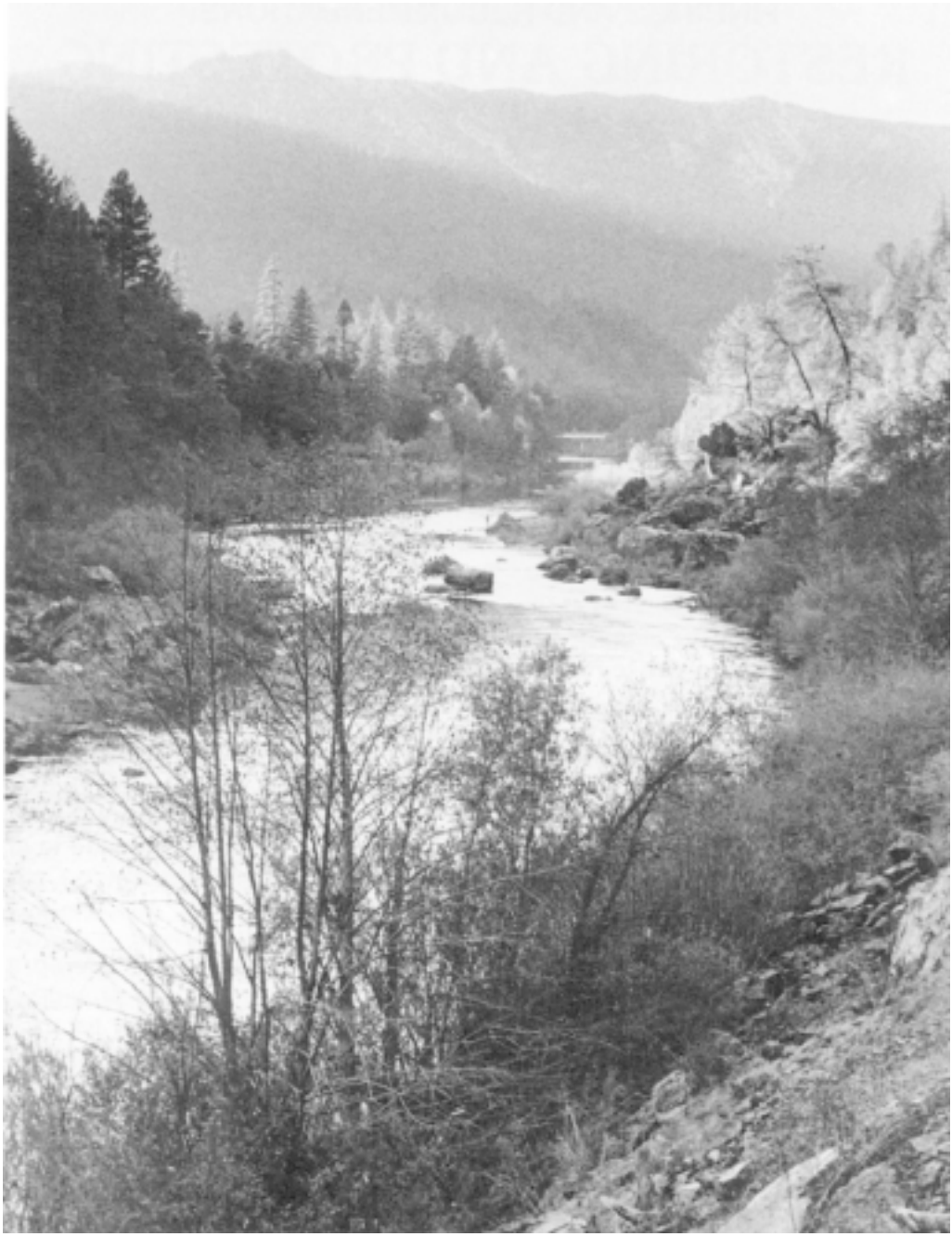


PHOTO: R. VALENTINE ATKINSON

Because they migrate from the headwaters, through the estuaries, to the sea *and back again, salmon and steelhead gauge our performance as stewards of California's land and water resources. When we have adequately protected their habitat, we have assured the health of our environment, as well.*

FINDINGS AND RECOMMENDATIONS:

RESTORING AND PROTECTING HABITAT

● Salmon and steelhead habitat has been and continues to be lost or degraded because of the effects of a variety of land uses, including logging, agriculture, gravel mining, road construction and urban development. These activities cause erosion of soils, loss of stream side vegetation, poor water quality and stream channelization. The cumulative effect of these activities on streams has been disastrous in terms of both the amount and quality of salmonid habitat affected. Since it is costly to repair damaged habitat, *it is essential to adopt policies and practices that prohibit further degradation or loss of habitat.* Because so much habitat has already been lost, it is equally important to give top priority to restoration of habitat.

ACTION: The Legislature should declare the policy of the state to restore and protect the salmon and steelhead fisheries. This policy should encourage the improvement of in-stream habitat and elimination of man-made factors that destroy juvenile fish. It should prohibit any further loss of salmon and steelhead habitat and direct all state agencies to conform their activities to ensure the policy is achieved.
(See SB-2261, page 53.)

● Prime fish habitat is managed and under the jurisdiction of a lengthy list of state, federal and county agencies, private businesses and individuals. It is essential to establish a way to measure and regulate the cumulative effects of land use practices on the fisheries.

ACTION: The Legislature should direct a multi-agency task force, headed by the Department of Fish and Game, to find ways to measure and monitor the cumulative effects of land use practices on fish habitat and to develop methods of offsetting undesirable effects.

● There is already much documentation of the impact of logging on fish habitat. Removal of riparian vegetation (a critical source of food, shade and shelter) and accelerated soil erosion (primarily due to disturbances caused by roads) have a significant effect on stream conditions. Conflicting recommendations for timber harvest practices are often made by fishery, forestry and water quality biologists, reflecting department biases, and there is no clear process for resolving these disputes. Some of the problems that occur from multiple resource management can be resolved through amendments to the Forest Practice Act. These amendments will also protect the efforts already made to improve Anadromous fish habitat in California's northwest.

ACTION: The Legislature should amend the Forest Practice Act to provide greater protection for fish habitat by establishing a process for settling interdepartmental differences. SB-1335, introduced by Senator McCorquodale, specifically addresses these concerns.
See SB-1335, page 57.)

● Policies must be established aimed at timber harvesters who damage habitat to pay or repairs and restoration. A firm policy of You break it. you fix it" is needed.

ACTION: The Legislature should identify

Coastal lagoons are important salmon and steelhead nurseries.

appropriate sources for funding repairs to salmon and steelhead streams damaged by known timber harvest operations. One alternative is a surcharge on the timber yield tax which would be credited or refunded to those whose operations are not damaging, but which would be forfeited by those whose logging practices are found to be harmful to the fish habitat.

● Federal agencies, including the U.S. Bureau of Land Management and the U.S. Forest Service (USFS), have recently initiated new programs to place more emphasis on management of fishery habitat. The USFS program, 'Rise to the Future," emphasizes enhancement of fishery resources by strengthening technical capabilities, cooperation and public information, by adding fishery personnel, and by taking specific actions at Regional and Forest levels. These initiatives should be encouraged and supported. ACTION: The Legislature should memorialize the Secretaries of Agriculture and the Interior to immediately request full funding for these programs. The Legislature should also direct the Department of Fish and Game to fully cooperate in these programs and all initiatives to improve salmon and steelhead habitat on National Forest and Public Domain Lands.

● The fresh or brackish water of coastal estuaries provide critical nursery habitat for young salmonids migrating to the ocean. Estuarine habitat is essential to all anadromous salmonids, yet very little is known about the use and condition of many California estuaries. Almost all of the estuaries that have been scrutinized have been subject to significant degradation (i.e., Sacramento/San Joaquin, Redwood Creek). More research in this critical area is needed for sound fisheries management. Estuarine research projects

are specified in the Advisory Committees workshop publication entitled *California's Salmon and Steehead Trout A Research and Extension Program.* (See Appendices.)

ACTION: The Department of Fish and Game should incorporate estuarine research projects in the comprehensive management plan for salmon and steelhead it is to develop.

● Based on information already available, there is a need for protection and restoration of estuaries. Estuaries are subject to degradation from a variety of causes. Diking, filling and sandbar breaching are "local" activities that directly affect estuarine productivity. But erosion, chemical pollution and water withdrawals anywhere within a watershed can have a significant impact on an estuary.

ACTION: The Legislature should declare it a policy of the state to prohibit any further loss of salmon and steelhead habitat. Further, plans to protect, restore and enhance estuarine habitat must be included in the Department of Fish and Game's management plan. (See SB-2261, page 53.)

● Artificial sandbar breaching at the mouths of streams during low-flow periods is usually detrimental to fish. Breaching is done to prevent flooding of adjacent agricultural land, roads or other developed property, to control odors or to improve access to beaches. A Fish and Game Code Section 1603 stream alteration agreement is required for such actions. In many cases, these agreements may be readily approved by DFG wardens because of the 'emergency" nature of the needed action. Those involved with the agreement process may not fully understand the disastrous effects that artificial breaching can have on an entire year-class of salmonids.

ACTION: The Legislature should direct the Department of Fish and Game to prepare specific management plans for all estuaries as part of the process of developing programs for entire watersheds. Those estuaries subject to artificial water level control or conflicts should be specified and a process to identify and resolve conflicts must be devised.

● The riparian zone is critical to salmon and steelhead. While the Fish and Game Code leaves some ambiguity about the extent of this area, fishery professionals consider it to be the land adjacent to and up slope from streams and rivers. The condition of the riparian zone has a direct impact on the productivity of instream habitat. Some measure of protection is provided by timber harvest and coastal zone regulations; however, the ambiguity of the Fish and Game Codes results in inadequate protection and regulation of this sensitive area.

PHOTO: CALIFORNIA TROUT, INC.

Riparian zones can be protected in ways that are compatible with livestock and timber operations.

● The protection of riparian and estuarine habitat can be addressed through the policies of SB-2261. Some specific changes in existing Fish and Game Code Sections 1600-1603 are also needed. The boundaries of the riparian zone must be more thoughtfully defined in order to achieve better habitat protection, streambed alteration agreements and enforcement. Furthermore, the streambed alteration agreement process is weak. The conditions developed by the Department of Fish and Game are not binding unless

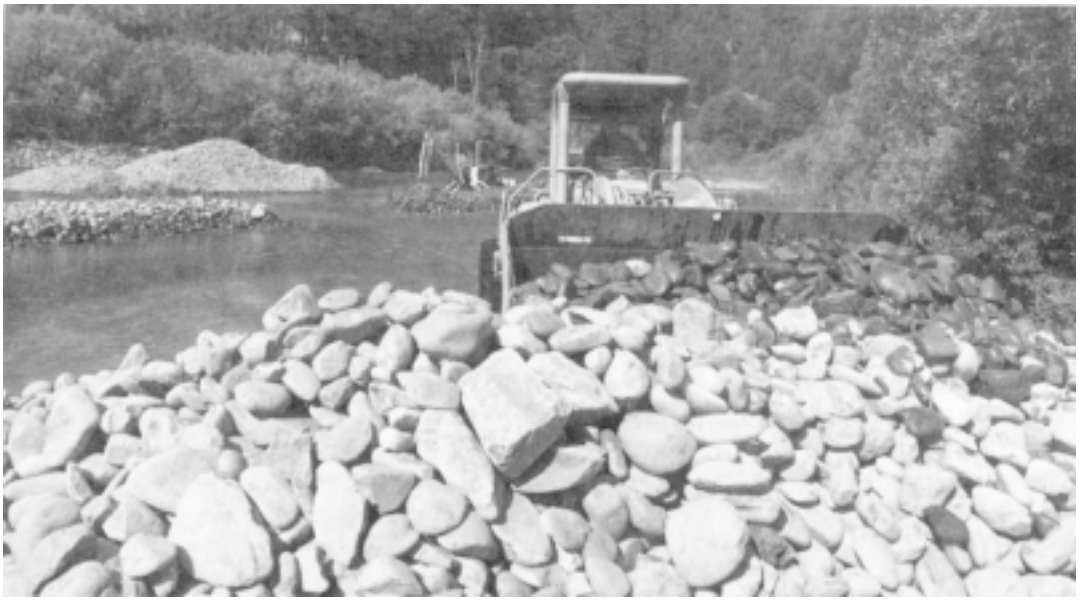


PHOTO: BUREAU OF RECLAMATION

The cost of restoring spawning and rearing habitat will be returned many times over by increased fishery benefits.

accepted by the stream alterer. If DFG recommendations are rejected, they can be appealed to an arbitration panel, whose decision is considered binding. This removes protection of fish habitat from wildlife professionals and places responsibility in the hands of nontechnical individuals.

ACTION: The Legislature should expand the Fish and Game Code beginning at Section 1600 to better define riparian habitat and to specifically address the breaching of lagoons. In addition, these codes should be modified to make Department of Fish and Game recommendations more binding on all stream alterers.

- Many of the changes in statute recommended regarding protection and enhancement of the riparian zone could be complemented by an incentive program aimed at private landowners. Tax inducements could be offered to those willing to set aside riparian corridors for the benefit of the fisheries

ACTION: The Legislature should develop an incentive program to support protection and restoration of the riparian zone. Such a law could be patterned after Oregon's riparian tax incentive program.

- DFG wardens make frequent use of Fish and Game Code 5650. concerning water pollution. The section specifies a variety of substances deleterious to fish life, such as petroleum, acid, coal, refinery discharges, sawdust, and more. It does not specify sediment, although the harmful effects of stream sedimentation are well-documented. Cases that involve soil erosion and sediment accumulation must be prosecuted under a heading that includes any other substances that are deleterious to fish life. Because sediment is not specified, these cases are difficult to win.

ACTION: The Legislature should amend Fish and Game Code 5650 to specify sediment as a substance that is deleterious to fish life.

"The amount of Central Valley spawning habitat available to migrating fish has fallen from 6,000 miles to a scant 300 miles— a 95% reduction from historic levels."

● The Department of Fish and Game needs specialized staff to deal with water pollution and stream modification violations. Wardens and environmental services specialists are asked to evaluate and inspect violations ranging from small backyard diversions to those of major proportions, such as the millions of fish killed annually by the Glenn-Colusa Irrigation District operations. Law enforcement is time consuming and requires specialized training. In response to these conditions, the Wildlife Protection Branch has developed a pilot program for one region involving a special Stream Alteration Team. Its duties are to develop enforceable streambed alteration agreements, follow up on the agreements to ensure compliance with mitigation measures and report violations to the appropriate wardens. The three-person team includes water quality and fisheries biologists who specialize in stream alteration violations. This innovative program should help protect fish habitat.

ACTION: The Legislature should provide the DFG with staffing and funding to implement the stream alteration team program in all regions, once the pilot program is proven to be effective.

● Since 1978, the Legislature, the Bosco-Keene program, SB-400, AB-1705, Proposition 19, commercial salmon fishermen (Salmon Stamp fee), and citizen groups have provided $25 million and considerable amounts of donated materials for habitat restoration and fish restocking projects in northwestern California. These projects, administrated by DFG, have developed methods for repairing damage to salmonid habitat. The results are promising. In fact, there is now a statewide federation of restoration groups which restore habitat, artificially propagate native stocks and conduct pubic information programs.

Several exciting restoration projects are also underway in the central and south coast regions, including some in heavily urbanized areas. Recent citizen efforts to promote successful steelhead spawning in Los Angeles County's Malibu Creek have sparked considerable local support of stream restoration. The State Water Resources Control Board demonstrated its appreciation for public trust fisheries values in its 1987 Santa Clara River (Ventura County) decision ordering restoration of steelhead habitat there. These statewide efforts show that recovery of the salmon and steelhead resource is possible with adequate funding, attention and citizen involvement.

ACTION: The Legislature should declare the policy of the state to encourage the participation of its citizens in the conservation of salmon and steelhead trout resources.
(See SB-2261, page 53.)

"... Recovery of the salmon and steelhead resource is possible with adequate funding, attention and citizen involvement..."

HATCHERIES TO MITIGATE FOR LOSSES

Hatcheries are a tool,
not a substitute for natural spawning
or restoration of habitat...

PHOTO: BUREAU OF RECLAMATION

Hatcheries were not invented to outdo Mother Nature.
Hatcheries are a manmade tool for softening the
impact of dams and water diversions on fish life.

PHOTO: BUREAU OF RECLAMATION

As natural habitat diminished, hatcheries shouldered more of the production burden.

Hatcheries help maintain fish production numbers

Before there were dams and hatcheries, California's rivers—flowing wild and free—easily sustained the state's plentiful salmon and steelhead trout resource. Hatcheries were not invented to outdo Mother Nature. Hatcheries are a manmade tool for softening the impact of dams and water diversions on fish life.

Since 1870, in one form or another, state law has required dam builders to provide hatcheries or to "ladder" fish around their structures. Fish ladders allow spawners to bypass the dam and resume their journey upstream, to spawn naturally. Hatcheries are nurseries to breed and grow fish that cannot move upstream of dams to spawn naturally. The intent of hatcheries, then, is to mitigate for the loss of production from these upstream spawning grounds by growing fish in an artificial setting. *Eight of the state's nine salmon and steelhead hatcheries are mitigation hatcheries.*

The Department of Fish and Game has turned the hatcheries, some of which are more than 40 years old, into extremely productive operations. California's salmon and steelhead hatcheries produce more than 50 million juvenile fish each year. Forty-eight percent (48%) of the fall-run king salmon that spawn in the Sacramento River basin are reported to be progeny from just two hatcheries, Nimbus and Feather River. Further, fall-run Sacramento River basin spawners now produce 70% of the entire statewide salmon harvest. For a variety of reasons, *hatcheries have not mitigated for the loss of natural spawning populations, as documented by the decline.* Nevertheless, California has come to rely heavily on her hatcheries for salmon and steelhead production.

Originally, hatcheries released juvenile fish directly into their home streams; from there, the fish made their long journey downstream to the ocean. In recent years, inadequate stream flow, unscreened diversions, irrigation pumps and other factors have hampered downstream migrations. Millions of fish never made it to the ocean, to live the adult part of their life cycle.

A program of trucking fish downstream was initiated and for the past 20 years, hatchery managers have boosted juvenile survival numbers by trucking larger and larger portions of their young fish to the San Francisco Bay estuary, and even to the Bay itself. Spared from the hazards just mentioned, these hatchery fish have returned to spawn at increasing rates.

On the surface, the trucking program seems an efficient management innovation. It has increased juvenile survival and spawning returns of hatchery stock. The four-wheel substitute for downstream flows neither addresses nor resolves the serious problems that hamper downstream migration of natural spawning populations.

At the same time that greater effort has been placed in a trucking program to improve the survival of hatchery fish, the number of

"The loss of juvenile salmon to unscreened or inadequately screened irrigation diversions has reached intolerable levels..."

king salmon spawning naturally in the river has continued to decline. Steady deterioration of the natural productivity has caused even greater dependency on the hatchery system and trucking efforts.

Natural spawning preserves vitality of the resource

An over reliance on hatcheries is dangerous and could leave California's salmon and steelhead resource at risk. The artificial hatchery regimen produces 'carbon copy' fish that lack a necessary survival quality — genetic diversity. Hatcheries also crowd fish and their spawn; this can magnify the toll of diseases and other catastrophes, including mechanical failures and human errors. Remember, half of the Sacramento River basin fall-run king salmon production comes from just two hatcheries and this river basin produces 70% of the entire statewide harvest. One catastrophe could have a devastating effect on the state's *entire* salmon resource!

Natural, in-river spawning lowers the risks of such catastrophes. It improves chances for survival by distributing the fish throughout the spawning grounds and the time of spawning throughout the season. It assures there will be the diversity so critical to salmon survival through the ages. *Hatchery stock can strengthen production numbers but natural populations are essential to maintain the balance,* to truly protect and conserve the salmon and steelhead resource.

To maintain natural spawning populations, California must better protect, restore and enhance spawning and rearing habitat. Adequate flows and protection from unscreened or inadequately screened water diversions must be assured. (Such downstream stream-low improvements would also, incidentally, benefit hatchery stocks and may reduce the

Hatcheries crowd fish and their spawn; disease outbreaks can be devastating.

PHOTO: BUREAU OF RECLAMATION

need for such extensive trucking efforts.) It is, in fact, the explicit policy of the California Fish and Game Commission that the state conserve salmon and steelhead through the vigorous protection of instream habitat. The problems on the Sacramento River are just one of many examples that the policy has not been followed.

With proper facilities and better stream flows, California's hatcheries help make up fish lost to dams and diversions. But they are not, and were never intended to be, a substitute or habitat protection and natural spawning. *A cautious balance must be struck between hatcheries and natural production on every watershed where hatcheries exist.*

FINDINGS AND RECOMMENDATIONS:

HATCHERIES

● Anadromous fish hatcheries are a mitigation tool. They have been built to make up for spawning and rearing losses due to dams, diversions and reductions in stream flow. They were not and are not intended to replace natural spawning or habitat protection as a means of preserving the resource or maintaining fish production numbers. Natural production systems best provide and sustain stock vigor and diversity, which is critical to the survival of these species. Therefore, natural spawning habitat must be protected. restored and enhanced to preserve the unique characteristics so fundamental to the survival of this resource.

ACTION: The Legislature should declare it a policy of the state to restore and enhance the salmon and steelhead fisheries. Such policy should encourage the improvement of instream habitat and the elimination of man-made factors that destroy juvenile fish. (See SB-2261, page 53.)

● *Over reliance on hatchery production can have negative results.* In fact, hatchery production of salmon and steelhead trout in California may already be at the maximum level it should occupy in a balanced program of hatchery and natural production. Caution is indicated, as the Department of Fish and Game has no proven genetics policy, nor established guidelines, for determining the mix of hatchery and natural stocks in each watershed. Because of this, it has made no clear provisions for preserving the vigor and integrity of the natural spawning populations. The Advisory Committee has provided the DFG with a format for such a policy. The DFG has agreed to adopt the format, but has not yet done so.

ACTION: The Legislature should direct the Department of Fish and Game to set a completion date for adoption of a salmon and steelhead genetics policy that addresses hatchery/wild stock issues for each watershed. The Advisory Committee would assist the DFG in this task, or would recommend the project be given to a separate group comprised of specialists from the DFG, U.S. Fish and Wildlife Service, universities, fishery groups and the general public.

● The state has no program or facility dedicated to the preservation of unique genetic

"Hatcheries have not mitigated for the loss of natural spawning populations..."

strains of salmon and steelhead. Such a facility is needed to work with wild salmonids, conduct research, test new equipment, etc.

ACTION: The Legislature should direct the DFG to develop, build, and operate a research facility dedicated to preservation and development of wild salmonid diversity. Appropriate funding and staffing should be provided.

- The DFG has done an exemplary job of increasing production and survivability at its anadromous fish hatcheries. The DFG has been developing consistent operating procedures at all hatcheries. The process of standardizing operations is about 50% complete. In some cases, hatcheries are nearly a half-century old and require modernization in order to achieve the desired operating efficiency. The DFG should be encouraged to continue its current efforts to streamline operations and to develop a plan to modernize facilities in order to optimize the investment already made in the hatchery system.

ACTION: The Legislature should direct the Department of Fish and Game to complete the job of standardizing hatchery operations. The DFG should be asked to submit a plan and schedule for modernizing those hatcheries that need modification to meet new operations standards. Funds and staffing should be provided.

ACTION: The Legislature should memorialize Congress to fund needed improvements at all federal mitigation projects to assure that full mitigation levels of production are soon reached.

- When the state enters into a water diversion agreement with another entity, that entity agrees to "mitigate' or reduce the effects of the project on fish populations by building and maintaining hatchery facilities and producing a specified number of fish annually. There are serious shortcomings in this program. *First, almost without except/on, the facilities have not achieved mitigation.* This is due largely to design flaws in the facilities. The federal Coleman National Fish Hatchery has suffered from inadequate water supplies throughout its 45 years of operation. The federal Nimbus Dam was designed to rely on water from nearby Lake Natoma — water which is far too warm for salmon. Cooler water is now piped all the way from Folsom Dam, and even this is inadequate. Second, mitigation agreements frequently become outdated. There are no provisions for revising or updating either mitigation agreements or facilities. Finally, in some cases, mitigation agreements have relinquished instream flows that, subsequently, have been identified as necessary for salmon and steelhead survival. Opportunities to restore stream flow conditions have been rare.

The result of these deficiencies is that mitigators are allowed to make minimum restitution to the fisheries resource while they gain maximum benefits from the water allocation. The work of correcting hatchery problems usually falls, unfairly, on the DFG, as hatchery managers. The burden of rectifying the problems has been absorbed by commercial and sportfishing groups, which have provided funds and labor to correct the problems.

ACTION: The Legislature should direct the Department of Fish and Game to analyze the degree to which the state's salmon and steelhead mitigation hatcheries are achieving the required mitigation. The DFG should advise the Legislature if revisions in agreements or enforcement procedures are needed.

- For nearly 50 years, California laws have sought 'mitigation' for the loss of fish and wildlife habitat to development projects. In at least two crucial areas—wetlands and salmon and steelhead habitat—mitigation has failed or is inadequate. This has fostered the steady decline of these resources. There will always be demands for water; it is now time

PHOTO: BUREAU OF RECLAMATION

Nearly 50 years after its completion, neither stream flow nor hatchery mitigation has been provided by the federal government for the construction of Friant Dam.

to say no to any more mitigation trade-offs.

ACTION: The Legislature should declare the policy of the state that the remaining salmon and steelhead trout habitat will not be diminished further.
(See SB-2261, page 53.)

● When Friant Dam was built on the San Joaquin River, the U.S. Bureau of Reclamation did not build a hatchery as mitigation for fish losses. Consequently, salmon and steelhead stocks are gone from the river and a hatchery in the San Joaquin basin is essential to rebuild these fisheries and allow the basin to play a role in restoring salmon and steelhead statewide.

ACTION: The Legislature should memorialize Congress to direct the U.S. Bureau of Reclamation to construct, operate and pro vide adequate water for a hatchery in the San Joaquin River basin, as mitigation for the losses suffered from the construction a Friant Dam.

● When the U.S. Army Corps of Engineer built Coyote Dam across the Russian River for flood control and water supply purposes it cut off ancestral spawning grounds for m grating steelhead trout. To date, there ha been no mitigation for losses, estimated 4000 spawning fish per year since 1959.

ACTION: The Legislature should memorial ize Congress to direct the Secretary of Arm: to schedule funds for the long overdue steel head mitigation facility at Coyote Dam on the Russian River

FULL RECOGNITION OF THE VALUE OF SALMON AND STEELHEAD TROUT

Salmon and steelhead trout provide significant economic benefits for California...

PHOTO: NATIONAL MARITIME MUSEUM

Salmon and steelhead have contributed mightily to the state's economy and they will again as their true value is recognized.

PHOTO: PETER PALMQUIST COLLECTION

California businesses will receive $150 mi/lion a year from salmon and steelhead restoration.

Economics provide full and fair consideration

Economics have been used to bolster arguments for the investment of literally billions of dollars in California's two major, tax-supported water development schemes, the federal Central Valley Project and the State Water Project. Since the advent of the Central Valley Project in the mid-1930's, "welfare economics" — the idea that all public investment that creates new economic activity is "in the public interest" — has driven all of California's major river-damming decisions.

An elaborate body of dam building economic concepts and procedures have been utilized to show the value of irrigation, flood control and hydroelectric generation. Salmon and steelhead also provide significant economic benefits to society; however, *in most project decision making, no economic values have been given to downstream fish life.* This resource, so easily relinquished, is normally viewed only as a project constraint.

Salmon and steelhead must receive full and fair economic consideration. The economic benefits from this resource must be more fully defined, developed and made a purpose of water projects, in the same way that other beneficial resources have been protected and developed in California. For if water development interests can assert that flood control is for the good of the general public, is it any less valid to assert that a productive salmon and steelhead resource also benefits that same public?

These realities prompted the Advisory Committee to commit funds and effort to develop a methodology for evaluating salmon and steelhead that is both comprehensive and fair. This methodology identifies potential economic benefits to California from conserving and restoring salmon and steelhead resource. These economic findings are contained in three separate reports. The first provides a plain-language explanation of how economics can be used to measure salmon and steelhead benefits. The second report presents a detailed methodology for such evaluation. The third report applies the process to prospects for the restoration of salmon and steelhead in California.

The results of applying this new strategy are encouraging. The economic benefits of a strong salmon and steelhead resource are significant. If a program to double salmon and steelhead stocks in California were implemented, as described in SB-2261, net economic benefits of $150 million per year would be achieved. Of this, $30 million would be new profit to business. With full implementation, the total net profits could reach $6 billion, with $1 billion of this sum as profit to business. Some 8,000 new jobs would be created.

Restoration of this once-strong fisheries resource is a sound financial investment, one that can provide significant economic benefits to society. Conversely, the "cost" will also be high if this resource continues its decline. Earlier work by the Department of Fish and Game suggests that since (1968), California

has lost more than $500 million in business revenue, and over $1 billion in overall net profits because of declines in salmon and steelhead stocks!

Fair values, new court rulings offer hope for the fisheries

The State Water Resources Control Board has begun a three-year hearing concerning the allocation of water from the Sacramento and San Joaquin rivers to the federal Central Valley Project and State Water Project. The state's water adjudication responsibilities were carefully reviewed in a landmark 1986 State Court of Appeals decision. This so-called Racanelli Decision' cautions the Board to closely balance the values of diverting more water from the San Francisco Bay estuary against the instream values, especially the fisheries, which may be diminished by such diversions.

During the 1987 fact-finding phase of the State's Bay-Delta hearings, the California Department of Fish and Game provided testimony relating the amount of freshwater flow through the estuary to the health of the region's fish and wildlife populations. However, it provided virtually no testimony concerning the economic value of fish and wildlife. It is essential that the Department of Fish and Game develop accurate economic assessments of instream values in order to give the Water Board a more balanced view of the fisheries resource.

These values will correct the misconception that California water diversion projects inevitably create greater values than any they might destroy. The assumptions about the value of irrigated agriculture, most of which is sustained by water diverted from the Sacramento and San Joaquin rivers, can now be tested with the University of California's agricultural resources computer model, CARM'. CARM has demonstrated that if water were withdrawn from the production of low-profit crops, including those which can be sustained only with the aid of federal price supports and crop subsidies, San Joaquin Valley farming couid yield higher net profits while using substantially less water.

The state's resources, water in this case, must be conserved and must provide good returns to the people of California. If stream flow is being diverted to produce crops which now yield no net value to society (as the computer model suggests) and fishlife capable of contributing to the economy is being lost to such diversions, then such water has been misallocated. And so have California tax dollars! The state's balancing duty, so precisely described in the Racanelli Decision, has not been met.

An effort has now been made to begin development of a methodology that gives full and fair value and recognition to the state's salmon and steelhead fisheries. These economic values must be considered in the state's water allocation process. To achieve this, the Department of Fish and Game must become competent in valuing the resources and applying these values at hearings and proceedings in ways that conserve fish.

"If stream flow is being diverted to produce crops which now yield no net value to society... and fish life capable of contributing to the economy is being lost to such diversions, then such water has been misallocated...."

FINDINGS AND RECOMMENDATIONS:

ECONOMICS

PHOTO: DEPARTMENT OF WATER RESOURCES

There is strong, worldwide market demand for California troll-caught salmon.

● Water developers, loggers, and ranchers constantly provide data underscoring the value of their particular operations to the state's economy. As underscored at the Bay-Delta hearings, the water developers have relied heavily on economic analysis to bolster their claims. The DFG, by contrast, has seldom utilized competent economic assessments in its actions to conserve salmon and steelhead trout resources.

● Recognizing the need to operate at the same level as other resource users, the Advisory Committee committed efforts and funds to develop a new methodology that accords a full and fair economic value to the salmon and steelhead trout resource. When properly evaluated, doubling California's present salmon and steelhead resources would produce a net economic benefit of $150 million a year and would create 8,000 new jobs.

ACTION: The Legislature should direct the DFG to utilize and build on this new methodology. The DFG must become competent in understanding and using economic analysis to assist in conservation and restoration of the salmon and steelhead trout resources in its charge.

STEWARDS OF THE RESOURCE

The balance must be reestablished.
Working together,
the public trust resources can be restored...

PHOTO: DEPARTMENT OF FISH AND GAME

In recent years, there has been a surge of interest by citizens to restore California's streams and their fish life. Trout Unlimited members contribute labor and materials to rebuild a fish ladder on Corte Madera Creek.

PHOTO: DEPARTMENT OF FISH AND GAME

Fence exclosures protect stream habitat from trampling by livestock.

The health of a single watershed involves maintaining that delicate balance wrought by nature over the ages. The stewardship of the fisheries resource, likewise, requires achieving and maintaining a balance...the dramatic decline of the salmon and steelhead fisheries is testimony of a system that *is out of balance.*

The task of restoring the balance, as described in the preceding pages, involves renewed commitments to stewardship of the resource. First, several of the state's laws and policies must be amended to provide for more vigorous protection and restoration of the resource. Second, the managers of the resource, the Department of Fish and Game, must be strong, adequately funded and operated from a solid management plan. Finally, the salmon and steelhead recovery program must have broad and widespread public support: it requires a California populace that is aware and cares.

Public Trust Doctrine is the backbone of stewardship

When California joined the Union in 1850, it adopted English Common Law. Under Common Law, the King was the trustee for the public's rights in natural resources, including fish life.

In this tradition, the State of California is the "sovereign", responsible for preserving the public's rights and interest in the natural resources of the state, particularly those involving navigable waterways. The state may grant "proprietary"—property—rights to individuals to use the trust lands. But there remains an underlying public ownership which can never be severed; this is the public trust which the state is obliged to preserve.

This "public trust doctrine" has been applied over the years in California court rulings concerning commerce, navigation, fisheries and other conventional uses of waterways. Recently, however, the courts have expanded the doctrine to protect the public's stake in recreation, fish and wildlife habitat, scenic values and environmental preservation.

The 1983 California Supreme Court decision in National Audubon Society v. Superior Court of Alpine County merged issues of public trust doctrine with those of California's water rights laws and found that 1) state licenses to divert streams are subject to the public trust doctrine; 2) when issuing water rights permits and licenses, the state must consider public trust values; and 3) to protect public trust values, the state must continue to review and reconsider existing water rights. This was the "Mono Lake Decision."

For the first time, the California courts made a clear distinction between water rights and "property" rights. Water rights are to be reviewed from time to time and, where necessary, revised to assure they continue to serve the public interest.

The State Court of Appeals drew on the Mono Lake Decision in its 1986 review of the

Consolidated Delta Cases. The Mono Lake action helped clearly define the Water Resources Control Board's responsibilities for balancing the benefits from Delta diversions against its public trust duty of protecting the beneficial uses of the San Francisco Bay estuary – including the region's valuable salmon and steelhead resources. This is known as the Racanelli Decision.

Hopefully, this is the beginning of a new trend. In 1987, the State Water Resources Control Board ruled on Ventura County's United Water Conservation District application to increase its diversions from the Santa Clara River. The Board declared, "We are of the opinion that the Santa Clara River steelhead, as an anadromous fish, is protected by the public trust doctrine." It then ordered that adequate stream flow be provided for the few surviving steelhead in the Santa Clara River. This is a substantial improvement from the position held by its predecessor Board in 1959, when it declared that no public purpose would be served by conserving the annual run of 100.000 salmon below Friant Dam.

There is now greater concern with the state's responsibilities to protect the public trust resources. With the clear guidelines provided by the courts, the Advisory Committee is optimistic that the salmon and steelhead restoration program can become a reality. The state has the authority and duty to review how water is being used and to reallocate water, if necessary, to improve the balance between irrigation diversions and fisheries protection.

Stewardship demands strong resource management

The direct responsibilities for stewardship fall on the shoulders of the primary resource managers the Department of Fish and Game. The recovery program envisioned must be spearheaded by strong and effective resource managers, guided by a comprehensive program that engenders public awareness, support and confidence.

In its 1972 report, the Citizens' Advisory Committee on Salmon and Steelhead Trout observed, "In California, salmon and steelhead management by the Department of Fish and Game has been, of necessity, an *ad hoc* effort to 'mitigate' the losses caused by relentless environmental change. A rear guard of dedicated but poorly armed professionals, sportsmen, and commercial fishermen as-

Strict enforcement of Fish and Game codes is essential.

PHOTO: DEPARTMENT OF FISH AND GAME

Salmon and steelhead belong to all Californians.

sisting the Department of Fish and Game, have fought an extended series of defensive actions against environmental destruction. They have slowed the attrition of these resources, but they have not and cannot succeed with only a defensive philosophy."

If rear guard actions were insufficient in 1972, they are even less so today. Californians are now aware of the costs of "relentless environmental destruction". Stewardship of the state's resources requires more than a defensive philosophy.

As managers of the fishery resource, the Department of Fish and Game is the logical organization to lead the charge for salmon and steelhead conservation. But this agency is beset by a number of problems that relate to budgets, staffing and, in particular, its position within the structure of state government. It has also lacked a comprehensive plan to guide and focus its efforts to manage the salmon and steelhead trout resource. Taken together, these issues prevent an advocacy role and result in a defensive philosophy.

In 1962, the Department of Fish and Game was placed in the Resources Agency, along with the Department of Water Resources, Department of Forestry, and other natural resource departments. While this placement makes organizational sense, it has resulted in interagency arrangements that disserve the conservation of salmon and steelhead trout. As part of the Resources Agency "family", the Department of Fish and Game is expected to resolve its differences with other family members *without* conflict and *within* the Resources Agency, through coordination and cooperation. By their very nature, there are genuine conflicts between department goals and policies. These issues should receive public scrutiny and public input, but they frequently do not.

Some agencies, particularly the Depart-

ment of Water Resources, are also much better prepared to achieve their purposes. The State Water Project, for example, literally moves the water resource from its publicly-owned condition, as stream flow, to large agricultural operations and new urban developments, where its use creates private wealth. Those with a personal stake in the Project organize politically. These "constituents" of the Department of Water Resources are informed and alert to any plans that might disrupt water development plans. They maintain full-time attorneys, lobbyists, and auditors in Sacramento to assure their interests in the water resource are protected. Likewise, the Department of Forestry and the Department of Food and Agriculture have major industry constituencies.

The Department of Fish and Game, by contrast, does not have lucrative projects which can be used to develop such strong and well-organized support from the public or constituency groups. In fact, over the years, recreational and commercial fishermen and hunters have had to carry the burden for financing a majority of the DFG programs!

The Department of Fish and Game does not have broad public support and confidence. This is not because good work or worthy programs are lacking. It may be due, in part, to the absence of an aggressive and well-organized public information program. During the last decade, the DFG's Conservation Education Branch has experienced consistent personnel cuts. In 1987, only one percent (1%) of the DFG annual budget was spent on all public information and education efforts.

The current Department of Fish and Game leadership has recognized this deficiency and is developing plans to rebuild a strong information and education program. Some projects are under way, including several Natural Heritage publications, new interpretive centers, Project WILD, a new hatchery video, etc. These and similar efforts must receive

Project WILD Teacher Workshop.

PHOTO: DEPARTMENT OF FISH AND GAME

both encouragement and adequate funding. Support for the Department of Fish and Game, the custodians of California's wildlife resource, will come only by cultivating understanding and confidence.

Stewardship embraces all Californians

The responsibilities of stewardship are broad; they extend to all Californians. A public awareness campaign to promote recovery of the salmon and steelhead resource must embrace and motivate all Californians. It must reach commercial and recreational anglers, Indian interests, marina operators, grocery stores, restaurants, and anyone who enjoys fish. It should encompass photographers, hunters, hikers, boaters, birders, picnickers, and environmentalists. And it must involve everyone else who wants a state with productive rivers and streams and a wildlife legacy for future generations to enjoy. Remember, these fisheries are an integral part of a balanced ecological equation. *When salmon and steelhead survival is threatened, other values important to all Californians are at risk, too.*

Specific information programs must be directed to both rural and urban audiences. Educational units about salmon and steelhead must be incorporated into the public school curriculum. Timely issues should be discussed at community meetings, through speakers bureaus and public gatherings. Programs, updates and public service announcements should be aired routinely in the press, on radio and television.

The conservation of salmon and steelhead trout in California is possible and can be achieved. The development of successful habitat restoration methods will now allow vital habitat to be repaired and become productive again. A new economic methodology will give full and fair values to the salmon and steelhead resource when they are compared to competing water or land uses. The public trust doctrine and other important court decisions can now be used to help restore balance in allocating the state's water resources. With proper guidance and support, the Department of Fish and Game can assume its necessary role as a strong advocate for the fisheries resource. With the inspired interest, support and commitment of the people of California, the balance *will* be restored.

FINDINGS AND RECOMMENDATIONS:

STEWARDS OF THE RESOURCE

● The last DFG attempt to make a comprehensive assessment of salmon and steelhead conditions occurred in 1965. This Advisory Committee was commissioned to continue the work of its predecessor committee and develop a management strategy for the recovery of salmon and steelhead trout. This report contains considerations and guidelines that must be included in the recovery effort. It is imperative that the DFG follow these guidelines and develop a technical and comprehensive conservation and restoration plan for salmon and steelhead trout.

ACTION: The Legislature should support Department of Fish and Game efforts to prepare a detailed salmon and steelhead conservation program, including staffing and funding requirements, directed at doubling the state's salmon and steelhead trout production within twenty years. The Legislature should provide at least an additional $10 million in 1989 to initiate this restoration program. Provisions for long-term funding should be included in the plan. Such a bill has been introduced (SB-2261); it can be found, in entirety, on page 53.

● The Advisory Committee sponsored a two-day salmon and steelhead trout research workshop at the University of California, Davis. The goals of the gathering were to identify and prioritize the problems facing salmon and steelhead trout in California and to craft a research, development and extension program to solve these problems. More than 100 projects were identified. Of these, 35 received initial development; 18 were considered urgent. The cost of implementing all 35 projects is approximately $90.9 million over a ten year period.

ACTION: The Legislature should direct the Department of Fish and Game to utilize the findings of this workshop and include ongoing research and evaluation goals in its comprehensive program, as outlined in SB-2261.

● The Department of Fish and Game is one of the smallest of the resource departments, with a staff of 1,517 (Department of Water Resources has 2,650 people; California Department of Forestry has 4,100). DFG staff numbers have not changed substantially during the last decade and have actually been reduced in recent years. Due to increased environmental pressures, the agency's workload today is undoubtedly greater. The DFG is responsible for managing and protecting the millions of fish and animals that live in California and its coastal waters. Presently, 255 California animal species face the threat of extinction. If Californians are committed to protecting and restoring their wildlife heritage, a greater investment must be made in department staff to do the work.

ACTION: The Legislature must continue to increase DFG staffing to meet the goals outlined in SB-2261.

● The Department of Fish and Game is not adequately funded for the scope of its responsibilities. Its 1987-88 annual budget is $106,600,000. This is also one of the smallest budgets of the resources agency (Department of Water Resources budget is $600,000,000; California Department of Forestry is $300,000,000). In 1987-88, hunting and fishing licenses and revenues account for a majority of the DFG annual budget. The burden of protecting and managing the resource falls inequitably on the shoulders of a small portion of Californians. The DFG is substantially self-supporting, despite the fact that it manages the resource for the public good. Only 8% of the budget is from General Fund tax dollars. If Californians wish to conserve the wildlife resource, DFG must be adequately funded with support coming more equitably from all Californians, through general tax fund dollars.

ACTION: The Legislature should direct the Department of Fish and Game to determine the appropriate level of funding and identify funding sources for the program developed through SB-2261.

● At the two-day salmon and steelhead research workshop, the development of a strong public awareness program was among the priorities. The key elements of such a program were developed, with an anticipated cost of $7.5 million over ten years. Summarized here, these activities should be incorporated into DFG public awareness efforts:

1) Survey existing and past programs;
2) Involve other agencies or organizations in program development and implementation;
3) Provide timely information on important issues to other agencies and organizations;
4) Develop newsletters, public service announcements, advertisements, videos, and utilize all media services;
5) Develop displays for fairs, public gatherings and community events;
6) Promote a speakers' bureau oriented

PHOTO: DEPARTMENT OF FISH AND GAME

"If you want to plant a crop that will last one year, plant rice; if you want to plant a crop that will last ten years, plant a tree; if you want to harvest a crop that will last a lifetime, educate a person."—an old Chinese proverb

to adult and youth audiences;

7) Develop a media center to facilitate education and information transfer; and
8) Develop and incorporate salmon and steelhead materials to supplement Project WILD's K-12 program.

● To demonstrate feasibility and value of a stronger public awareness program, the Advisory Committee is producing a video presentation of the challenges facing salmon and steelhead trout resources today. Furthermore, the Advisory Committee has sponsored the development and testing of interdisciplinary salmonid and aquatic ecology curriculums for school children throughout northern California. No such state curriculum has been available and plans are already being made to provide these materials to supplement the DFG's Project WILD classroom program (See Appendices).

ACTION: The Legislature should direct the Department of Fish and Game, other public agencies and private interests, to make public awareness of salmon and steelhead trout conservation issues a top priority. Further, it should instruct the Department of Fish and Game to develop and implement a multi-level public awareness program to complement the salmon and steelhead conservation program and goals outlined in SB-2261. The Legislature should provide the needed funding of $7.5 million over ten years.

AMENDED IN SENATE APRIL 14,1988
AMENDED IN SENATE APRIL 5, 1988

SENATE BILL No. 2261

Introduced by Senator Keene

February 17,1988

An act to add Chapter 8 (commencing with Section 6900) to Part 1 of Division 6 of the Fish and Game Code, relating to fish, making an appropriation therefor, and declaring the urgency thereof, to take effect immediately.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds that the Advisory Committee on Salmon and Steelhead Trout, reestablished by Resolution Chapter 141 of the Statutes of 1983, has conducted a thorough inquiry into the decline of the salmon and steelhead trout resources of the state and has presented to the public its findings and recommendations for legislative and administrative actions to conserve and restore those resources. It is the intent of this act to implement the recommendations of the advisory committee.

SECTION 2. Chapter 8 (commencing with Section 6900) is added to Part 1 of Division 6 of the Fish and Game Code, to read:

CHAPTER 8. SALMON AND STEELHEAD TROUT CONSERVATION AND RESTORATION

Article 1. Citation and Legislative Findings

6900. This chapter shall be known and may be cited as the California Salmon and Steelhead Trout Conservation and Restoration Act.

6901. The Legislature finds, as follows:

(a) The production of salmon and steelhead trout in California has declined to approximately 1,000,000 adult chinook or king salmon, 100,000 coho or silver salmon, and 150,000 steelhead trout.

(b) The salmon and steelhead trout resources of the state have declined dramatically within the past four decades, primarily as a result of water diversion projects and land use practices which destroy stream habitat.

(c) Much of the loss of salmon and steelhead trout habitat in the state, particularly in the Central Valley, has resulted from water development programs which have enjoyed substantial federal and state general fund assistance.

(d) The conservation and restoration of the salmon and steelhead trout resources of the state would provide a large statewide economic benefit and would, in addition, provide employment opportunities not otherwise available to the citizens of this state, particularly in rural areas of present underemployment.

(e) The conservation and restoration of California's salmon and steelhead trout re-

sources would return to the citizens valuable public resources which have been taken from them and would aid in the fulfillment of the public trust obligations of the state.

(f) Successful salmon and steelhead trout conservation and restoration requires maintaining adequate levels of natural, as compared to hatchery, spawning and rearing.

(g) The present level of reliance upon hatchery production of salmon and steelhead trout in California is at or near the maximum that it should occupy in the mix of natural and artificial hatchery production in the state.

(h) The conservation and restoration of the salmon and steelhead trout of the state must be accomplished primarily through the improvement of stream habitat and the elimination of manmade factors which cause the loss of juvenile fish in California's stream systems.

(i) Funds provided by the Legislature since 1978 to assist the restoration of the fisheries of the state have been administered by the Department of Fish and Game in a successful program of contracts with local government and nonprofit agencies and private groups in ways that have attracted substantial citizen effort.

(j) The department's contract program has demonstrated that California has a large and enthusiastic corps of citizens that are eager to further the restoration of the stream and fishery resources of this state and that are willing to provide significant amounts of time and labor to that purpose.

(k) There is need for a comprehensive plan, program, and state government organization to guide the conservation and restoration of the salmon and steelhead trout resources of the state.

6902. The Legislature declares, as follows:

(a) It is the policy of the state to increase the production of salmon and steelhead trout by the end of this century to approximately double that of present levels.

(b) It is the policy of the state to provide sustained annual funding for the purpose of doubling the production of the state's salmon and steelhead trout resources.

(c) It is the policy of the state to encourage the participation of its citizens in the conservation and restoration of the salmon and steelhead trout resources.

(d) It is the policy of the state to restore California's salmon and steelhead trout resources primarily through the improvement of instream habitat and the elimination of manmade factors which kill juvenile fish.

(e) It is the policy of the state that the salmon and steelhead trout habitat remaining in California shall not be diminished further and that every state agency and political subdivision of this state will conform its projects, programs, and activities to ensure that this policy is achieved.

Article 2. Definitions

6910. Unless the context clearly requires a different meaning, the definitions in this article govern the construction of this chapter.

6911. "Production" means the survival of fish to adulthood as measured by the abundance of the recreational and commercial catch together with the return of fish to the state's spawning streams.

6912. "Program" means the program for conserving and restoring the salmon and steelhead trout of the state provided for in Article 3 (commencing with Section 6920).

Article 3. Salmon and Steelhead Trout Conservation and Restoration Program

6920. The department shall, with the advice of the Advisory Committee on Salmon and Steelhead Trout and the Commercial Salmon Trollers Advisory Committee, pre

pare and maintain a detailed and comprehensive salmon and steelhead trout conservation and restoration program.

6921. The program shall identify the measures the department will carry out to assure a statewide doubling of salmon and steelhead trout by the end of the century.

6922. The program shall include, but is not limited to, all of the following elements:

(a) Identification of streams where the production of salmon and steelhead trout can be increased primarily through the improvement of stream and stream banks conditions without substantial concern for land ownership, land use practices, or changes in stream flow operations subject to the control of the state.

(b) Identification of streams where the production of salmon and steel head trout can be increased only through the improvement of land use practices or changes in stream flow operations subject to the control of the state.

(c) Identification of streams where the conservation and restoration of salmon and steelhead trout resources require, as a result of significant prior loss of stream habitat, the construction of artificial propagation facilities.

(d) A program element for evaluating the effectiveness of the program.

(e) Recommendations for an organizational structure, staffing, budgeting, long-term sources of funding, changes in state statutes and regulations and federal and local government policy and such other administrative and legislative actions as the department finds to be necessary to accomplish the purposes of this chapter.

6923. Measures which are clearly the responsibility of other agencies or persons, such as the repair or replacement of dysfunctional fish screens, are not eligible for funding under the program.

6924. The department shall determine the initial elements of the program and transmit those elements to the Advisory Committee on Salmon and Steelhead Trout within six months of the effective date of this chapter.

6925. The Advisory Committee on Salmon and Steelhead Trout shall report to the Legislature within 90 days of its receipt of the initial elements its recommendations for implementing and, where necessary, improving the program to assure conformance with the purposes and policies of this chapter.

SECTION 3. The sum of one hundred twenty-five thousand dollars ($125,000) is hereby appropriated from the Environmental License Plate Fund to the Department of Fish and Game for the preparation of the initial elements of the salmon and steelhead trout conservation and restoration program pursuant to Chapter 8 (commencing with Section 6900) of Part 1 of Division 6 of the Fish and Game Code.

SECTION 4. This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting the necessity are:

The decline of salmon and steelhead trout is occurring at such a precipitous rate that some segments of these native California fish (winter run and spring run king salmon and steelhead trout of the upper Sacramento River) are threatened with extinction. In order to stop the decline and restore the fishery resource at the earliest possible time, it is necessary that this act take effect immediately.

"Stewardship of the state's resources requires more than a defensive philosophy.."

AMENDED IN SENATE APRIL 6,1988

SENATE BILL No. 2390

Introduced by Senator Campbell

February 18,1988

An act to amend Sections 5989 and 6100 of the Fish and Game Code, relating to fish screens.

The people of *the* State *of California do enact as follows:*

SECTION 1. Section 5989 of the Fish and Game Code reads:

5989. (a) After acceptance, if the screen fails to function in an efficient manner and no changes in conditions affecting its operation have occurred subsequent to the acceptance of the screen, the owner shall not be required to install a new screen. However, the department may install another screen at the sole cost and expense of the department of a type, size, mesh, and at a location agreed upon by the department and the owner, or approved by the Department of Water Resources, as provided in Section 5992.

(b) After acceptance, if the screen fails to function in an efficient manner because of changes in conditions affecting its operation, including, but not limited to, method of operation, quantity of water diverted, or avulsion, accretion, or other conditions of the channel, the department may order the owner to replace or modify the screen, or the department may replace or modify the screen, in the same manner and at the same shared cost as provided in this article for initial screens on the conduit.

SECT ION 2. Section 6100 of the Fish and Game Code reads:

6100. (a) (1) Notwithstanding Article 3 (commencing with Section 5980) and Article 4 (commencing with Section 6020), on or after March 4, 1972, any new diversion of water from any stream having populations of salmon and steelhead which is determined by the department to be deleterious to salmon and steelhead shall be screened by the owner. The construction, operation, or maintenance costs of any screen required pursuant to this article shall be borne by the owner of the diversion.

(2) The department, within 30 days of receipt of a notice of the diversion, or within the time determined by mutual written agreement, shall submit to the owner its proposals as to measures necessary to protect the salmon and steelhead. The department shall notify the owner that it will make an onsite investigation and any other investigation before it proposes any measure necessary to protect fish life.

(3) The department, or any agency of the state, shall provide the owner of the diversion any available information which is required by such owner in order to comply with this article.

(4) The diversion shall not commence until the department has determined that measures necessary to protect fish life have been incorporated into the plans and construction of such diversion.

(b) After commencement of diversion, if the screen fails to function in an efficient manner because of changes in conditions affecting its operation, including, but not limited to, method of operation, quantity of water

diverted, or avulsion, accretion, or other conditions of the channel, the department may order the owner to replace or modify the screen at the owner's cost, or the department may replace or modify the screen, notify the owner of the cost thereof, and the owner shall, within 30 days, remit the amount of the cost to the department.

SECTION 3. Notwithstanding Section 17610 of the Government Code, if the Commission on State Mandates determines that this act contains costs mandated by the state, reimbursement to local agencies and school districts for those costs shall be made pursuant to Part 7 (commencing with Section 17500) of Division 4 of Title 2 of the Government Code. If the statewide cost of the claim for reimbursement does not exceed five hundred thousand dollars ($500,000), reimbursement shall be made from the State Mandates Claims Fund.

AMENDED IN SENATE MAY 18,1987
AMENDED IN SENATE APRIL 20,1987

SENATE BILL No. 1335

Introduced by Senator McCorquodale

March 6,1987

An act to amend Section 4604 of the Public Resources Code, relating to forest practices.

LEGISLATIVE COUNSEL'S DIGEST

SB 1335, as amended, McCorquodale. Forest practices: inspections.

Under the Z'berg-Nejedly Forest Practice Act of 1973, the Department of Forestry and Fire Protection is required to provide at specified times, as needed, inspections of an area in which timber operations are conducted.

This bill would remove the authority of the department to omit an inspection upon determination that it is not needed, except that where a registered professional forester has assumed specified responsibilities with respect to the operations, the Director of Forestry and Fire Protection could provide such inspections of the area as the director determines are necessary.

The bill would authorize the Department of Fish and Game and the State *Water Resources Control Board* to enter and inspect land at any time during timber harvest plan activities on the land.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: no.

The people of the State of California do *enact as* follows:

SECTION 1. Section 4604 of the Public Resources Code is amended to read:

4604. (a) The department shall provide an initial inspection of the area in which tim-

ber operations are to be conducted within 10 days from the date of filing of the timber harvesting plan, or a longer period as may be mutually agreed upon by the department and the person submitting the plan, except that the inspection need not be made if the department determines that it would not add substantive information that is necessary to enforce this chapter. In any event, the department shall provide for inspections, as needed, as follows:

(1) During the period of commencement of timber operations.

(2) When timber operations are well underway.

(3) Following completion of timber operations.

(4) At any other times determined to be necessary to enforce this chapter.

The Department of Fish and Game and the State Water Resources Control Board may enter and inspect land at any time during the timber harvest plan activities on the land.

SENATE JOINT RESOLUTION No.43

Introduced by Senator McCorquodale

April 28,1988

Senate Joint Resolution No. 43— Relative to Fish and Wildlife.

LEGISLATIVE COUNSEL'S DIGEST

SJR 43, as introduced, McCorquodale. Fish and wildlife: water needs: studies.

This measure would memorialize the President and Congress of the United States to direct the Bureau of Reclamation to suspend its efforts to sell water from the Central Valley Project until specified fish and wildlife studies have been completed.

Fiscal committee: no.

WHEREAS, Fish and wildlife in California are dependent on adequate flows of freshwater in the state's rivers and estuaries; and

WHEREAS, the State Water Resources Control Board has commenced hearings to determine the amount and quality of water flowing through the San Francisco Bay-Delta estuary which is necessary to protect the fisheries, wildlife, and other beneficial uses of the water and will decide if the amount of water which the Central Valley Project and State Water Project currently pump from the estuary should be modified to protect the fisheries and other beneficial uses of the Delta; and

WHEREAS, During the recent hearings the State Water Resources Control Board was presented with extensive testimony that the past operations of the Central Valley Project and State Water Project may be causing significant damage to the Bay-Delta fisheries; and

WHEREAS, On December 29, 1978, the Secretary of the Interior issued a formal decision directing the agencies of the Department of the Interior to determine the status of the fish and wildlife resources of the Central Valley and recognizing the obligation of the federal government to participate in meeting water quality and other conditions necessary to conserve and protect the fish and wildlife resources of the Central Valley and the San Francisco Bay-Delta estuary; and

WHEREAS, The Secretary's decision was

intended to assure that the uncommitted water supply of the federal Central Valley Project could be used to correct past damages and to meet the needs of fish and wildlife; and

WHEREAS, The Department of the Interior agencies have not carried out those fish and wildlife studies; and

WHEREAS, The Bureau of Reclamation. an agency of the Department of the Interior, operates the Central Valley Project, and furnishes 7.3 million acre feet of water each year to project customers under long-term contracts from the Trinity, Sacramento, American, Stanislaus, and San Joaquin Rivers; and

WHEREAS, The Bureau of Reclamation estimates that 1 .1 million acre feet of dependable annual water supply remains uncommitted in its project; and

WHEREAS, The Bureau of Reclamation is actively seeking long-term contracts for the sale of the 1 .1 million acre feet of water which it estimates remains unsold in its Central Valley Project; and

WHEREAS, Until the agencies of the Department of the Interior have completed the fish and wildlife water needs studies as directed by the Secretary of the Interior in 1978, and until the State Water Resources Control Board determines how much water is necessary to protect fishing and other beneficial uses of the Delta, it is uncertain as to how much, if any, water remains uncommitted in the project; and

WHEREAS, In the absence of that information, the Bureau of Reclamations current water marketing program is premature, and should not proceed until the water needs of fish and wildlife in the Central Valley and San Francisco Bay-Delta estuary have been determined and addressed; now, therefore, be it

Resolved by the Senate and Assembly of the State *of California, jointly* That the Legislature of the State of California respectfully memorializes the President and Congress of the United States to direct the Bureau of Reclamation to suspend its current efforts to sell 1.1 million acre-feet of water from the Trinity, Sacramento, American, Stanislaus, and San Joaquin Rivers of California, and to complete the determination of how much water is needed to mitigate the adverse effects on fish and wildlife caused by the development and operation of the Central Valley Project; and be it further

Resolved, That the Secretary of the Senate transmit copies of this resolution to the President and Vice President of the United States, to the Secretary of the Interior, to the Speaker of the House of Representatives, and to each Senator and Representative from California in the Congress of the United States.

Ninety percent of the Trinity River's flow has been diverted to the Central Valley.

SECTION TWO:

RIVER BASIN RECOMMENDATIONS

MAP LEGEND

1. Smith River, Redwood Creek, Mad River Region
2. Klamath River, Lower Trinity River
3. Trinity River Upstream from Hoopa
4. Mattole River, South Fork Eel River, Lower Eel River, Van Duzen River
5. Upper Eel River
6. Sacramento River System
7. Mann, Sonoma & Mendocino County Coastal Streams
8. Russian River
9. San Francisco Bay Streams
10. San Joaquin River System
11. Central and South Coast Streams

INTRODUCTION

Section One of this report describes the conservation problems that face salmon and steelhead trout throughout California. In this section, fish conservation in specific geographic regions of the state is discussed.

California's "salmon and steelhead trout country" is spread throughout several geographically distinct regions of the state. To facilitate research, the Advisory Committee divided California into eleven (11) geographic regions, areas with common biological features and relationships. As information was gathered, it made sense to approach the Klamath and Trinity rivers as a natural unit; consequently, numbers two and three (see map) have been treated as one basin in the discussion that follows.

A subcommittee was formed to study each one of the basins described and to seek out local specialists and volunteers to conduct specific studies and projects. Local involvement has formed the foundation of these investigations to assure that plans and recommendations have a strong base of local support.

Local involvement in projects has been extensive, in most cases, with hundreds of professionals, fishermen and citizens sharing responsibilities for the work.

Smith River, Redwood Creek, and Mad River Region

The Setting

Located in extreme northwestern California, the north coast basins include the following Del Norte and Humboldt county watersheds: Smith River, Redwood Creek, Little River, Mad River, Jacoby Creek, Freshwater Creek, Elk River, Salmon Creek and the smaller Humboldt Bay tributary streams. Except for the streams that pass through Humboldt Bay communities, these are wildland watersheds, devoted primarily to livestock grazing, timber production, National Forest and park uses.

The Problems

The Smith River is the largest and most productive of the streams in this group. Most of its watershed lies within the Six Rivers and Siskiyou National Forests. The Smith, which has been included in the federal Wild and Scenic Rivers System, supports heavy recreational use—particularly camping. Fishing for "summer trout" is popular and draws many visitors to the area. Unfortunately, much of this fishing activity centers on juvenile salmon and steelhead that remain in the area during part of their life cycle. Education programs and angling regulations should be developed to discourage take of juvenile salmonids so they may survive, mature, provide food and sport as adults, and return to spawn two years later.

Salmon and steelhead habitat in Redwood Creek has been heavily damaged by extensive logging on the watershed's steep, highly erodible slopes. With creation of the Redwood National Park, Congress authorized a 1 5-year, $33 million watershed rehabilitation program that will substantially improve fish habitat within the park boundaries. Unfortunately, no similar improvement program exists for the remaining 65% of the drainage, which is in private timber management.

In recent decades, Mad River salmon and steelhead have had a troubled history. King salmon spawning runs past old Sweasey Dam exceeded 3,000 fish during the 1940's, but dropped to just 19 fish in 1959. Construc-

tion of a municipal water supply reservoir near Ruth in the early 1960's altered the river's flow and degraded its water quality. Demolition of Sweasey Dam in 1970 exacerbated these problems by filling the river with sediment and covering the spawning gravels. The state built Mad River Hatchery in 1970, not as a mitigation hatchery, but rather, to increase the region's salmon population. The hatchery has not been able to increase salmon numbers, but it has significantly increased the Mad River steelhead crop.

In general, all of the Humboldt Bay tributaries have suffered from the effects of logging, grazing and land development. During the past decade, however, local citizens have initiated some very promising restoration projects on several of these streams.

The north coast region offers some extraordinary resources for developing and expanding fish conservation and restoration projects. Humboldt State University has renowned programs in fisheries education, research and extension. State and federal land management and fisheries conservation agencies are well-represented throughout the region. Angling organizations, service clubs and commercial fishing groups are very active and have already established many stream improvement and restocking projects. Collectively, these resources can make a solid contribution to the salmon and steelhead trout restoration program.

Capitalizing on the strong interest in fish conservation among these groups and the area's teachers, the Advisory Committee sponsored the development of an interdisciplinary classroom teaching unit about salmon and steelhead trout. The unit has been tested in classrooms throughout northern California and shows promise in creating greater awareness of salmon and steelhead conservation problems and opportunities.

The Solutions

ACTION: It is essential to develop public awareness programs throughout the north coast basin to reduce the take of "summer trout," which are, in fact, juvenile salmon and steelhead ocean-bound migrants.

ACTION: It is reasonable to adjust angling seasons and catch limits in the affected streams of this region, by adopting the more restrictive regulations used by neighboring Oregon.

ACTION: The Department of Fish and Game should encourage and facilitate the use of the classroom curriculum developed by the Advisory Committee to expand community knowledge of and support for salmon and steelhead conservation and restoration efforts.

"... ***Public enthusiasm for stream and fish restoration in these and other California watersheds reveals a poignant part of human nature: things are frequently prized more fully when they are lost or nearly lost..."***

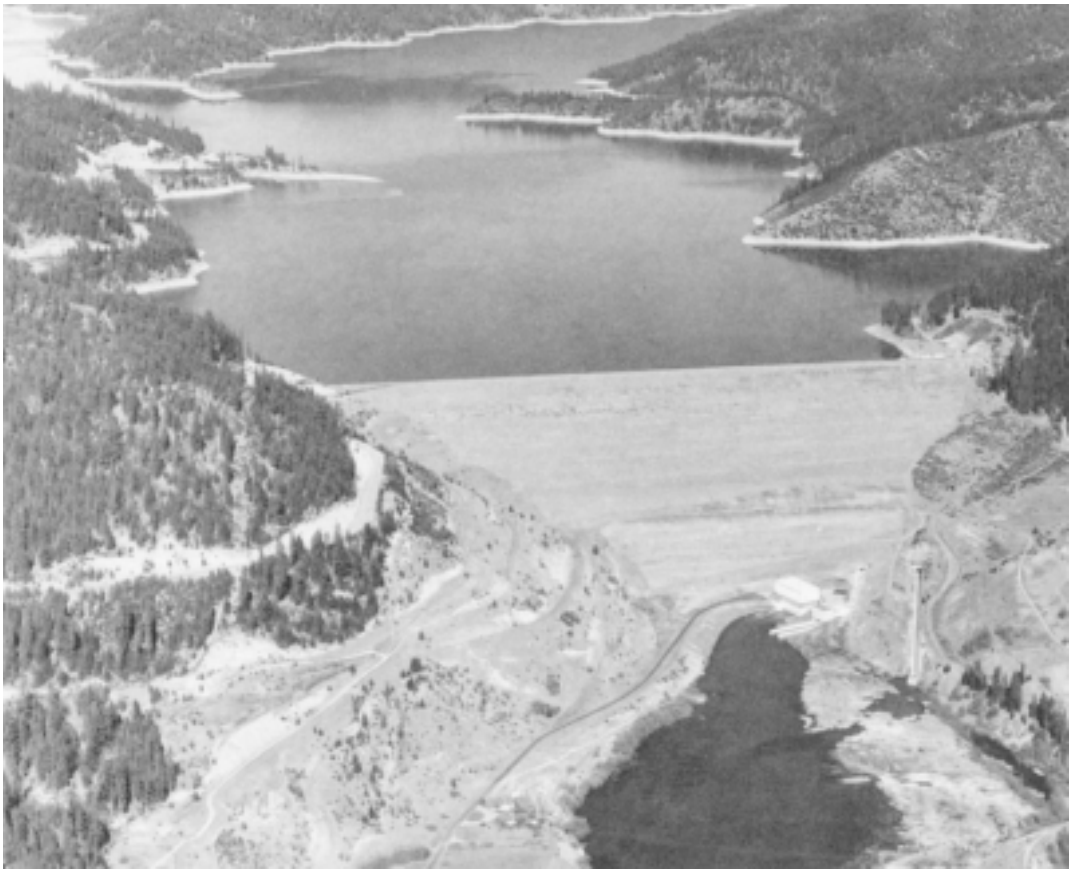


PHOTO: BUREAU OF RECLAMATION

Lewiston Dam on the Trinity River. Salmon and steelhead stocks declined by 90% after water diversions to Central Valley irrigators began.

Klamath and Trinity Rivers Basin

The Setting

The Klamath and Trinity rivers basin includes the Shasta, Scott, Salmon and Trinity rivers, and over 200 smaller feeder streams. The basin drains a vast region of southern Oregon and northwestern California. This area is the state's top steelhead region. After the Sacramento, this is also California's second most important salmon-producing river.

The Problems

Consistent with statewide trends, salmon and steelhead spawning runs in the Klamath River basin have varied widely in recent years in response to both natural and human-caused environmental factors. King salmon runs entering this huge watershed's estuary have been as low as 25,000 and as high as the estimated run of 190,000 in 1987.

Dams block home streams

Natural spawning migrations up the main Klamath River are blocked by the Iron Gate hydroelectric dam a few miles south of the Oregon border. A mitigation hatchery there produces king salmon, silver salmon and steelhead trout.

On the Trinity River, spawners reach the end of the line at Lewiston Dam. This facility was built by the U.S. Bureau of Reclamation

in 1963 to divert 90% of the Trinity's stream flow to Central Valley Project irrigators. Not surprisingly, the Trinity River's salmon and steelhead stocks declined by 90% after these diversions began. The mitigation hatchery below the dam can not even begin to make up for these losses. In 1981, the U.S. Secretary of Interior ordered Trinity River diversions reduced by 219,500 acre-feet until a state-federal study team determined the amount of stream flow needed for rebuilding the area's salmon and steelhead runs, The study should be completed by 1993.

Silt **and politics smother restoration efforts**

Trinity River fish restoration efforts have been confounded by two factors - one physical, the other political. Many of the river's best spawning gravels have been smothered by silt. Stream flow has been so low since the construction of Trinity Dam that it has failed to move the silt downstream. To make matters worse, willows and other riparian plants have encroached on the silt beds, held them in place and, in this way, have further diminished the extent of the spawning gravels. The stream f low increases that have occurred since 1981 have yielded steady improvements in the spawning runs; however, the physical damage caused by 18 years of Central Valley Project diversions will take many years to overcome. Restoration will be costly and financial responsibility for the problems on the Trinity River clearly rests with those who benefit from the Central Valley Project.

The second matter clouding Trinity River fish conservation involves the water which the U.S. Bureau of Reclamation has returned" to the river for the duration of the stream flow studies slated for completion by 1993. Despite repeated protests by fish conservation interests, the Bureau continues, as a matter of policy, to include the 219,500 acre-feet of water among its inventory of "uncommitted" Central Valley Project yield. The Bureau is offering the water for sale to Central Valley irrigation districts at the very time its need for fish restoration is being established by state and federal scientists!

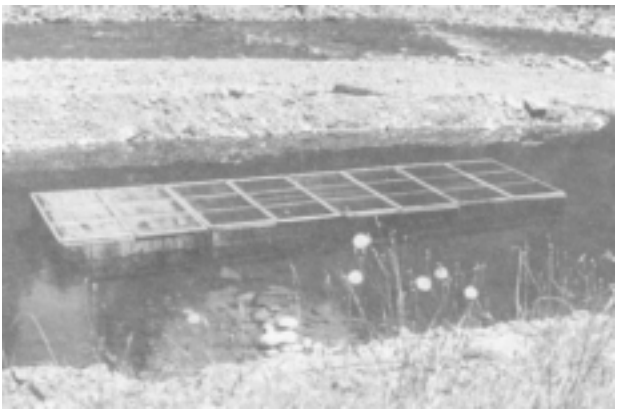
This inexplicable and contradictory behavior prompted the Advisory Committee to request the introduction of California Senate Joint Resolution 43 in 1988. The resolution asks the President and Congress of the United States to restrain the federal Bureau of Reclamation from marketing Central Valley Project water until after the stream flow needs of salmon and steelhead trout have been set and met.

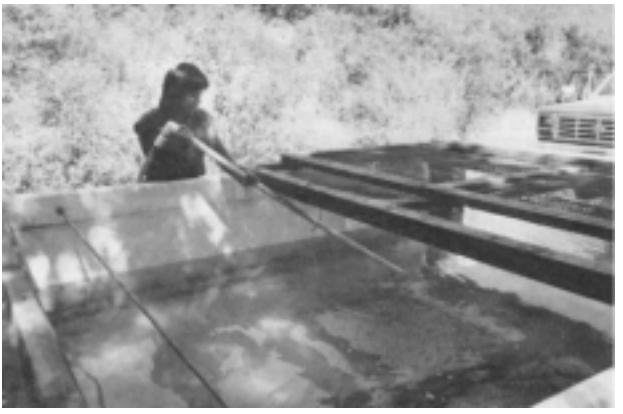
Restoration efforts boosted by new funds

The majority of the Klamath River watershed is managed for timber production by private and federal agencies. The hillsides are steep, rainfall is abundant and erosion problems are persistent. In recent years, the U.S. Forest Service has shown genuine interest in watershed and fisheries restoration opportunities. Projects throughout the watershed, involving not only the land management agencies, but the Department of Fish and Game, angler organizations, Native American groups and commercial fishermen. have demonstrated that the region's salmon and steelhead stocks can be substantially restored with cost-effective methods.

Encouraged by these local initiatives, Congress enacted the Klamath and Trinity River Basins Fisheries Restoration Act (Public Law 99-552) in 1986. The Act authorizes a $20 million, 20-year federal government effort to

"...the dramatic decline of the salmon and steelhead fisheries is testimony of a system that is out of balance..."





PHOTOS: HUPA VALLEY TRIBE

TOP: The region's Indians are involved with restocking projects. CENTER AND BOTTOM: Salmon are raised and eventually planted in the Klamath River.

"When salmon and steelhead survival is threatened, other values important to all Californians are at risk, too..."

restore the watershed's salmonid fisheries. The State of California has promised to match the federal effort – providing a total of $40 million for the duration of the program.

The U.S. Fish and Wildlife Service has established a new fisheries restoration project office in Yreka and has requested its first $1 million appropriation for the fiscal year beginning October, 1988. The U.S. Secretary of Interior's guidelines for the state's matching commitment will be available soon. The Director of the Department of Fish and Game assured the Legislature in 1987 that the State Administration will budget whatever funds are required to assure success of the Klamath basin program.

Native American interests in the fishery

There is an urgent need for fisheries restoration in the Klamath River basin. The salmon of the Klamath River are harvested not only by California and Oregon commercial trollers and anglers, but also by members of the region's three indigenous Native American communities: Hupa, Karuk and Yurok Indians. The allocation of Klamath River fish between California and Oregon interests – and among anglers, commercial trollers and Indians – is made by the federal Pacific Fisheries Management Council.

The degradation of fish habitat in the basin has contributed to large variations in the size of spawning runs. The variations increase the difficulty of estimating the size of the region's total salmon population; these estimates are the basis upon which the Council determines how many fish may be harvested by each of the two states and the three user groups. Uncertainty over the estimates and how they will influence each year's allocation makes the livelihoods of fishermen and the area's recreational economy uncertain; it also increases tensions between the user groups.

As California's salmon resources dwindled during this century, the state gradually restricted their harvest in the state's rivers to recreational fishing only. An exception has been made for the Klamath area Indians, providing for their use of gill nets in the river, because of special rights accorded them. During the past 15 years, the courts have clarified the Indians' fishing rights throughout the nation, thus contributing to the legal basis upon which Native Americans claim their share of the Klamath basin's salmon resource.

These developments underscore the need for direct consultation between state or federal officials and the leaders of the indigenous Klamath area Indian communities in shaping the basin's fisheries restoration program. The restoration program will strengthen the regions fish stocks and provide greater certainty to the annual allocation process.

The Solutions

ACTION: The Legislature should adopt Senate Joint Resolution 43 and do all else in its

"The State must adopt an overall plan for the conservation and restoration of the salmon and steelhead trout fisheries..."

PHOTO: DEPARTMENT OF FISH AND GAME

power to restrain the U.S. Bureau of Reclamation from selling the 219,500 acre-feet of Trinity River water so obviously needed for restoration of the basins salmon and steelhead trout resources.

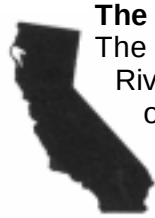
ACTION: The Department of Fish and Game should accelerate efforts to restore and maintain salmon and steelhead spawning gravels in the Trinity River below Lewiston; it should seek compensation for this purpose from the federal Central Valley Project because of the damage caused to the spawning grounds from stream flow reductions between 1 963 and 1981.

ACTION: The Department of Fish and Game should follow through on its commitment to full state funding for the congressionally-authorized Klamath River basin salmon and steelhead trout restoration program. This will assure success of the program and may encourage Congress to authorize similar federal efforts for other areas of need, including the Russian and Eel River basins.

ACTION: The Legislature and the Department of Fish and Game must recognize the legitimate rights of the indigenous Indian communities of the Klamath and Trinity rivers basin to be consulted directly concerning conservation and restoration of fish resources to which they have traditional harvesting rights.

Mattole River, South Fork Eel River, Lower Eel River, and Van Duzen River

The Setting



The lower Eel River and Mattole River basins are independent of one another, each with its own connection to the sea - but they adjoin each other and have similar salmon and steelhead trout conservation problems and prospects. The lower Eel rises in Mendocino County and includes the South Fork Eel River; they are joined by the Van Duzen River, which rises in Trinity County, at a point south of Fortuna (Humboldt County); from there they flow to the sea just down coast of Humboldt Bay.

The Mattole River meets the sea along California's Lost Coast, southwest of Eureka. Like the Eel, the watershed here has been heavily logged and severely grazed. Torrential rainfall on the soils exposed by these land uses has accelerated the area's naturally high erosion rate.

The Problems

The U.S. Fish and Wildlife Service estimated the Mattole River's salmon spawning potential in 1960 to be nearly 36,000 adult fish. Redd surveys and carcass counts conducted by watershed restoration workers since 1981 indicate that no more than a few

hundred spawning pairs of salmon now utilize the river. Steelhead were last introduced into the basin in 1982; augmentation of the silver salmon population has not been attempted since the 1930's. Restoration workers have, however, hatched, reared and released more than 1 50000 juvenile native king salmon each year since 1980.

In sharp contrast to the Mattole River's Lost Coast isolation, the South Fork Eel, lower Eel and Van Duzen rivers are paralleled by roads, including the busy Highway 101. Each fall and winter, they attract tens of thousands of anglers to communities that stretch from Garberville to Eureka. Angling makes a major contribution to the region's economy.

One chronic conservation problem in the lower Eel River involves the vulnerability of spawners to fishermen when stream flow is very low, as it was in the fall and winter of the drought years of 1986 and 1987. While it is awkward to change state fishing regulations once the season has started and fishing plans have been made, restoration of the Eel River's salmon resource requires a creative regulatory approach. The punch card" or report card system shows promise here; this method limits the number of fish an angler may take during the fishing season, as well as the traditional daily limit.

New incentives could help restoration

As elsewhere in the state, salmon and steelhead productivity in the Eel, Van Duzen and Mattole watersheds is diminished by the continuing destruction of stream side, or riparian vegetation. The Advisory Committee has made a number of recommendations that will assure that greater consideration is given to riparian values by logging operations on private land – which is the major use of the lands within these watersheds.

It will be challenging to find new ways to curb stream damage from livestock operations. Exclosures—fences that keep livestock from trampling streambeds and banks—are costly and deny animals unrestricted access to water. Their success in restoring stream conditions and fish populations has been well-demonstrated throughout the West. A state incentive program, similar to the California Forest Improvement Program, should be crafted to enable ranchers to participate more directly in salmon and steelhead restoration efforts.

The Solutions

ACTION: The Department of Fish and Game should analyze the vulnerability of salmon to fishermen especially in the lower Eel River during low stream flow periods. It should recommend regulatory alternatives to the Fish and Game Commission, including the report card program, which will assure appropriate protections for salmon and steelhead spawners against inappropriate harvest.

ACTION: The Legislature should expand the California Forest Improvement Program and other programs of watershed protection to encourage California ranchers to include stream protections and salmon and steelhead restoration projects in their rangeland management efforts.

"Stream protection provisions of the California Forest Practice Act must be strengthened..."

Upper Eel River Basin

The Setting

The upper Eel River basin is that portion of the watershed above the confluence of the main Eel River and the South Fork Eel River in Humboldt County.

The area's headwaters include's portions of Trinity, Glenn, Lake and Mendocino counties.

The Problems

The most critical problem for salmon and steelhead conservation and restoration in this watershed is the loss and degradation of stream habitat through soil erosion and sedimentation caused by poor land use practices associated with logging, grazing and road building. Stream flow characteristics have also been adversely modified by water diversions, severe vegetation removal and road building activities. The use of heavy road-building machinery near streams causes some degree of soil erosion and sedimentation. However, the substantial loss of stream side vegetation compounds this damage; riparian vegetation normally intercepts soil moving from surfaces next to or above streams and thus reduces sedimentation.

As with many fish screens in California, the one located at Pacific Gas and Electric Company's Van Arsdale Dam diversion to Potter Valley is dysfunctional and has been since its installation in 1972. In 1987, a new fish ladder was built over the dam. This will allow spawners to reach the area above the dam and more juvenile fish will die at the dysfunctional fish screen at the Potter Valley diversion. The Van Arsdale fish screen must be replaced; the project, for which public funds are being sought, may cost more than $2.5 million.

Gravel mining also frustrates salmon and steelhead conservation efforts in the upper Eel River watershed. The act of removing the gravel causes siltation; and taking the gravel itself can remove critical habitat needed for spawning. County governments should be encouraged to find safe sources of gravel and to develop local ordinances that help preserve instream salmon production opportunities.

A **watershed approach is needed**

Although the Eel River carries one of the world's highest sediment loads, **It** still has substantial fish resources and one of the highest potentials for restoration in the state.

The salmon and steelhead conservation and restoration opportunities in this watershed should be approached through a coordinated watershed-wide fishery management and restoration program. Local groups interested in fish restoration would be assisted by the creation of a watershed-wide entity to coordinate land and stream restoration efforts — an Eel River Watershed and Fishery Restoration Program.

This must include both public and private landowners, the U.S. Forest Service, the U.S. Bureau of Land Management, Native American tribal governments, the railroad and utility companies. Activities to address erosion and sedimentation will involve planting of upland areas to reduce runoff, which will then allow rehabilitation of riparian vegetation. To complement these efforts, specific riparian zone protections should be added to state laws and local ordinances. Drainage problems must be addressed and both the scope and enforcement of the Forest Practice Act should be improved.

The Solutions

ACTION: The basin subcommittee believes that an Eel River Watershed and Fishery Restoration Program should be established. It should regard the watershed as a "natural hatchery,' provide funding for restoration work, and encourage citizen-based projects to restore and monitor streams on an ongoing basis.

PHOTO: BUREAU OF RECLAMATION

Further marketing of Central Valley Project water from Folsom Dam threatens downstream steelhead fishing.

Sacramento River System

The Setting

The Sacramento River, its main tributaries—the Feather and American rivers—and 20 smaller tributaries, produce most of the salmon and a large percentage of the steelhead harvested in California. Water storage and diversion practices throughout the basin are steadily destroying the river habitat. Available spawning habitat has been reduced from 6,000 miles of river to just 300 miles! In order to maintain fish production numbers, there has been increasing dependency on the area's four state and federal salmon and steelhead hatcheries, a dependency that is dangerous.

The Problems

Thirty years ago, the Sacramento River basin supported four healthy and distinct spawning runs of king salmon, occurring in the fall, late fall, winter and spring. Since then, the late fall run has been eliminated. Spring-run salmon, once the dominant race throughout the Central Valley, survive only in scattered remnants. Winter-run numbers are so low these fish have been nominated for federal protection under the Endangered Species Act.

Only the fall-run king salmon of the Sacramento River basin has been maintained. Its survival is attributed both to its tolerance of warmer, low elevation stream habitats and to expensive state and federal hatchery programs.

Steelhead runs in the upper Sacramento

River averaged about 20,000 fish in the 1950's. By 1983, the count had fallen below 2,000 fish. Maintenance of steelhead populations now also depends on hatchery production — from Coleman, Feather River and Nimbus hatcheries.

Somehow, despite this bleak picture, the Sacramento River system still produces 70% of the salmon caught in California waters — about a half million fish. With more thoughtful water project operations, the elimination of fish-killing factors like unscreened irrigation diversions, optimization of remnant stream habitat and modernization of aging hatcheries, the harvest could be twice what it is today. This doubling would provide a statewide economic benefit of $150 million annually.

Fish-killing factors

When the federal Central Valley Projects Shasta and Keswick dams were completed in the early 1940's, they blocked the migration of salmon and steelhead spawners that had already traveled some 300 miles upstream from the Golden Gate. Even so, throughout the 1950's, the Sacramento River stream bed at Redding, just below the dams, was black with spawning salmon and steelhead.

This prolific spawning activity came to an abrupt halt in 1964, with completion of the Central Valley Project's Red Bluff diversion dam, located 40 miles below Redding. The fish ladders over this diversion dam do not work under most river flow conditions. Each year, spawners struggle, in vain, to reach the spawning grounds above the diversion dam. Eventually, they are forced to spawn in the poor habitat below this dam or perish during their futile efforts to pass it.

The Red Bluff diversion dam has destroyed over half the upper Sacramento River king salmon spawning run in the past 20 years

Irrigation customers pay a cheap price for water. The cost to the salmon and steelhead resources has been excessive. The loss to the fisheries is estimated to be 228,000 salmon, equal to half of the present $100 million statewide harvest. There is no reasonable explanation for the U.S. Bureau of Reclamation's failure to replace the Red Bluff diversion dam fish ladders.

The inexcusable waste of the fisheries resource continues sixty miles downstream. The Glenn-Colusa Irrigation District (GCID) draws of f one-fifth (20%) of the Sacramento River flow with its pumps — and kills at least one-fifth of the river's juvenile salmon and unknown numbers of steelhead in the process. Estimates of juvenile salmon killed at the dysfunctional fish screen in front of the pumps range from five million to twenty million fish a year. Even the lower estimate translates to an average annual harvest loss of 35,000 adult fish.

It is sad to note that the GCID's dysfunctional fish screens *kill* more salmon than are produced at the Coleman National Fish Hatchery, 100 miles upstream. Coleman hatchery production was intended to compensate for the loss of habitat due to the construction of Shasta and Keswick dams. Between them, the federal government's dysfunctional fish ladders at Red Bluff and the GCID's dysfunctional fish screen deprive Californians of *300,000 harvestable king salmon.*

Clearly, the disasters at Red Bluff and GCID must be resolved. This compounding

"The GCID's dysfunctional fish screens kill more salmon than are produced at the Coleman National Fish Hatchery 100 miles upstream..."

"Seventy-five percent of California's present instream salmon production and half of the state's remaining steelhead are now at risk because of inadequate stream flow provisions in the Sacramento-San Joaquin rivers Delta and the Trinity River..."

of losses to water storage and water diversions accounts for tremendous annual losses and the continued decline of naturally spawning salmon and steelhead in the Sacramento River Basin.

A troubled future for watershed's salmon and steelhead

There is no doubt that water development projects have caused the severe decline of salmon and steelhead trout in this river basin since World War II. Further exploitation of the area's stream resources, particularly by the federal Central Valley Project, threatens to destroy the natural spawning populations of both species altogether.

The large Shasta and Folsom storage reservoirs, and the state's reservoir at Oroville, trap the early spring flows that juvenile fish need for their downstream migration to the sea. The stored water is delivered in the summer to the projects' irrigation customers. The pools that remain behind the dams in October, when spawning begins, retain summer heat.

As the U.S. Bureau of Reclamation continues to promote the sale of water from its reservoirs — it claims to have an annual average 1 .1 million acre-feet not yet sold — the drawdown and warming problem for salmon and steelhead becomes more severe. Even in poor rainfall years, like 1987 and 1988, the Bureau's irrigation customers are guaranteed all the water they want, while fish protection flows are cut to "dry year" minimums as early as April. The fall 1987 stream temperatures in the upper Sacramento and American rivers below the federal Central Valley Project reservoirs were lethal for salmon and their spawn.

Controlling spring flows by holding them in federal reservoirs has had an additional impact on fish life. The reduction of flood dangers along the river has made it possible for adjacent landowners to crowd their homes and orchards to the river's edge. These landowners have recently revived a U.S. Army Corps of Engineers plan to blanket the streambanks between Red Bluff and Chico with rock rip-rap to prevent bank erosion.

The construction of Shasta Dam blocked the natural movement of river gravels, so most of the replacement spawning gravel now comes from the erosion of banks downstream. The rip-rapping would starve the river of essential gravel and contribute further to the decline of the Sacramento River's natural spawning populations.

Whether hatchery or natural stock, salmon and steelhead have much to overcome on the downstream migration. If they reach Sacramento, they still must pass through the Delta to reach the sea. The rate at which they survive this passage depends upon the amount of stream flow that is available to sweep them past the state and federal project pumping plants to the safety of San Francisco Bay.

State and federal fishery scientists testified at the 1987 state Bay-Delta water rights hearings that the amount of stream flow allocated

for fish by the State Water Resources Control Board (SWRCB) is too low. The standard set ten years ago for future springtime migrations of juvenile salmon through the Delta was miscalculated by more than 50%. The SWRCB must allocate adequate stream flow for the Sacramento River's fall run king salmon. *These fish are the mainstay of the state's fisheries; without adequate flows, the resource will collapse!*

Hatcheries need work

Presently, the basin's four state and federal salmon and steelhead hatcheries are sustaining the Sacramento's fishery resource. Together, they produce 44 million fingerlings, sub-yearling- and yearling-sized fish. With proper maintenance and modest improvements, their production could be increased to 74 million fish.

Of the four facilities, the most in need is the Coleman National Fish Hatchery. It was built to offset the loss of natural salmon and steelhead habitat to the construction of Shasta and Keswick dams by the U.S. Bureau of Reclamation. However, throughout its 43-year history, it has produced only one-third (33%) of the fish the Bureau is obligated to replace. Several million dollars are needed for restoration but have not been provided by the Department of Interior. It has also succeeded in transferring responsibility for the hatchery to the U.S. Fish and Wildlife Service: the Services plea for funds has yielded meager results.

The Solutions

ACTION: The U.S. Army Corps of Engineers rip-rapping scheme should be abandoned; zoning should be adopted to set development back from the river edge so that natural channel changes may continue to occur.

NOTE: Many recommendations concerning the Sacramento River are presented in Section One.

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Marin, Sonoma, and Mendocino Coastal Streams

The Setting

The streams of California's north central coast, from the Golden Gate north through Mendocino County, tend to be short and steep. Only a few—Lagunitas Creek and the Russian, Gualala. Garcia, Navarro, Albion, Big and Noyo rivers—have extensive estuaries. Nearly all of the streams have year-round flow which, if water temperatures were cooler, could still produce silver salmon and steelhead trout at near-historic levels.

The Problems

This entire region has been logged repeat

Logging debris blocks spawning runs in some Mendocino County streams.

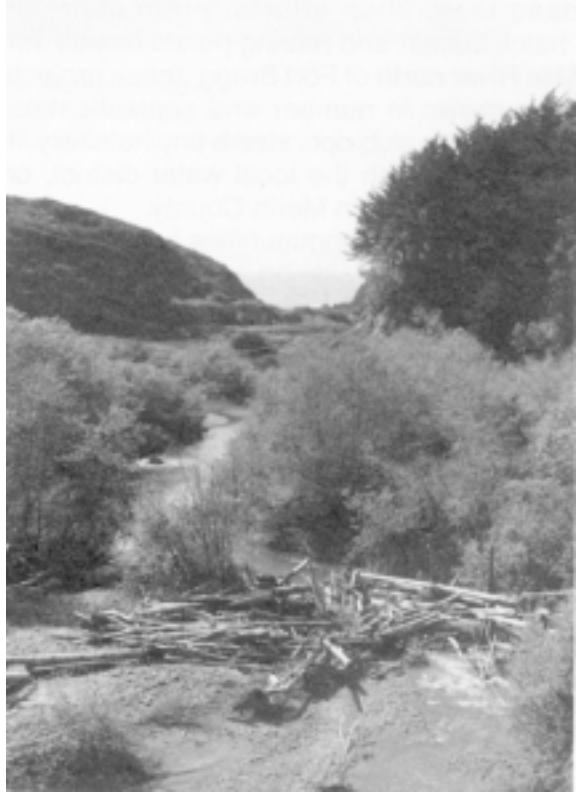

PHOTO: THE CENTER FOR EDUCATION AND MANPOWER RESOURCES

edly for a century. The use of tractors for logging during the past three decades had a particularly devastating effect for the fish of these coastal streams. Department of Fish and Game surveys found silver salmon in virtually every coastal stream in Mendocino County in the mid 1950's. A recent survey of 70 of these streams found silver salmon in just 20—and only at remnant levels.

The salmon and steelhead trout native to this region of summer fogs and winter rain are accustomed to cool water temperatures. The removal of the redwood and fir forest cover, as well as the destruction of willows, alders and other stream side vegetation, leaves stream flows exposed to warming and evaporation. Corridors along these coastal streams and their tributaries must be allowed to revegetate as part of the region's salmon and steelhead restoration plan.

The communities along California's north central coast were the pioneers of the states low-cost, citizen-based salmon and steelhead restoration efforts. From instream 'hatch boxes" and rearing ponds beside Ten Mile River north of Fort Bragg, these projects have grown in number and sophistication. One angling club operates a tiny hatchery, in cooperation with the local water district, on Lagunitas Creek in Mann County.

These coastal communities have been involved with both salmon and steelhead restoration and commercial timber management issues. Because of this, the citizens are particularly sensitive to the effect of defoliants on young fish. In this case, defoliants are chemicals sprayed from the air to kill leafy vegetation to increase tree growth. Debate over jurisdiction for the control of spraying, whether by the state or counties, raged between the coastal counties and the Capitol for nearly a decade. Five years ago, the Legislature stripped local governments of any ability to regulate forestry chemicals.

While the debate has diminished, the risk to juvenile salmon and steelhead remains. The U.S. Forest Service spraying programs, dormant in recent years, will resume following completion of expanded environmental documentation. Private timberland managers have, meanwhile, adopted new spray products. The effects of these products on juvenile salmonids must be explored before their use is expanded significantly.

The Solutions

ACTION: The Department of Fish and Game should anticipate an expansion in aerial application of forest pesticides and arrange for increased laboratory and field testing of their effects on juvenile salmonids. Failure to do so could jeopardize local salmon and steelhead restoration efforts.

Russian River

The Setting

The Russian River rises from the slopes of the Coast Range mountains two hours north of San Francisco and flows to the sea at Jenner on the Sonoma coast. The river has been augmented by diversions from the upper Eel River for a hydroelectric project since 1909. The Russian River once provided nearly 700 miles of salmon and steelhead habitat and as recently as 1970, supported a steelhead spawning run of 65,000 fish.

Historically, the Russian River was one of the finest steelhead streams *in the world.* The river's salmon resources have been reduced

"Historically, the Russian River was one of the finest steelhead streams in the world..."

At Healdsburg, young salmon and steelhead are forced to plunge through the narrow opening in Sonoma County's dam, only to strike the concrete sill below

to remnants; steelhead numbers have decreased severely from historic levels.

The Problems

As with other areas of the state, the Russian River's salmon and steelhead resources have suffered from blockage to spawning migrations, inadequate water flows and reduced water quality. This is precisely what resulted from the development of Coyote Valley Dam during the 1950's. A mitigation hatchery built at the Warm Springs Dam is attempting to reestablish the region's salmon and steelhead production. Despite Corps of Engineers' promises to fund mitigation for the loss of 4,000 steelhead spawners to Coyote Valley Dam, it has balked at the Department of Fish and Game's mitigation plans. No money has yet been provided.

Water diversions from the Russian River and its tributaries are increasing with the region's increasing urban and suburban development. Many of these diversions are being made without permission from the State Water Resources Control Board. The Board should declare a moratorium on new diversions from the Russian River basin until the Department of Fish and Game can complete an instream flow requirement study of the sort sought in AB 723. The Board should use the results of the study to act against illegal diversions and to guide the allocation of any water available for use.

A recreation dam constructed by Sonoma

County at Healdsburg in 1953 has hampered fish passage there. While downstream migrants have been harmed from the start, erosion at the base of the dam is now hindering upstream spawning migrations—even when the dam's flash boards are removed. Fish conservationists have sued the county to force repair of the dam; Sonoma County has resisted. The Department of Fish and Game (DFG) is concerned that while the issue is being tried in the courts, fish restoration efforts in the area will be frustrated. Consequently, the DFG has requested funds in 1988 to repair the dam and will seek reimbursement from the county after the repairs are made.

Gravel mining threatens fish

The Russian River's proximity to large urban populations makes the river an excellent candidate for restoration. Salmon and steelhead trout resources could contribute significantly to the area's recreation economy. Unfortunately, this closeness to urban areas also makes the river a prime target for gravel extraction. The spawning gravels within the basin must be given the same protections as other prime spawning areas of the state. The Department of Fish and Game should assist Advisory Committee representatives in identifying key spawning reaches so they can be added to Fish and Game Code Section 1505, placing them under the control of the Director of the Department of Fish and Game.

Legislation has been introduced in Congress — House of Representatives Bill 2513, by Mr. Bosco — which would authorize a two-year, $3 million study of the fishery resources of the Russian River and their habitat needs. The study would be conducted by the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers and the California Department of Fish and Game. Given the Corps' direct involvement in the decline of the area's salmonid fish, it is highly appropriate that it be a full partner in shaping a restoration plan.

The Solutions

ACTION: The U.S. Army Corps of Engineers should be directed to make good on its commitment to fund production of juvenile steelhead trout (the amount specified by the DFG is 40,000 pounds a year) to mitigate the loss of upstream spawning habitat to the construction of Coyote Valley Dam.

ACTION: The Department of Fish and Game should urge the State Water Resources Control Board to place a moratorium on further water diversions throughout the Russian River basin until such time as the instream flow requirements of salmon and steelhead have been determined and assured. The Board should act to curb illegal water diversions in the basin immediately.

ACTION: The Legislature should fund repairs to Sonoma County's Healdsburg Dam on an urgency basis; this support should be offered with the understanding that the Department of Fish and Game should recover the county's fair share of the expenses.

ACTION: The Department of Fish and Game should identify the salmon and steelhead spawning reaches of each stream in the Russian River basin; the Legislature should add these areas to Fish and Game Code Section 1505.

ACTION: The Legislature and the Department of Fish and Game should support enactment of H.R. 2513, the proposed state-federal joint study of the fishery resources of the Russian River.

San Francisco Bay Streams

The Setting

There are 57 major rivers and creeks that enter San Francisco Bay, not counting the Sacramento and San Joaquin rivers. Those 57 are fed, in turn, by 106 smaller streams. Virtually all of these streams historically supported spawning runs of salmon and steelhead trout. Today, only a few of them are capable of providing the needed spawning or rearing habitat.

Salmon and steelhead still enter and spawn in the Napa and Petaluma rivers, Sonoma Creek, Corte Madera Creek, Walnut and Wildcat creeks, Alameda Creek, the Guadalupe River and San Francisquito Creek.

The Problems

Bay area rivers and creeks have benefitted from several citizen restoration projects. These projects deserve continued support and encouragement from the Department of Fish and Game. It is not likely that the remaining salmon or steelhead streams in the area could be restored to support traditional fishing pressure. These streams can, however, act as preserves or outdoor classrooms – special places where the effects of development have been reversed enough to provide a glimpse of unspoiled nature.

Each stream has its own problems and opportunities. Wildcat Creek in Richmond, for example, exists only because its neighbors refused to accept a conventional flood control channelization project. Controversy over the Wildcat Creek project helped educate engineers and laypersons alike, to the physical, fiscal and social advantages of non-structural solutions to flood problems. Had the Wildcat Creek lesson come earlier, there would undoubtedly be many more productive salmon and steelhead streams in urban California.

Alameda Creek has strong restoration potential because its stream flow, which has been exploited, can be augmented with State Water Project supplies en route from the Delta to urban Project customers. Such "conjunctive" water use opportunities abound in California; they can contribute substantially to the statewide salmon and steelhead restoration program.

The California Department of Water Resources conducts a very popular, albeit modest, program of financial assistance to community groups engaged in the restoration of urban streams. There is enormous potential here; there is also much value in teaching the public about the advantages of low-cost, socially beneficial, non-structural solutions to community flooding problems. The Department's program can provide major benefits to the state over time and should surely be expanded.

The Solutions

ACTION: The Legislature should expand the Department of Water Resources' urban creeks restoration program. The program is complimentary to the restoration program outlined in SB 2261.

San Joaquin River Basin

The Setting

The San Joaquin River system flows from south to north, ending at the Delta where it joins the Sacramento River. This basin includes the watersheds of the Kern, Tule, Kaweah, Kings, Merced, Tuolumne, Stanislaus, Mokelumne and Cosumnes rivers.

Located at the southern end of the drainage, the Kern, Tule, Kaweah and Kings rivers only connect with the San Joaquin during extremely wet years. The federal dam built at Friant during the 1940's stopped spawning migrations and dewatered the San Joaquin River for a downstream distance of 50 miles —thus eliminating salmon and steelhead

PHOTO: BUREAU OF RECLAMATION

With proper stream flow. the three main San Joaquin tributaries could accommodate 85,000 natural

production there. Much further to the north, the Cosumnes and Mokelumne rivers join the San Joaquin downstream of Stockton, but only after the river has entered the Sacramento-San Joaquin rivers Delta.

Salmon and steelhead production on the San Joaquin River system is focused on 1) the Merced, Tuolumne and Stanislaus rivers and 2) the San Joaquin's main stem, from the junction of the Merced River downstream to Stockton.

The Problems

At one time, king salmon spawning runs in the San Joaquin drainage approached 300,000; this was comprised, in large part, of spring-run fish that migrated to the cool, upper elevation reaches of the drainage. The development of high-elevation dams on the Merced, Tuolumne and Stanislaus rivers, prior to 1940, blocked these annual upstream migrations and reduced the estimated average basin-wide spawning run to 150000 fish.

The construction of storage reservoirs al the lower elevations has blocked spawning migrations further; the few salmon that remain are fall-run fish. There are a few steelhead remaining in the Stanislaus River, as well.

The federal Friant Dam has severely reduced stream flow to the main San Joaquin River at a point 20 miles northeast of Fresno since 1946. A significant spawning population was lost. To date, no stream flow provisions have been made for any fish life below Friant Dam. The only time there is adequate stream flow is during very wet winters.

Despite these serious alterations in stream f low, there is usually adequate late-fall flows to lead spawners to their Merced, Tuolumne and Stanislaus home streams. Unfortunately, the water conditions for the rearing

"King salmon runs on the San Joaquin River have dropped by 90% and a similar decrease has occurred on the Trinity River in the last 20 years..."

and downstream migration of young fish are poor in these home stream areas. As a result, fish survival is poor.

Good gravels but inadequate flows on the Merced, Tuolumne and Stanislaus

Historically, these three rivers enjoyed abundant salmon spawning activity. The dewatering of the rivers in the San Joaquin system has led to an ongoing decline in spawning activity. For instance, spawning runs on the Tuolumne averaged just 5,400 fish during the 1970's. Spawning on the Stanislaus averaged just 3,100 fish for the same period. The Merced's *average* during the 1 960's was truly dismal, a mere 240 fish.

Each of these rivers, however, *could* support strong spawning runs. The Tuolumne has adequate spawning gravels to support 40,000 adults, the Stanislaus, 20,000 and the Merced, 25,000. What accounts for the difference between capacity and the disappointing annual averages? Simply, the availability of adequate stream flow at critical times for spawning, hatching, rearing and outmigration.

In 1984, 12,000 spawners were counted on the Stanislaus. In 1985, the Merced's fall run totaled 25,500 fish. The same year, a run of 39,000 fish was observed on the Tuolumne. In all three cases, heavy spring rains or snowmelt during 1982 and 1983 made for high juvenile survival on the downstream migration — such high survival rates that record numbers returned to spawn in 1984 and 1985. The Merced River's increase was likely boosted by the production from the Department of Fish and Game's Merced Fish Facility, as well,

When combined, the natural salmon spawning potential of these three important rivers is 85,000 fish a year. If adequate rearing and outmigration flows are provided, 85,000 spawners could contribute 1 70,000 fish to the sport and commercial salmon harvests. *This would represent an 850% increase over the 1970's production levels.*

Maintaining adequate stream flow for fish

These figures do nothing more than demonstrate what is possible given adequate flows. Salmon and steelhead cannot depend on a few extremely wet years. Changes must be made in both state and federal water project programs to provide adequate and predictable flows for fish.

Changes must occur at the New Don Pedro reservoir on the Tuolumne River, for example. The existing federal power license there requires that from 64,000 to 123,000 acre-feet of water should be provided for fish conservation. The exact amount depends on the dryness of the years. The irrigation district has recently applied for a license amendment. This triggered a request from the Department of Fish and Game for improvements in the fishery stream flow delivery schedule. Here, as elsewhere in the San Joaquin basin, there is too little stream flow for late-winter rearing and for springtime downstream migrations. This type of intervention by the Department of Fish and Game is crucial if fish survival is to be increased in this area.

Similar requests for stream flow are being made on the Stanislaus River. When it reauthorized construction of the New Melones Dam, Congress reserved 69,000 to 98,000 acre-feet of water each year for conservation of downstream fish life. In 1972, the Department of Fish and Game reported to the State Water Resources Control Board a need for approximately 300000 acre-feet for salmon production on the Stanislaus River. The Board ruled, at that time, that more research was needed to verify this claim.

In 1987, the DFG and the U.S. Bureau of Reclamation, which sells the water from New Melones reservoir, agreed to conduct a seven-year study to determine precisely how much water is needed to optimize salmon production on the Stanislaus. Fish conservationists have noted that the initial state-federal agreement did not consider the needs of the river's steelhead trout; consequently. they have petitioned the State Water Re-

sources Control Board to reconsider relying on this agreement as a basis for water rights decision-making on the river.

Inadequate flows and pumps trouble the Lower San Joaquin River

Most of the stream flow that escapes the numerous diversions upstream is drawn from the lower San Joaquin River. It moves, via Old River. to the federal Central Valley Project pumps near Tracy. Old River is, literally, an historic channel of the San Joaquin. Ocean-bound salmon and steelhead juveniles are sucked along with the water to the pumps. where they die. As the amount of water drawn to the pumps increases, so does the mortality rate of young salmon and steelhead.

The Department of Fish and Game estimates that *up to* 96% of the fall-run king salmon juveniles born in the San Joaquin River watershed are lost to federal and State Water Project pumping in the Delta, It is imperative that efforts to conserve salmon and steelhead in the San Joaquin River basin include the restoration of stream flow in the lower river to allow safe downstream passage of young fish.

The Department of Fish and Game made vigorous recommendations at the 1987 Bay-Delta water hearings for enough stream flow to allow juveniles to pass the pumps. It also advised that a gate or some other device be constructed and operated at the Old River diversion during peak migration periods. If recovery of salmon and steelhead trout resources is to become a reality in this watershed, the state must adopt these recommendations.

The Solutions

ACTION: The State Water Resources Control Board has the power to restore the salmon and steelhead resources of the San Joaquin River basin. It should do all of the following:

- Adopt an interim moratorium on further allocation of stream flow in the basin;
- Complete its inventory of the unappropriated water resources in the basin;
- With assistance from the Department of Fish and Game, determine the stream flow and water quality conditions necessary for young salmonids to move safely from their home streams to the western Delta;
- Direct the major water rights holders to cooperate in determining how to reorganize water use through exchanges, conjunctive use opportunities and modification of state and federal projects; and
- Place enforceable fish conservation conditions on those water permits and licenses which now lack them, including the operations of the federal Friant Dam. (Many of the original water sales contracts for Friant water will terminate in 1990. It is appropriate, now, to include Friant operations in the search for water needed to assure juvenile salmon safe passage to the Delta.)

NOTE: Many recommendations affecting the San Joaquin River Basin are presented in Section One.

Central and South Coast Streams

The Setting

This region encompasses California's coast south of San Francisco Bay. Silver salmon historically spawned in California's coastal streams as far south as Monterey Bay. *Steelhead trout once ranged as far south as Mexico.* The exploitation of these coastal streams for irrigation and domestic water supplies has severely reduced the number that still support annual salmon and steelhead spawning runs. One of the largest annual steelhead runs in the area is found on the Carmel River – a run of nearly 2,000 spawners. This spawning population survives from a run of **20,000 fish some** sixty years ago.

The Problems

Urbanization of this coastal area and the

PHOTO: JERRY SMITH

Artificial sandbar breaching at coastal lagoons kills young fish.

use of streams for domestic water supplies and irrigation are the reasons behind the fishery resource decline here. As with the San Francisco Bay area, the scattered salmon and steelhead runs of the south and central coast have attracted significant public concern and restoration effort. Despite the remnant size of these populations, restoration projects are underway in the Monterey Bay streams, Carmel River, San Luis Obispo Creek, Santa Ynez River, Gaviota Creek and even Malibu Creek in urban Los Angeles County. There are many more streams, as far south as the Santa Margarita River in San Diego County, where salmonid populations can be restored.

The public enthusiasm for stream and fish restoration in these and other California watersheds reveals a poignant part of human nature: things are frequently prized more fully when they are lost or nearly lost. The energy that citizens have generously given to the care of Malibu Creek's handful of steelhead spawners is as great as though it were a run of 20,000. The absolute number may matter less than its relationship to the setting. This "scarcity value' was recognized by the State Water Resources Control Board in its 1987 decision ordering the restoration of the remnant steelhead trout resource of the Santa Clara River in Ventura County.

Breaching sand bars at lagoons a problem

It appears that some coastal steelhead populations have been able to survive because of their ability to adapt to unusual stream conditions. Steelhead survive surprisingly high water temperatures in some of the coastal lagoons. These lagoons form when there is not sufficient stream flow to keep the mouth of the stream open to the sea. Stream flow is reduced by upstream diversions.

Ironically—and tragically—hardy steelhead that have managed to adapt to these high lagoon temperatures often face an additional lethal assault Coastal landowners or local agency officials open lagoons by bulldozing the sandbars when water levels threaten to flood nearby crops and developments. The lagoon may hold an entire year's crop of juvenile steelhead, or even steelhead from a prior brood year. The sudden exposure to the sea has a catastrophic, fatal effect on these fish. Sections 1600 through 1603 of the Fish and Game Code prohibit altering lagoons without the permission of the state. These codes should be strengthened and the DFG must be more consistent in its enforcement of these provisions.

The Solutions

ACTION: The Director of the Department of Fish and Game should take steps to assure that Fish and Game Code Sections 1600 through 1603 are being fully enforced to assure that lagoon-locked fish remain safe from unauthorized sandbar alteration.

CONCLUSION

California's salmon and steelhead trout resources are clearly at a crucial crossroad. Official statistics reflect a dismal record of habitat destruction and dwindling fish numbers.

Salmon and steelhead trout resources suffered deeply as California emerged from her frontier days and plunged into full-scale growth and development during the twentieth century.

There is little doubt, now, that the water and land use policies and practices so helpful in exploiting the state's water and land resource wealth, have unwittingly depleted the state's once-abundant anadromous fisheries resources.

The Advisory Committee was asked to investigate the causes of the decline and to develop ways to begin the healing process. It has sought information and guidance from agencies and individuals, anglers, commercial fishermen and lawmakers, fisheries professionals and volunteers. Many of these Californians have been actively involved in developing stream restoration projects, drafting protective laws and informing the public about the condition of these fisheries. Their efforts offer hope and show that recovery is possible. *But the time for swift and decisive action is now.*

Salmon and steelhead trout have reached a critical moment in their 100 million years of evolution in this state. Such an ailing resource cannot indefinitely survive the onslaught of 'relentless environmental change." If the salmon and steelhead trout resources are to sustain us, and the generations to come, we must proceed with intelligence and conviction. We must act to restore the balance now.

Salmon and steelhead stream with adequate flow, cool water, spawning riffles – a balanced ecosystem.

PHOTO: BUREAU OF RECLAMATION

APPENDICES

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PLEASE NOTE: The first seven publications are available from the California Legislature, Joint Publications Office, *State* Capitol, Box 942849, Sacramento CA, 94249-0001.

When ordering, please add 6% sales tax. Make checks payable to STATE OF CALIFORNIA. Use the document reference number when making your request.

The last publication is available from Wildland Resource Center, address listed above.

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