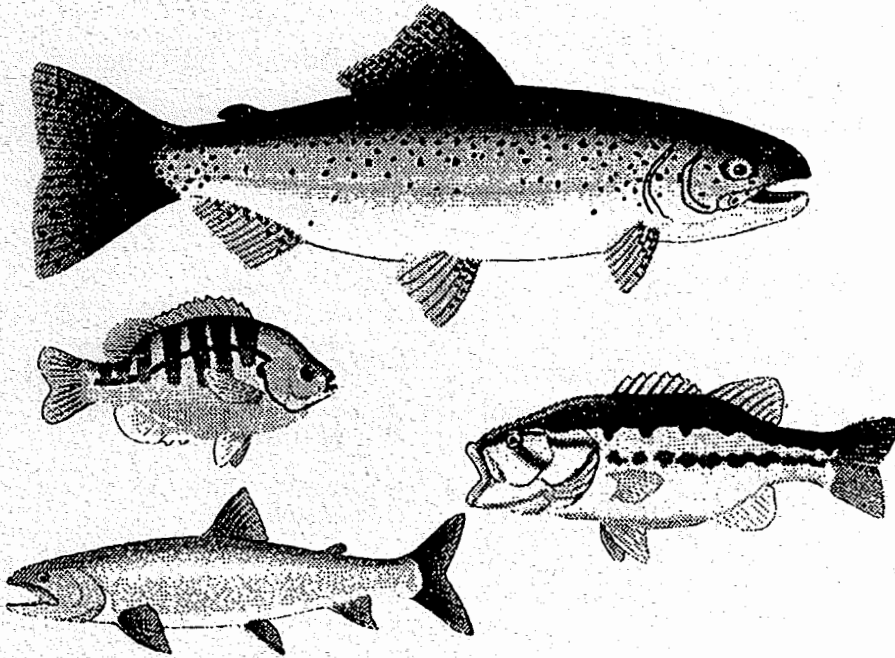


AMERICAN FISHERIES SOCIETY

California-Nevada Chapter



CONSENSUS BUILDING IN RESOURCE MANAGEMENT

February 3 and 4, 1995

Napa Valley Marriott
Napa, California

1995 PROGRAM COMMITTEE

Program Coordinator	Ed Bianchi
Friday General Session	Lesla Meng, Patrick Wright
Saturday General Session	Susan Ellis
Technical Session 1	Dan Howard, Ed Ueber
Technical Session 2	Lesla Meng
Technical Session 3	Dave Lentz
Technical Session 4	Mary Coburn
Technical Session 5	Larry Brown
Technical Session 6	Wayne Lifton
Exhibits/Photography Contest	Bob Reavis
Local Arrangements	Ed Bianchi
Raffle	Nick Villa, Alan Pickard

REGISTRATION

All attendees must register. Registration fees are \$75 for AFS members, \$100 for non-members, \$40 for students. Banquet tickets are \$35.

GENERAL INFORMATION

AFS WINE TASTING RECEPTION AND BANQUET

The banquet will be held at the Marriott on Friday beginning at 7:00 p.m. The banquet will be followed by the raffle.

5:30 - 7:00	Wine Tasting Reception
7:00	Dinner Banquet/Raffle Speaker: John McCosker, California Academy of Sciences - The Natural and Unnatural History of White Sharks

EXHIBITS

Commercial exhibits are in the foyer.

CAL-NEVA BUSINESS MEETING

The annual business meeting will begin promptly at 12:00 noon on Friday at the Marriott.

CALIFORNIA-NEVADA CHAPTER 1995 EXECUTIVE COMMITTEE

OFFICERS

President
President-Elect
Past President
Secretary
Treasurer

Susan Ellis
Ed Bianchi
Jennifer Nielsen
Lesa Meng
Ed Cheslak

COMMITTEES

Awards
Policy and Resolutions
Bylaws and Nominations
Membership
Conservation
Continuing Education
Finance
Exhibits
Sacramento Subunit
Pisces Editor

Kevan Urquhart
Dave Lentz
Wayne Lifton
Jean Baldrige
Dennis McEwan
Kathy Hieb
Gene Geary
Bob Reavis
Lesa Meng
Alan Baracco

FRIDAY MORNING

GENERAL SESSION

- 8:30 - 9:00** **Introductory Remarks**
- 9:00 - 10:00** **Keynote Address - Robert Hansen, Tulare Lake -
Phantom in the Desert**
- 10:00 - 10:15** **Break**
- 10:15 - 12:00** **Plenary Session: Perspectives on Consensus Building
in Resource Management**
Chair: Lesa Meng, USFWS
Moderator: Patrick Wright, EPA
Panel:
Cay Goude, USFWS, Sacramento, CA - Federal
Perspective;
David Behar, Bay Institute, San Rafael, CA -
Environmental Group Perspective;
Edward Huntley, Dept. of Water Resources, Sacramento,
CA - State Perspective

FRIDAY AFTERNOON
TECHNICAL SESSION 1

MARINE SESSION

**CO-CHAIRERD, ED UEBER AND DAN HOWARD,
GULF OF THE FARALLONES AND CORDELL BANK
NATIONAL MARINE SANCTUARIES**

1:30 Introduction - Ed Ueber, Gulf of the Farallones National Marine Sanctuary

1:45 Oil Drilling, Shipping, Spilling and Cleanup. Building Consensus in Oil Development and Transportation on the California Coast - Warner Chabot, Center for Marine Conservation

2:15 The Partners in Flight Initiative: A Coalition for Bird Conservation - Dan Evans, Point Reyes Bird Observatory

2:45 Community Involvement in Environmental Planning - Mia Monroe, Muir Woods National Monument

3:15-3:30 Break

3:30 Regional-Scale Seafloor Mapping and Characterization: Application to Fisheries Resource Management - Herman Karl, U.S. Geological Survey

4:00 An Overview of the Sacramento Winter Run Captive Broodstock Program: A Multi-Agency Effort - David White, Bodega Marine Laboratory/Steinhart Aquarium, California Academy of Sciences

4:30 Qualitative Issues in the Conservation Biology of Pacific Salmonids: Education at all Levels - Paul Siri, Bodega Marine Laboratory, University of California at Davis

FRIDAY AFTERNOON
TECHNICAL SESSION 2

CONSENSUS BUILDING ON DELTA ISSUES

**CHAIR, LESA MENG, USFWS, SACRAMENTO,
CALIFORNIA**

1:30 Allozyme analysis of delta smelt and wakasagi, and potential effects of inland silversides on delta smelt from the Sacramento-San Joaquin Estuary - Peter Moyle and Bill Bennett, U.C. Davis.

1:50 Monitoring of delta smelt (*Hypomesus transpacificus*) in the Sacramento-San Joaquin Estuary: Recent findings and the use of monitoring as a tool for water management - Dale Sweetnam, CDFG, Stockton

2:10 Smelt distribution and abundance in San Francisco Bay in relation to hydraulic processes - Bruce Herbold, USEPA, San Francisco

2:30 The ethics of splittail - Lesa Meng, USFWS, Sacramento

2:50-3:30 Break

3:30 Interactions between two estuarine gobies, the endangered tidewater goby, *Eucyclogobius newberryi*, and the exotic shimofuri goby, *Tridentiger bifasciatus*, a recent Delta invader - Ramona Swenson, U.C. Berkeley and Scott Matern, U.C. Davis

3:50 Temperature tolerance and swimming ability of Sacramento splittail - Joe Cech and Cincin Young, U.C. Davis

4:10 Salinity and dissolved oxygen tolerance of young-of-the-year and juvenile Sacramento splittail - Cincin Young and Joe Cech, U.C. Davis

4:30 Habitat requirements and management guidelines for the delta smelt - Tina Swanson and Joe Cech, U.C. Davis

FRIDAY AFTERNOON
TECHNICAL SESSION 3

**CONSENSUS BUILDING IN FRESHWATER
RESOURCE MANAGEMENT**

**CHAIR, DAVE LENTZ, CALIFORNIA DEPARTMENT
OF FISH AND GAME, RANCHO CORDOVA,
CALIFORNIA**

**1:30 Consensus on the Forks of the Walker: Contrasting
Experiences - Steve Parmenter, California Dept. Fish and Game, Bishop, CA**

**1:50 Beyond the Red Queen: A Cooperative Approach to Preserving
Species in the Owens River Basin - Betsy Bolster, California Dept. Fish and
Game, Rancho Cordova, CA**

**2:10 Management of Black and Blue Shiners (*Notemmywatch nimbyi*)
and Red Herrings (*Falsus issueii*) and Their Relationship to the
Performance of Stream Restoration Projects - Thomas L. Taylor, Trihey and
Associates, Walnut Creek, CA**

**2:30 Building Cooperative Watershed Partnerships on the North
Coast - Scott Downie, California Dept. Fish and Game, Redway, CA**

3:00 Break

**3:15 Native and Introduced Stream Fishes on the San Joaquin Valley
Floor - Their Relation to Quality of Water and Habitat - Larry Brown,
U.S. Geological Survey, Sacramento, CA**

**3:35 Quantifying Optimal Salinity Habitat in the Sacramento-San
Joaquin Delta Estuary - Phil Unger, Jones and Stokes Associates, Sacramento,
CA**

**3:55 The Distribution and Abundance of Fishes in the Tributaries of
Goose Lake, Modoc County, CA - Steven Hendricks, California Dept. Fish
and Game, Rancho Cordova, CA**

SATURDAY MORNING

GENERAL SESSION

FACILITATED WORKSHOP - BUILDING A COMMON AGENDA FOR THE FUTURE

- | | |
|----------------------|---|
| 8:00 - 8:15 | Introductory Remarks - Susan Ellis, President, Cal-Neva Chapter |
| 8:15 - 8:45 | The Fisheries Action Network - What It Means to the Chapter - Dale Burkett |
| 8:45 - 9:00 | Instructions for Facilitated Workshop - Dale Burkett |
| 9:00 - 9:45 | Break in Working Groups to Identify Issues:
Identification of Key Watersheds
Reauthorization of the Endangered Species Act
The CVPIA |
| 9:45 - 10:00 | Break |
| 10:00 - 12:00 | Select Action Items for Chapter |

SATURDAY AFTERNOON
TECHNICAL SESSION 5

CALIFORNIA COHO SALMON

**CHAIR, LARRY R. BROWN, USGS, SACRAMENTO,
CALIFORNIA**

1:15 Historical Decline and Current Status of California Coho Salmon - Larry R. Brown, Peter B. Moyle, and Ronald M. Yoshiyama, Dept. of Wildlife and Fisheries Biology, University of California, Davis, CA

1:50 California Coho Salmon (*Oncorhynchus kisutch*) Evolutionarily Significant Units (ESUs) - Greg Bryant, NMFS, Eureka, CA

2:25 Behavioral Genetics & Life History Strategies in Coho Salmon - Jennifer Nielsen, USFS, Hopkins Marine Station, Stanford University, Pacific Grove, CA

3:00-3:15 Break

3:15 Stochastic Decline of Coho Salmon at the Southern End of Their Range - Jerry. J. Smith, Dept. of Biological Sciences, San Jose State University, San Jose, CA

3:50 What Do Trinity River Hatchery Coho Salmon and Snow White Have in Common? - Alan Baracco, CDFG, Rancho Cordova, CA

4:25 Recent Management Actions and Plans for California Coho Salmon - Tim Curtis, CDFG, Sacramento, CA

SATURDAY AFTERNOON

TECHNICAL SESSION 6

CONTRIBUTED PAPERS

CHAIR, WAYNE LIFTON, ENTRIX INC., WALNUT CREEK, CALIFORNIA

1:15 Relationships Between Trout Populations and WUA in Streams with Other Limiting Factors - Thomas K. Studley, Pacific Gas and Electric Company; Jean Baldrige, Trihey and Associates; and Steve Railsback, Lang and Railsback

1:40 Investigation of the Effect of Habitat Availability, Cover and Shear Zones on the Microhabitat Selection of Rainbow and Brown Trout in Three Central Sierra Streams - Lawrence M. Wise Jr. and Wayne S. Lifton, Entrix, Inc.

2:05 Simulating the Effects of Alternative Temperature and Flow Regimes on Stream Resident Populations of Brown and Rainbow Trout: Linking PHABSIM and Individual-Based Modeling - Webb Van Winkle, Yetta Jager, and Brady Holcomb, Oak Ridge National Laboratory, Oak Ridge, TN; Steve Railsback and Tom Studley, Pacific Gas and Electric Company, San Ramon, CA; Jean Baldrige, Trihey & Associates, Concord, CA

2:30 Selecting Habitat Suitability Criteria for Rainbow and Brown Trout in California - Dave Hanson, EA Engineering, and Tom Lambert, Pacific Gas and Electric Company

3:00-3:15 Break

3:15 Pilot Monitoring Program - In-Stream Component - Stephen Rae, California Department of Fish and Game

3:45 Use of Rapid Bioassessment Protocols for Monitoring Biological and Physical Conditions of Wadeable Streams in California - James M. Harrington, California Department of Fish and Game - WPCL, Rancho Cordova, CA

4:15 Springs and Fishes Down Under - Peter J. Unmack, South Australian Research and Development Institute, (SARDI), Aquatic Sciences, Inland Waters Section, P.O. Box 120, Henley Beach, SA 5022, Australia. Present address: 261 Leach Hall, University of California Davis, CA 95616

ABSTRACTS

BARACCO, ALAN

Marine Biologist, California Department of Fish and Game,
1701 Nimbus Road, Suite B, Rancho Cordova, California,
95670, (916) 355-7098

**What do Trinity River Hatchery Coho Salmon and
Snow White Have in Common?**

It would certainly be politically incorrect to question the character or lineage of the popular Disney creation, Snow White. On the other hand, it appears politically correct to call any population of salmon subjected to importations from non-natal areas, as well as those natal populations cultured in a hatchery environment, derogatory names, relegating them to the scrap heap of the species.

A gross examination of Trinity River Hatchery importation and stocking records for coho salmon would appear to place this population in with the worst of the worst; four different non-natal stocks were imported to the facility in its early years of operation. A closer look at the subsequent success of these stock transfers by brood cycle, however, together with recent electrophoretic studies and biological investigations within the Trinity River, suggest that this population has retained a high degree of population integrity.

BOLSTER, BETSY

Associate Fishery Biologist, Endangered Species Project,
California Department of Fish and Game, 1701 Nimbus
Road, Suite C, Rancho Cordova, California, 95670, (916)
355-7115

**Beyond the Red Queen: A Cooperative Approach to
Preserving Species in the Owens River Basin**

Marc Reisner's "The Red Queen" chapter in "Cadillac Desert" describes how the City of Los Angeles' skillful manipulation of Owens Valley residents in the early 1900's resulted in the export of most of the valley's water. Subsequent relations between the city and valley residents, land managers and regulators have been tenuous at best, litigious at worst. As a result, three species endemic to the Owens Basin are endangered, and six other endemics are listing candidates and/or Species of Special Concern. Fifteen other sensitive plant and animal species occur there as well. Existing recovery plans for the Owens pupfish (*Cyprinodon radiosus*) and Owens tui chub (*Gila bicolor snyderi*) are not working. A light exists at the end of the tunnel, however. A draft multispecies recovery plan for the listed and candidate species is due in mid-1995. The consultant team preparing the plan will emphasize an ecosystem-based approach. The team will also prepare a separate document containing management guidelines for the remaining sensitive species. This effort is being funded by the U.S. Fish and Wildlife Service, the California Department of Fish and Game and the Bureau of Land Management. A task force was assembled to involve other agencies and interested parties including the U.S. Forest Service, Los Angeles Department of Water and Power, Inyo County and the Desert Fishes Council. The consultant team will work closely with the task force to redirect recovery efforts in the Owens Basin.

BROWN, LARRY R.

U.S. Geological Survey, 2800 Cottage Way, Room W-2233,
Sacramento, California, 95825, (916) 979-2615 ext. 361

**Native and Introduced Stream Fishes of the San
Joaquin Valley Floor - their Relation to Quality of
Water and Habitat**

The San Joaquin-Tulare Basins study unit of the U.S. Geological Survey's National Water Quality Assessment Program includes 28,500 square miles in central California. Sixteen San Joaquin Valley floor sites on the San Joaquin, Stanislaus, Tuolumne, and Merced rivers were sampled for fish during August 1994. Four sites were sampled on each river. Twenty-one introduced species and eight native species of fish were captured.

A cluster analysis of Jaccard similarity coefficients identified six groups of sites. The San Joaquin River sites were characterized by introduced red shiner, fathead minnow, inland silverside, and threadfin shad. The middle and downstream tributary sites were characterized by introduced basses, sunfishes, and catfishes. The remaining four groups, primarily upstream tributary sites, were characterized by differing combinations of introduced and native species, which included Sacramento squawfish, hardhead, Sacramento sucker, and tule perch.

The abundance of introduced species was positively correlated with increased water temperature, specific conductance, alkalinity, pH, and oxygen concentration. Introduced species were positively correlated with increased stream discharge and width, but negatively correlated with elevation, riparian shading, and instream cover. Native species showed opposite relations to these variables. These data show that fish can be useful indicators of water and habitat quality.

**BROWN, LARRY R.¹, PETER B. MOYLE, AND
RONALD M. YOSHIYAMA**

Department of Wildlife and Fisheries Biology, University of
California, Davis, California, 95616, (916) 752-6355

¹Present address: U.S. Geological Survey, 2800 Cottage Way,
Room W-2233, Sacramento, California, 95825, (916) 979-
2615 x361

Historical Decline and Current Status of California Coho Salmon

The southernmost populations of coho salmon *Oncorhynchus kisutch* occur in California. We reviewed historical data up to 1992 to determine the present status of California populations. Coho salmon previously occurred in at least 582 streams. The status of coho in 58% of the streams was unknown. Coho were still believed present in 23% and absent in 19%. Using recent (mid-80s or later) population estimates or our own estimates we calculated a total California coho salmon population of 30,728 fish. Of these fish, 57% were produced by hatcheries, 28% by naturally spawning fish in populations that included a large portion of hatchery fish at one time, and 15% by naturally spawning fish with little or no hatchery influence (wild fish). Possible reasons for the present low populations include stream alterations resulting from poor land-use practices, periodic droughts and floods, introduction of exotic stocks, introduced diseases, overharvest, and climate change.

BRYANT, GREGORY J.

Fisheries Biologist, Protected Species Management Division,
National Marine Fisheries Service, 1330 Bayshore Way, Eureka,
California, 95501, (707) 441-3684

**California Coho Salmon (*Oncorhynchus kisutch*)
Evolutionarily Significant Units (ESUs)**

A population, or group of populations, must satisfy two criteria to be considered an ESU: (1) it must be reproductively isolated from other conspecific population units, and (2) it must represent an important component in the evolutionary legacy of the biological species. This is the first NMFS status review that attempts to comprehensively define salmonid ESUs over a broad geographic area. In general, the ESU boundaries being considered by NMFS are supported by several lines of evidence that show similar patterns. Based on the best available biological and environmental information, and after considering the biological effects of human activities, NMFS has tentatively identified six distinct population segments of coho salmon: (1) central California coast; (2) southern Oregon/northern California coasts; (3) Oregon coast; (4) lower Columbia River/southwest Washington coast; (5) Olympic Peninsula; and (6) Puget Sound/Strait of Georgia. Genetic data (from studies of protein electrophoresis and DNA) are the primary evidence being considered for the reproductive isolation criterion, supplemented by inferences about barriers to migration created by natural geographic features and human-induced changes resulting from artificial propagation and harvest. Several types of physical and biological evidence are also being considered in evaluating the contribution of coho salmon from southern British Columbia, Washington, Oregon, and California to the ecological/genetic diversity of the biological species throughout its range. Factors under consideration include: (1) the physical environment--geology, vegetation, soil type, air temperature, precipitation, river flow patterns, water temperature, and ocean conditions/upwelling;

(2) zoogeography--marine, estuarine, and freshwater fish distributions; and (3) life-history traits--smolt size and outmigration timing, river entry timing, spawning timing, and marine coded-wire-tag recoveries. The relative magnitudes of potential human-induced genetic changes are also under consideration.

CECH, JOSEPH J., JR. AND PACIENCIA S. YOUNG

Department of Wildlife, Fish, and Conservation Biology,
University of California, Davis, California, 95616, (916)752-8659

Temperature Tolerance and Swimming Ability of Sacramento Splittail

Sacramento splittail is an endemic cyprinid fish of California's Sacramento-San Joaquin Rivers system. Currently, its abundance is low and mostly restricted to estuarine areas of Suisun Marsh and the Sacramento-San Joaquin Delta. To better understand the splittail's environmental requirements, we measured its critical thermal maxima (CTMa) and minima (CTMi), with equilibrium loss as the endpoint, and its critical swimming velocities (Ucrit). Mean CTMa (range = 20.5 - 32.0°C) generally increased with increasing acclimation temperature (12, 17, 20°C) and decreased with increasing body size (wet weight range = 0.1 - 29.3 g), while mean CTMi (range = 6.5 - 7.3°C) showed no relationship with either acclimation temperature (17, 20°C) or body size (range = 0.1 - 35.2 g). Mean Ucrit (range = 19.5 - 43.9 cm/s) increased (overall) with increasing standard length (range = 2.32 - 12.61 cm). These thermal tolerance and swimming data should help predict splittail distribution and survival for informed water and fisheries management decisions. (Research supported by Delta Research Enhancement Program)

CURTIS, TIM

Senior Biologist, Anadromous Fisheries Restoration Coordinator, Inland Fisheries Division, California Department of Fish and Game, 1416 Ninth Street, Sacramento, California, 95814, (916) 654-1076. E-mail: 74771.3676@compuserve.com

Recent Management Actions and Plans for California Coho Salmon

There is nothing like the threat of an endangered species listing to motivate action among government bureaucrats and private businesses whose economic interests maybe affected. The State bureaucrats have been pursuing two proposals, first a petition from the County of Santa Cruz to list coho salmon south of San Francisco Bay as an threatened species under the California Endangered Species Act and second a petiton by the Department of Fish and Game to list coho as a sensitive species under the rules of the Board of Forestry. You will get a status report. Private industry has learned from painful experience that it pays to get organized and have thorough information on their own lands before a species becomes listed. The Fish, Farm, and Forestry Coalition was formed to indentify and pursue common interests of the fishing, timber and agricultural commuities for promoting recovery of coho salmon. The leaders of these industries are taking a proactive approach, hoping that the best way to reduce the effect of listing on their operations is to demonstrate their commitment to species recovery before the rules are all written. To this end they have taken several joint actions to raise their level of knowledge and expertise about coho.

DOWNIE, SCOTT

Fish Habitat Supervisor II, North Coast Basin Planning Project, P.O. Box 770, Redway, California, 95560, (707) 923-4802

Building Cooperative Watershed Partnerships on the North Coast

The California Department of Fish and Game, Inland Fisheries Division, has established and maintained a Basin Planning Project in the Eel River since 1991. The mission of project personnel is to assess stream habitat in the anadromous reaches and tributaries within the system, evaluate their findings, and develop and implement salmonid habitat improvement plans. The Eel River basin cover 3,600 square miles, and 86% of that area lies in private ownership. Typical land uses include ranching, logging, mining, recreation, rural subdivision, urban development, etc. Project personnel realized that the key to any success rested with their ability to build trust, create enthusiasm and cooperation, and develop the active involvement of watershed landowners and managers. An approach has been developed, and is used successfully to build partnerships with most landowners large or small.

EVANS, DANIEL

Director, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, California, 94970, (415) 868-1221.
Partners in Flight, California Chairman

The Partners in Flight Initiative - A Coalition for Bird Conservation

In 1990, under the title "Partners in Flight - Aves Del Las Americas", Federal, State, and private organizations came together to form a bold new movement to protect migratory landbirds in North America, Latin America, and the Caribbean.

Partners in Flight has brought together over nine Federal agencies, 40 State agencies, and 60 private organizations to develop and implement a coordinated plan to reverse the historic declines in neotropical migratory birds (i.e., birds that migrate between the New World's two hemispheres to winter in Central and South America). Partners in Flight seeks to protect a wide array of avian species from habitat loss and fragmentation, changes in forest composition, human-related increases in predation and parasitism, and environmental contamination. This is an historical effort to protect broad groups of species from diverse threats prior to any single species being Federally listed as threatened or endangered.

The components for success are diverse, with avenues of participation for just about everyone. Nine technical working groups, comprised of specialists from a wide variety of disciplines, provide expert support in research, education, and information exchange, bird monitoring, and management. These Working Groups are coordinated to operate at international, national, and regional levels.

In California the Partners in Flight program has initiated California's first nongame habitat joint venture. This agreement, signed by 11 Federal, State, and private organizations, creates a working structure to facilitate cooperation between groups toward a common set of goals. This habitat joint venture is an excellent example of how larger, more ambitious objectives can be obtained through cooperative projects.

HANSON, DAVID F.¹ AND THOMAS R. LAMBERT²

¹EA Engineering, Science and Technology, Lafayette, California

²Pacific Gas and Electric Company, San Ramon, California
Selecting Habitat Suitability Criteria for Rainbow and Brown Trout in California

Habitat suitability criteria (HSC) are the major component of the Instream Flow Incremental Methodology (IFIM) developed by the U.S. Fish and Wildlife Service. The IFIM is used in water management decision-making by providing an estimate of the relationship between streamflow and usable fish habitat. Instream flow study results are very sensitive to which HSC are used. HSC are developed by observing fish in the wild, usually by snorkeling, and then performing a frequency analysis of the microhabitat features, such as the depth and velocity, that the fish were seen using. The resulting HSC are specific to the particular stream reach at the time of observation. This paper discusses selecting the most appropriate HSC for trout in Sierra Nevada streams where the criteria cannot be developed because of an insufficient number of trout to observe, poor visibility, or inaccessible study sites. Also discussed is the selection of appropriate HSC gathered from a "source" stream to transfer to "destination" IFIM study sites to avoid the expense of developing site-specific HSC.

NOTES

NOTES

We investigated the literature to find differences in HSC for rainbow and brown trout in Sierra Nevada streams and developed hypotheses to explain the differences. Key factors that were found to significantly affect trout HSC included trout size, season, stream structure, interspecific and feeding competition, and food availability. The primary determinant in microhabitat selection, and the resulting HSC, is trout size. Generally, as trout size increases, trout occupy swifter, deeper water. Seasonal shifts in microhabitat use were also found, with trout occupying higher velocity water as water temperature increases. Stream structure includes stream size and gradient, macrohabitats (riffle, run, and pool), and substrate composition. Comparisons of HSC with wide differences in the availability of macrohabitats showed HSC cannot be transferred between those sites. The numbers of trout competing for feeding stations affects HSC because a few larger, dominant trout may force smaller trout into less energetically beneficial microhabitats. Two studies of food availability showed trout will forage in higher velocities if it results in greater food intake.

On the basis of the literature reviewed, applying HSC developed from a wide range of streams outside of California is not recommended for IFIM studies on Sierra Nevada streams. An important conclusion is that "generic" HSC assembled from data on various streams are not necessarily applicable to any one stream. In fact, HSC gathered from various dissimilar streams may not accurately represent trout microhabitat use in any of the streams. Instead of using "generic" HSC at IFIM sites, it is more appropriate to select HSC from a single stream.

Development of a model capable of comparing variables at HSC "source" streams, one stream at a time, to the "destination" IFIM study site is recommended. The variables the model would compare trout size distribution, stream structure, species composition, fish density, water temperature, and food availability. If a strong correlation exists for all the variables, the HSC from the "source" stream can be used for the "destination" IFIM study site.

HARRINGTON, JAMES M.

Water Pollution Control Laboratory, California Department of Fish and Game, 2005 Nimbus Road, Rancho Cordova, California, 95670

Use of Rapid Bioassessment Protocols for Monitoring Biological and Physical Conditions of Wadeable Streams in California

The CDFG Water Pollution Control Laboratory (WPCL) uses various chemical, toxicological and biological techniques to assess status, damage and monitor recovery of aquatic systems. One biological monitoring procedure currently utilized by WPCL is the Rapid Bioassessment Protocols (RBPs) developed by the U.S. Environmental Protection Agency (EPA) to develop biological criteria for State waters; evaluate the effectiveness of nonpoint source control projects; and determine effects of point sources of pollution to the biota of receiving waters. The RBPs were developed on a national level with the understanding that they would need regional modification. In September 1993, CDFG distributed a RBP protocol for California entitled "The California Stream Bioassessment Procedures (CSBP)". The CSBP has been successfully used to assess point source pollution of organic enrichment and inorganic sediment. Currently, the CSBP is being tested for use in assessing the biological condition of streams influenced by timber harvest practices and in developing biological criteria as a water quality management tool in the Consumnes and Russian River basins. CDFG, in cooperation with the State Water Resources Control Board, and funding from EPA, has also formed the California Aquatic Bioassessment Workgroup to facilitate development and distribution of standard procedures for assessing the biological condition of California aquatic systems.

HENDRICKS, STEVEN R.

California Department of Fish and Game, 1701 Nimbus Road, Suite B, Rancho Cordova, California, 95670, (916) 355-0126

The Distribution and Abundance of Fishes in the Tributaries of Goose Lake, Modoc County, California

California Department of Fish and Game is currently working cooperatively with several public and private agencies and land owners (The Goose Lake Fishes Working Group) to properly manage the fishes of Goose Lake. In accordance with the Working Group, CDF&G surveyed the tributaries of Goose Lake, within the state of California, during the summer of 1994 to determine the distribution and abundance of the eight native and endemic species in the basin. Comprehensive surveys in Lassen and Willow Creeks revealed discrete fish assemblages in each creek. Goose Lake tui chub (*Gila bicolor thalassina*) were extremely abundant, but only in a very limited range. Goose Lake sucker (*Catostomus occidentalis lacusanerinus*) were common throughout Willow Creek, but only in a small section of Lassen Creek. Goose Lake redband trout (*Oncorhynchus mykiss* subsp.) were found throughout both streams in mixed abundances. Goose Lake lamprey (*Lampetra tridentata* subsp.) and Pit-Klamath brook lamprey (*Lampetra lethophaga*) were sporadically common in both streams. Pit roach (*Lavinia symmetricus mitrulus*) were very abundant in a limited range in Willow Creek, but absent in Lassen Creek. Speckled dace (*Rhinichthys osculus*) and Pit sculpin (*Cottus pitensis*) were found in mixed abundances in both streams. Spot-check surveys revealed that only redband trout reside in Cottonwood Creek, while redband trout and brown trout (*Salmo trutta*) reside in Davis and Pine creeks. With persisting drought conditions, water diversions, fish barriers, and habitat degradation from a variety of land use practices it is apparent that these fish need special management in order to persist.

KARL, HERMAN A., PAT S. CHAVEZ, JR., JOHN L. CHIN, AND RICHARD L. BERNKNOPF

U.S. Geological Survey, 345 Middlefield Road, MS-999,
Menlo Park, California, 94025, (415) 354-3084

**Regional-Scale Seafloor Mapping and
Characterization: Application to Fisheries Resource
Management**

Acoustic mapping, sediment samples, and photographs of the seafloor provide scientific information useful for issues dealing with resource management, economic importance, and public safety. Sidescan sonar mosaics of the continental shelf and slope provide regional information on the nature of the substrate (type of sediment and undersea landforms). These mosaics are useful for site selection to collect samples of sediment and photographs of the seafloor. The information on the distribution of sediment types provides clues about habitat and to organisms that live on, in, and near the seafloor. This information can be used by scientists investigating biodiversity and ecological systems, by fisheries resource managers as a tool to make better informed policy and regulatory decisions, and by commercial and sport fisherman as an aid for locating fish and crabs. In addition to providing information about habitat, the sidescan sonar mosaics can be used to locate areas that may pose a hazard to recreational and commercial fishing activities. For example, about 50,000 containers of radioactive waste were dumped in the Gulf of the Farallones regions. Many of these containers can be detected on the sidescan sonar mosaics. Probabilistic hazards maps produced from the mosaic can be used to help identify environmental risks associated with recreational and commercial fishing that are related to previously dumped radioactive waste and other hazardous materials. In this way, the maps help reconcile and build consensus among the financial, environmental, resource, and safety interest groups that share the urban ocean.

MENG, LESA

U.S. Fish and Wildlife Service, 2800 Cottage Way,
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The Ethics of Splittail

Splittail may lack ethics, but examining the recent chronology of the proposed listing of the species may tell us something about human choices related to the environment. Fisheries data collected over the last 15 years indicate that splittail have declined an average of 60%. Despite strong scientific evidence supporting the listing of splittail, a final decision was postponed. What type of value system was this decision based on? Does value have any place in biological decision-making? Values underlying biological decision-making may be based on egocentric, homocentric, or biocentric views of splittail and the environment. Egocentric and homocentric views regard fish as property or a resource. Biocentric views recognize the intrinsic value of splittail; they are valued just because they exist. Scientists contributing technical information to environmental decision-making may need a code of ethics in the same way doctors or lawyers do. The first question of the ethical decision-making process is what is the ultimate value or metaethic? The decision on splittail wasn't based on biocentric values or biology. In order to reach greater consensus on environmental decision-making biocentric value should be added into the mix.

MONROE, MIA

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Consensus Building

Inspire with a vision, then find a way for idealists and skeptics alike to get their hands dirty together, stir in interactive educational experiences and the result will soon be consensus. Examples of how this model has been put to the test in the Redwood Creek watershed will be discussed.

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Allozyme Analysis of Delta Smelt and Wakasagi, and Potential Effects of Exotic Inland Silversides on Delta Smelt from the Sacramento-San Joaquin Estuary

The delta smelt (*Hypomesus transpacificus*) is listed as a threatened species, while the wakasagi (*H. nipponensis*) is an introduced species from Japan, abundant in a number of California reservoirs. The two species are only distantly related; electrophoretic techniques can be used to unambiguously distinguish them based on 13 diagnostic alleles. In 1994, 231 *Hypomesus* from the Delta were examined electrophoretically. 93% were delta smelt, 6% were wakasagi, and 1% were hybrids. Actual percentages of wakasagi and hybrids are probably considerably less because many of the smelt were saved for analysis because it was suspected they were wakasagi. Samples

from the CVP and SWP pumping plants revealed a 2% incidence of wakasagi or hybrids. both of the hybrid smelt collected were first generation, F_1 offspring. No backcrosses were detected. This study confirms that wakasagi have invaded the Delta in small numbers although it is likely that this has been happening for 30+ years. There is no evidence that wakasagi have had significant ecological or genetic impact on delta smelt.

Inland silversides (*Menidia beryllina*) introduced to Clear lake in 1966, appeared in the Delta in 1976. They increased sharply in abundance in 1981-82, coinciding with the dramatic decline of delta smelt. Replicated field experiments using 3.2m³ mesocosms indicated individual silversides consumed 60-85% of 40 striped bass (*Morone saxatilis*) larvae (5-7mm SL) after 4 hours. Dense schools of silversides inhabit the shoreline areas in the Delta where delta smelt spawn. Smelt adults and larvae occur more often in areas of high silverside abundance in dry years. Estimates of silverside abundance were compiled from 1977-1993 using the USFWS salmon smolt beach seine survey. Silverside abundance weighted by the proportion of days 2ppt. salinity was located upstream of Chipps Island during April-May was significantly and negatively associated with delta smelt abundance from the CDFG fall mid-water trawl survey ($R^2=0.50$, $p<0.02$) and CDFG summer tow-net survey ($R^2=0.60$, $p<0.01$). These results suggest that predation of larvae by inland silversides may have been an important factor contributing to the threatened status of delta smelt and other native fishes that spawn in nearshore habitats.

NIELSEN, JENNIFER L.

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Behavior Genetics and Life History Strategies in Coho Salmon

In situ observations of forage behavior in wild juvenile coho salmon (n=332) followed the creation and developmental structure of partial-dominance forage hierarchies (n=16) during the coho's first year in 10 northern California streams. Forage hierarchies consisted of dominant and subdominant individuals holding clearly defined forage stations within the stream pools. Satiated dominant individuals, found in forward positions within the hierarchy (in relation to the stream flow), were shown to allow intrusion into their forage station by selected individual coho. Documentation of this behavior led to questions about inclusive fitness within the coho forage hierarchies, where related individuals gain specific advantage from the altruistic behavior of dominant siblings. To test this hypothesis of inclusive fitness, genetic relationships among dominant and subdominant coho forming forage hierarchies were tested using allozyme, mtDNA and microsatellite DNA data on individual fish.

PARMENTER, STEVE

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Consensus on the Forks of the Walker: Contrasting Experiences

Since 1988 two classic, yet contrasting resource allocation conflicts have unfolded along the East and West Walker Rivers (Mono County, CA). On the West Walker, the California Wildlife Conservation Board's purchase of a 990 acre cattle ranch placed the traditional livestock operator in potential opposition to riparian restoration objectives preferred by the Department of Fish and Game. A cooperative arrangement between Fish and Game, the U.S. Forest Service, and a private rancher has been developed which promises to restore three times more riparian habitat than was purchased by California, while continuing a profitable livestock operation. Concurrently, the East Walker River experienced a catastrophic siltation episode below its main stem storage reservoir. The discharge was symptomatic of--and precipitated--a bitter dispute over water rights and streamflow protection between the State and an agricultural irrigation district. Three criminal convictions, amendments to appropriative water rights, and filing of a civil suit for natural resource damages followed. Out of court settlement in 1993 produced dramatic restoration benefits, protected the river from some future threats, and relieved the defendant of the burden of further litigation. The contrasting ontogenies of consensus will be examined, and essential factors common to both resolutions will be shown. Reference to the ecosystem collapse of Walker Lake (Mineral County, NV), and further needs for consensus will place the above disputes in a larger context.

RAE, STEPHEN

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Pilot Monitoring Program - In-Stream Component

The Pilot Monitoring Program is a techniques assessment study to identify and refine field methodologies for the monitoring of parameters on private timberlands. A Board of Forestry project, the PMP, also includes a hillside component and geologic mapping. The pilot phase is intended to provide a basis for a long-term monitoring effort by the BOF to assess the effectiveness of Timber Harvest Rules in safeguarding beneficial uses of water in streams associated with private timberlands. This project focuses on the in-stream component. Assessment techniques for monitoring six in-stream parameters (temperature, sediment deposition, habitat type, channel type, canopy coverage, and macroinvertebrate fauna) were implemented in eleven stream reaches within four watersheds in California (Mokelumne, Noyo, Gualala, and Scott rivers). Procedures for training unskilled field crew members were tested. Problems in standardizing field methodologies, relocating study sites, and creating a database management system were resolved.

The In-Stream Component was accomplished under budget, successfully incorporated field crew members of varying skill levels, established quality control/quality assurance procedures, identified opportunities to decrease the time necessary to implement each technique, and tested the linkage between information in a database management system and a geographic information system.

SIRI, PAUL

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**Qualitative Issues in the Conservation Biology of
Pacific Salmonids: Education at all Levels**

Endangered species listings of salmonids throughout the Pacific Northwest together with well reported jeopardy of important marine fisheries and the concomitant economic impacts now have the attention of legislators, resource managers and the public. Conservation biology using sophisticated molecular tools and a clearer understanding of the importance of salmonid life history variation create conflicts in the identification of resource management solutions. On the one hand, scientists offer increasingly sophisticated genotypic description in the absence of information on phenotypic variation. How do we use this information to manage the environment for wild stock preservation and in developing hatchery practice to avoid domestication? Some experience in captive breeding programs can assist, but all these technological issues must simultaneously be utilized in major education initiatives aimed at all levels of society.

SMITH, JERRY J.

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**Stochastic Decline of Coho Salmon at the Southern
End of Their Range**

Coho were present in numerous streams in San Mateo and Santa Cruz counties into the 1970's, but are now found regularly only in Scott and Waddell creeks (Santa Cruz County), which provide

the most extensive cool, low gradient habitat. However, coho densities varied substantially among the 1988, 1991, 1992, 1993 and 1994 year classes on the two creeks, even though summer rearing conditions, and steelhead densities, varied relatively little. A weak 1988 Waddell Creek year class was lost and a strong 1988 Scott Creek year class was almost eliminated by poor adult access, due to drought, in 1990-91. Since wild coho females are invariably 3-year olds, the effect persisted into the 1994 year class. The 1992 year classes on both streams were very weak, apparently as a result of February floods in 1986 and 1992. Catastrophic effects are of long duration and are probably geographically widespread. Redwood Creek (Marin County), 120 kilometers to the north, had very weak year classes in both 1988 and 1994. Since 1988 provided fair access and rearing conditions, the very weak year classes on Waddell and Redwood creeks may have resulted from the 1982 floods and/or the 1976 drought, 2-4 cycles earlier.

**STUDLEY, THOMAS K.,¹ JEAN BALDRIDGE²,
LARRY WISE³, AND STEVE RAILSBACK⁴**

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**Relationships Between Trout Populations and WUA
in Streams with Other Limiting Factors**

A primary assumption of the instream Flow incremental Methodology (IFIM) is that physical microhabitat controls fish

populations. A strong correlation between periodic limiting microhabitat events and fish populations would indicate that this assumption is valid. The Response of Fish Populations to Altered Flows Project is monitoring trout populations and weighted usable area (WUA) at 18 study sites at two PG&E hydro projects in the Sierra Nevada. Following a baseline monitoring period from 1985 to 1992, instream flows were increased. Responses of fish populations to these increases were predicted using three methods of increasing sophistication. Monitoring of fish populations will continue through 1996 to test the predictions.

Significant relationships between fish and WUA within sites during baseline conditions were found at most study sites. We found: (1) as many relationships with streamflow as with WUA, (2) more relationships between fall populations and summer WUA than between summer populations and spring WUA, (3) more relationships between fall age 1 and older populations and summer adult WUA than between fall age 2 and older populations and summer adult WUA, (4) and more, highly significant relationships between total trout populations and WUA than with individual species. Several limiting factors were identified that altered or masked relationships between fish and WUA.

SWANSON, CHRISTINA AND JOSEPH J. CECH, JR.
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Habitat Requirements and Management Guidelines for the Delta Smelt

Habitat degradation and altered water flows resulting from increased water exports, and entrainment of fish at water diversions are implicated in the decline of the delta smelt

(*Hypomesus transpacificus*), a small osmerid endemic to the Sacramento-San Joaquin estuary. This species is now listed as threatened by State and federal governments. We investigated delta smelt environmental tolerances and their swimming performance and behavior in laminar flow regimes. Depending on acclimation temperature and salinity, delta smelt tolerated temperatures from <7 to >29°C, a range within seasonal estuary conditions. However, temperatures in power plant cooling system diversions, which are known to entrain this species, may exceed thermal tolerances of the fish. Critical swimming velocities averaged 25 cm/sec, which exceed existing diversion approach velocity regulations, but we observed poor swimming performance and frequent incidences of impingement at intermediate velocities (6-20 cm/sec). This poor performance may be associated with the transition from intermittent to steady swimming. These results are being used to define delta smelt critical habitat, and develop approach velocity and temperature criteria for diversions in the estuary. (Research supported by Delta Research Enhancement Program)

TAYLOR, THOMAS A.

Senior Aquatic Biologist, Trihey & Associates, Concord, California

Management of Black and Blue Shiners (*Notemmyx nimbyi*) and Red Herrings (*Falsus issuei*) and Their Relationship to the Performance of Stream Restoration Projects

That one learns more from their failures than from their successes is an old axiom applicable to the practice of stream restoration. Not all restoration projects can be so easily classified. There are several items to consider in the evaluation of any restoration

project, among them being the technical performance of the project, the impression of the project as seen by the regulating agencies, the public, Non-Governmental Organizations (NGO's), or clients or contractors, are but a few. Some projects may be technical successes, but lose all their agency and public support, or they may perform only marginally well technically and retain extremely favorable support from various factions, or they may fall anywhere on this continuum. Performance can be measured relative to the project's objectives; however, the perception of success or failure is also important and may have little to do with the project's stated objectives. Personal experience in both government and private employment will be discussed and summarized to draw conclusions about the intricacies of managing restoration projects, and some of the unexpected benefits for streams derived from such projects.

UNMACK, PETER J.

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Springs and Fishes Down Under

Many of the world's deserts contain springs, these provide permanent sources of freshwater where there would otherwise be none. Many of these springs contain unique fish and other fauna. My own work is based in the arid zone of South Australia, (in conjunction with Bryan E. Pierce). This project consists of a fish survey of all springs; a classification system for springs; electrophoresis analysis of all populations of fish; and quantification of threats.

Most springs in the Australian desert or arid zone are associated with the Great Artesian Basin (GAB), which is one of the largest groundwater basins in the world. There are approximately 600 springs or spring groups in the GAB. Most springs are relatively small with the exception of Dalhousie Springs. Eleven native fishes and one exotic have been recorded. There are also numerous endemic invertebrates including hydrobiid snails, ostracods, amphipods, isopods and many other lesser known taxa. Other than taxonomy, very little work has been done on any of the fauna, fish included. Due to the previous lack of work, new fish species are still being identified either by electrophoretic studies or chance discovery. In 1990, I discovered a new sub-family of fish from springs in Queensland, thus demonstrating the need for thorough surveys. In the past, springfish have received little attention or management. Springs are an ecologically unique habitat which can provide biologists with many ideal opportunities to study nature in nature, (i.e., evolutionary studies, energy flow through ecosystems). Unfortunately, springs around the world are under threat primarily from groundwater mining, introduced species, and stock grazing. The long-term future of this precious ecotype is very uncertain.

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Quantifying Optimal Salinity Habitat in the Sacramento-San Joaquin Delta/Estuary

Survival of many estuarine species may be affected by the amount of habitat available with suitable salinities. The amount of a species' salinity habitat in the Sacramento-San Joaquin Delta/Estuary varies rapidly in response to tides, but the average amount of habitat present during one or more days is related

primarily to Delta outflow. A model was developed to simulate the surface area of a species' optimal salinity habitat. The model uses Delta outflow to estimate the distance from the Golden Gate Bridge of the species' upper and lower optimal salinity limits and then calculates the surface area of the portion of the Delta/Estuary that lies within the limits. Historic Delta outflow data were used to estimate monthly average surface areas of optimal salinity habitat during 1922-1993 for striped bass, delta smelt, longfin smelt, starry flounder, and *Crangon franciscorum*. Regression analyses indicate that the annual abundance indices of these species are significantly related to the surface areas of the species' optimal salinity habitats.

**VAN WINKLE, WEBB, YETTA JAGER, BRADY
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AND JEAN BALDRIDGE³**

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²Pacific Gas and Electric Company, San Ramon, California

³Trihey & Associates, Concord, California

**Simulating the Effects of Alternative Temperature
and Flow Regimes on Stream Resident Populations
of Brown and Rainbow Trout: Linking PHABSIM
and Individual-Based Modeling**

We developed a model for predicting the effects of alternative flow and temperature regimes on habitat utilization, growth, and survival of sympatric populations of rainbow and brown trout in streams. The model links the Instream Flow Incremental Methodology (IFIM-PHABSIM) with an individual-based modeling approach (IBM). We combine results from a PHABSIM study, a mesohabitat survey, and a habitat extrapolation algorithm to simulate the spatial and temporal

distribution of depth and velocity at different flows in a stream segment containing closed populations of these two trout species. We use an IBM to simulate reproduction, development and mortality of eggs and alevins, foraging, habitat utilization and movement, growth, and mortality of individual trout. The IBM enables population attributes (e.g., abundance and size-frequency distributions) to depend on relevant attributes of individual trout (e.g., length, habitat use, and physiological condition). The spatially explicit nature of the model permits evaluation of behavioral responses used by trout to mitigate temporary setbacks in habitat quality. For example trout can respond to reduced flow by moving to sites with more suitable velocity, depth, and cover. Results from simulation experiments illustrate the importance of considering the timing of changes in flow and temperature regimes relative to the differences in timing of life-cycle events for these two trout species. An important advantage of this linked mechanistic modeling approach is that it readily lends itself to an iterative process of prediction, comparison with field data, and design of further studies.

WISE, LAWRENCE M., JR AND WAYNE S. LIFTON
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**Investigation of the Effect of Habitat Availability,
Cover and Shear Zones on the Microhabitat
Selection of Rainbow and Brown Trout in Three
Central Sierra Streams**

The Instream Flow Incremental Methodology is commonly used to help allocate water in the western U.S. Habitat suitability criteria (HSC) are used with modeled hydraulic outputs to calculate an index of available habitat. HSC describe how fish

utilize microhabitat variables of depth, velocity and substrate. This study also evaluated the effects of habitat availability, distance to cover and distance to shear on the stream positions selected by rainbow and brown trout. Sampling was also conducted to evaluate whether habitat availability bias could be reduced by sampling different mesohabitat types. Preliminary results indicate that distance from cover was found to affect the habitat utilization patterns of some lifestages of the study species, while distance from shear was found to affect the habitat utilization of all lifestages of both species. This indicates a potential need to develop conditional criteria to account for these factors. The use of equal sampling area among different habitat types somewhat reduces the bias introduced in the development of habitat suitability criteria by non-uniform habitat availability. However, the bias is not eliminated. Therefore, habitat availability needs to be addressed in sampling and analytical efforts.

WHITE, DAVID

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**An Overview of the Sacramento Winter Run
Chinook Captive Broodstock Program: A Multi-
Agency Effort**

Previously listed as endangered by the State of California, the Sacramento River winter-run chinook salmon was placed on the Federal Endangered Species List in November of 1990. In response, the Steinhart Aquarium, U.C. Bodega Marine Lab, Coleman National Fish Hatchery (USFWS), and the California Department of Fish and Game began a captive broodstock

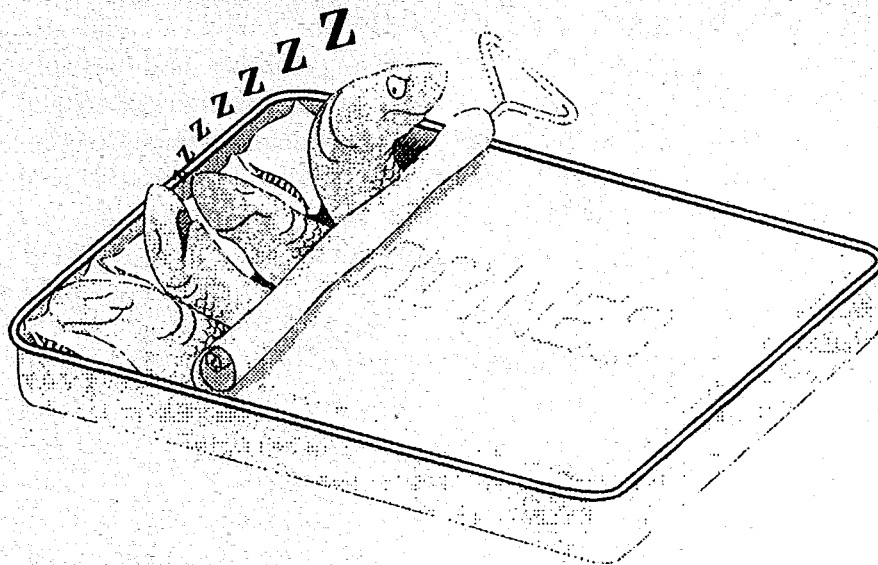
program in 1991 to insure against extinction. Winter-run chinook have been reared in controlled conditions until sexual maturity for use as broodstock. Special attention is provided in a project-wide overview of genetics and disease control. A summary of the program will be presented, focusing on the mechanics of the operation, rearing techniques, survival rates, and difficulties faced.

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Salinity and Dissolved Oxygen Tolerance of Young-of-the-year and Juvenile Sacramento Splittail

The Sacramento splittail (*Pogonichthys macrolepidotus*) used to be one of the most abundant endemic species in the Sacramento-San Joaquin estuary, but it disappeared from much of its native range because of loss or alteration of lowland habitats. Continued loss of freshwater flow would increase the amount of seawater entering the estuary, thereby increasing salinity and possibly decreasing dissolved oxygen. Critical salinity maxima and critical dissolved oxygen (DO) minima were determined for young-of-the-year (YOY) and juvenile splittail to predict the survival and distribution of this species as well as aid in its management and restoration. Mean critical salinity maximum was 22 ppt for YOY (0.2-2.3 g, acclimated in 17 and 20°C) and did not differ significantly from 24 ppt for juveniles (21-48 g, 17°C). Preliminary results of salinity endurance tests show 12-hr TLE (time to loss of equilibrium) at 19 ppt, and 24-hr TLE at 18 ppt for YOY (1.0-3.8 g, 17°C) splittail. Mean critical DO minimum was 18 torr (or 1.1 mg/l) for YOY (1.0-4.1 g, 17°C) and did not differ significantly from 15 torr (or 0.9 mg/l) for juveniles (17-48 g, 17°C). (Research supported by Delta Research Enhancement Program.)



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**Interactions between two estuarine gobies, the
endangered tidewater goby (*Eucyclogobius
newberryi*) and a recent Delta invader, the
shimofuri goby (*Tridentiger bifasciatus*)**

The tidewater goby (*Eucyclogobius newberryi*) is a federally endangered species that is native to California's estuaries. The shimofuri goby (*Tridentiger bifasciatus*), recently introduced from Asia via ballast water, is now established in the Delta. Although these species are allopatric, potential range expansion by the shimofuri goby could pose a threat to the tidewater goby through predation or competition. Laboratory observations demonstrated predation and aggressive interactions between the species. Shimofuri gobies may hinder reproduction in tidewater gobies by disturbing territorial males and distracting courting females. This study suggests that introduction of the shimofuri goby to coastal streams could seriously harm tidewater goby populations.

Ballast water introductions of fishes, invertebrates, and plants threaten to homogenize estuaries and should be prevented. Once these species become established in the Delta, they could spread southward via the water projects. Water transfers must therefore be carefully treated to avoid transporting exotics.

SATURDAY AFTERNOON

TECHNICAL SESSION 4

FISHERIES RESOURCES - STATE VS. FEDERAL JURISDICTION

CHAIR, MARY COBURN, ELKO NEVADA

- 1:15 Opening Statement/Panel Introduction**
- 1:25 Nevada - State Jurisdiction and Management of Fisheries
Resources - Robert McQuivey, Chief, Nevada Division of Wildlife, Habitat
Section**
- 1:50 California - State Jurisdiction and Management of Fisheries
Resources - Terry Mills, CDFG, Sacramento**
- 2:15 County/Private Rights in Management of Fisheries Resources -
Cliff Gardner, Rancher, Ruby Valley, Nevada**
- 2:40 Question and Answer Period**