AFS AMERICAN FISHERIES SOCIETY
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Abstracts and Agenda

for

1997 Annual Meeting

February 27 - March 1

at

Owhyee Plaza
Boise, Idaho

Idaho Chapter of the American Fisheries Society
1997 Annual Meeting
Feb 26 - Mar 1
Owyhee Plaza Hotel, Boise, ID

Final Agenda

Wednesday, February 26

0800-1700	**Training/Workshop--Species that Slip Through the Cracks of Current Management Paradigms** - AFS and TWS - Ivory Room
1700-2200	Registration - Mezzanine
1800-??	EXCOM - Capital Room
1900-2200	**Fish ID Workshop - Senate**

Thursday, February 27

Ongoing	POSTER -**Differentiation of two burbot stocks in the Kootenai River British Columbia, Idaho, and Montana, using mitochondrialDNA analysis** - Vaughn L. Paragamian, IDFG; Madison S. Powell, University of Idaho; Steve Dalbey and Scott Snelson, Montana Department of Fish, Wildlife, and Parks - Mezzanine
0700-0800	Registration -Mezzanine
0800-0830	**Opening Remarks** - Ballroom
0830-0930	**Keynote Address** - Dr. George Rabb, University of Chicago
0930-1000	Break
1000-1200	**Panel - Integrated Management** Moderator - Wayne Paradis Dave Wright, USFS; Alan Thomas, BLM; Steve Mealey, IDFG; Bill Wahl, Potlatch Corporation; Si Whitman, Nez Perce Tribe; Stan Hamilton, IDL
1200-1400	**Box Lunch - Committee Interaction** - Ballroom, Ivory, Ambassador
Session 1:	Moderator - Ted Koch
1400-1410	**Species That Slip Through the Cracks of Current Management Paradigms : Workshop Review** - Ted Koch, USFWS
1410-1420	**Commenting on Biological Diversity** - EXCOM
1420-1430	**The State Perspective on Alpine Lake Management and the Use Of Standard Survey Techniques to Document Other Species** - Bill Horton, IDFG
1430-1450	**Federal Wilderness Management** - Rick Stowell, USFS

1450-1510 **Incidental Observations of a Low-profile Species: Influence of Sampling Method on Detection of Tailed Frogs During Fisheries Surveys** - John W. Guzevich and Russ F. Thurow, USFS

1510-1530 **Impacts of Introduced Fish on Amphibian Populations in High Mountain Lakes in Central Idaho** - David Pilliod and Charles Peterson, Idaho State University

1530-1600 **Discussion**

1600-1620 Break

1620-1700 **Integrating Amphibian Observations With Fishery Surveys** - Chuck Peterson, Idaho State University

1900 - ? **Palouse Unit Social and Student Mixer - Louie's Pizza and Italian Restaurant**

Friday, February 28

0800-0810 Announcements--Ballroom

Session 2: Moderator - John Der Hovanisian

0810-0835 **Macroinvertebrate Drift in Lower Snake River Reservoirs** - Matt Davis, University of Idaho

0835-0900 **Temperature-dependent Consumption and Gut-residence Time in the Opossum Shrimp *Mysis relicta*** - Steve R. Chipps and David H. Bennett, University of Idaho

0900-0925 **Ontogenetic Changes in Food Habits of the Opossum Shrimp, Mysis relicta** - Steve R. Chipps and David H. Bennett, University of Idaho

0925-0955 **Use of Complementary Surveys in Fishery Management** - Jim Davis and Tom McArthur, IDFG

0955-1025 Break

Session 3: Moderator - Jody Brostrom

1025-1050 **Recent Flood Effects on the Nez Perce National Forest and Adjacent Areas** Nick Gerhardt, USFS

1050-1115 **Observations on Possible Effects of the 1995-96 Winter Floods on Northern Idaho Fish Populations** - Chip Corsi, IDFG

1115-1145 **Stream Dynamics, Fish Habitat, and Public Perceptions** - Glen Mendel, Washington Department of Fish and Wildlife

1145-1400 **Business Luncheon**

Session 4: Moderator - Kim Apperson

1400-1425 **Stream Structures for Fish Habitat Enhancement in East Fork Potlatch River** Dennis Schult, Potlatch Corporation

1425-1450 **A Hydraulic Approach to Fish Habitat Evaluation** - Bob Danehy, Boise Cascade

1450-1515 **The Tale of Two Jacks Creeks: Redband Trout Abundance in Relation to Stream Temperatures** - Bruce Zoellick, BLM

1515-1545 Break

1545-1610 **Cutthroat Trout Abundance and Distribution in the Coeur d'Alene River Basin** - Ann Abbott and David Bennett, University of Idaho; Bruce Reiman and James Dunnigan, USFS

1610-1635 **Smoltification, Stress, and Health Indices in Wild and Hatchery-reared Spring/Summer Chinook Salmon and Steelhead Smolts Sampled Before and After Barge Transportation** - Jim Congleton and Bill LaVoie, University of Idaho; Carl Schreck and Larry Davis, Oregon State University; Diane Elliot and Ron Pascho, Northwest Biological Science Center

1635-1700 **Physiological Indices, Microbial Infection, and Short-term Survival of Descaled and Non-descaled Chinook Salmon and Steelhead Smolts at Lower Snake River Dams.** Jim Congleton and Bill LaVoie, University of Idaho; Carl Schreck and Larry Davis, Oregon State University; Diane Elliot and Ron Pascho, Northwest Biological Science Center

1830-?? **"Angling The Rockies"Slide Show by Dave Cannon, 1900; Raffle, Auction starts at 2000 - Ballroom**

Saturday, March 1

Session 5: Moderator - Chuck Alexander

0800-0825 **The Origin of Fishes in the Big Lost River Drainage, Idaho** - Bart Gamett, Idaho State University

0825-0850 **Threats and Management Responses to the South Fork Snake River Yellowstone Cutthroat Trout Fishery: An Integrated Management Program** - Mark Gamblin and Bill Schrader, IDFG

0850-0915 **Spawning Habits of Wild Rainbow/Hybrid Trout and Their Overlap with Native Cutthroat Trout in the South Fork Snake River** - Rick Henderson, Utah State University

0915-0940	**Sediment Monitoring Below Large Mines On The Payette National Forest** Roger Nelson, and Dave Burns, USFS
0940-1005	**Adaptation of the Index of Biotic Integrity of Large River Systems in Idaho** Scott Relyea and G.Wayne Minshall, Idaho State University
1005-1035	Break
1035-1100	**Effect of Bait Training on Return to Creel of Put-and-Take Trout in Streams** Jeff Dillon and Chuck Alexander, IDFG
1100-1125	**Using Auxiliary Data to Estimate Natural Mortality** - John A. Der Hovanisian, IDFG
1125-1150	**Reintroduction Of Coho Salmon to the Clearwater River Subbasin** - Sherman Sprague, David Johnson, Becky Ashe, Nez Perce Tribe
1150-1200	**Presentation of Best Paper Awards**
1200-1300	EXCOM Meeting - Ballroom

Incidental Observations of a Low-profile Species: Influence of Sampling Method on Detection of Tailed Frogs During Fisheries Surveys

John W. Guzevich and Russ F. Thurow
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316 E. Myrtle, Boise, ID 83702

Biologists lack sufficient information to develop protocols for censusing native fishes and other aquatic species. We compared summer estimates of the abundance and size structure of trout populations derived by day snorkeling, night snorkeling, single-pass electrofishing, and multiple-pass electrofishing. During fisheries surveys, we also recorded the presence of tailed frog (*Ascaphus truei*) adults and larvae. Tailed frogs were present in 77 of 87 sites. Larval tailed frogs were more easily detected than adults. Multiple-pass electrofishing detected tailed frogs in 87% of the sites where the species were present. Night snorkeling (75% detection) and single-pass electrofishing (73% detection) were similar. Day snorkeling had the lowest level of detection (39%). We discuss the potential for fish biologists to collect useful information on low-profile aquatic species.

Impacts Of Introduced Fish On Amphibian Populations In High Mountain Lakes Of Central Idaho

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Recent reports of declining amphibian populations in relatively undisturbed locations such as national parks and wilderness areas have generated concern over the effects of stocking non-native fish in wilderness lakes. Allotropic distributions of native amphibians and introduced trout have been observed in many areas of the west, implying negative effects of fish stocking on amphibian populations. To better understand the apparent negative interaction between fish and amphibians, we focused our research on (1) identifying the proximate causes of amphibian distribution patterns (biotic and abiotic) and (2) determining the potential consequences of fish stocking on amphibian populations on local (lake by lake) and landscape (mountain basin or drainage) scales. In the summers of 1994 to 1996, we surveyed 55 lakes in the Bighorn Crags of the Frank Church River of No Return Wilderness documenting fish, amphibian, and environmental characteristics of each lake. We also conducted extensive mark-recapture surveys and used radiotelemetry to document movement patterns, migration routes, and travel corridors of Spotted Frogs (*Rana luteiventris*). On a local scale, we found that fish and frogs coexisted at 69 percent of the stocked lakes. However, frog egg masses and tadpoles were observed in less than five percent of these lakes. Similarly, Long-toed Salamander (*Ambystoma macrodactylum*) larvae were observed in only one stocked lake. This negative relationship between trout and amphibian reproduction appears to impact amphibian populations on a local scale through increased mortality and decreased recruitment. However, on a landscape scale, the negative effects of fish stocking are less obvious and have yet to be fully understood. Observations of frog movements, including both dispersal and seasonal migrations, suggest that the high mobility of some amphibians may enable certain species to persist despite the impacts of introduced trout. We suggest that the distribution of fishless lakes and isolated wetland habitat near stocked lakes for amphibian resource utilization in conjunction with amphibian migration and dispersal abilities may serve to mediate some of the negative effects of fish stocking on a landscape scale. However, if inadequate fishless habitat remains in an area, the stocking of trout may threaten the persistence of amphibians on a landscape scale. David S. Pilliod, Dept. of Biological Sciences, Idaho State University, Pocatello, Idaho, 83209-8007. Phone: (208) 236-4790; Fax: (208) 236-4570; E-MAIL: pilldavi@lcs.isu.edu

Macroinvertebrate Drift in Lower Snake River Reservoirs

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We evaluated density, biomass, and taxonomic richness of macroinvertebrate drift in the Lower Snake River reservoirs from late April 1996 through October 1996 using replicated nets at surface and deep (either 3m or 6m) depths. Seasonality in density and biomass coincided with flows, showing increases in spring and decreases in late summer and fall. Mayfly nymphs (Ephemeroptera) and caddisfly larvae (Trichoptera) were the more prevalent invertebrates in Lower Granite Reservoir in density and biomass. However, the amphipod *Corophium* and cladoceran *Leptodora* were the more prevalent macroinvertebrates in both numbers and biomass in Lower Snake River Reservoir tailrace sampling locations. Mayfly nymphs, caddisfly larvae, *Corophium* and cladocrans showed the widest seasonal differences in numbers and biomass. Average density and biomass decreased from upstream to downstream sampling locations in Lower Granite Reservoir. Average density and biomass was generally higher in deep samples throughout the sampling period. Macroinvertebrates in the drift constitute important food items for juvenile chinook salmon *Oncorhynchus tshawytscha* and steelhead *O. mykiss* in Lower Granite Reservoir and presumably other Lower Snake River reservoirs.

Temperature-dependent Consumption and Gut-residence Time in the Opossum Shrimp *Mysis relicta*

Steve R. Chipps and David H. Bennett
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We estimated maximum consumption for *Mysis relicta* fed ad-lib rations at 4, 10, 15 and 18 °C. Gut-residence time was also evaluated for *M. relicta* fed ad-lib rations of *Daphnia* at 4, 10 and 15 °C. Maximum consumption ranged from 22% · day^{-1} at 4 C to 43% · day^{-1} at an optimum temperature of 10 °C. At 18 °C, *Mysis* fed an average of 24% · day^{-1} with no apparent loss of appetite. Gut-residence time was inversely related to water temperature indicating that absolute evacuation rates increase with increasing water temperature. Feeding and gut-evacuation rates become disassociated at water temperatures greater than 15 °C. At higher water temperatures, evacuation rate continues to increase while feeding rate declines. Hence, the capacity to consume and digest food is no longer sustained at water temperatures above 15 °C. These relationships may provide an explanation for *Mysis* distribution in the natural environment. During summer stratification, *Mysis* typically migrate upward in the water column until they reach water temperatures of 15-18 °C. Moreover, estimating *Mysis* consumption using gastric evacuation models will likely be unreliable since at higher temperatures there is a breakdown in the association between gastric evacuation and feeding rates.

Ontogenetic Changes In The Feeding Habits of the Opossum Shrimp *Mysis relicta*

Steve R. Chipps and David H. Bennett
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We evaluated growth response of age-0 *M. relicta* reared in net pens containing different zooplankton densities. In-situ experiments were conducted with 1-month (YOY) and 5-month old (Juvenile) *M. relicta* to assess ontogenetic changes in feeding and growth. *Mysis* were reared at three zooplankton densities (high, low and none, $N = 12$) during June and October, 1996. Growth of YOY *Mysis* (4-6 mm) was not affected by zooplankton biomass ($P = 0.52$) with mean specific growth rates ranging from 3.5 to 3.6% · day^{-1}. Growth of juvenile *Mysis* (8-11 mm) was significantly affected by zooplankton biomass ($P < 0.001$). Specific growth rates of juvenile *Mysis* ranged from 1.5% at low zooplankton biomass (mean = 7.2 ug dw/l, S.E. = 1.7) to 2.6% · day^{-1} at high zooplankton biomass (mean = 26.5 ug dw/l $\pm$ S.E. = 12.4). A type II functional response was observed between prey density and juvenile *Mysis* consumption, corroborating earlier studies. Effects of zooplankton abundance on *Mysis* growth implies that the relative importance of zooplankton in *Mysis* diets increases as *Mysis* size increases above 8 mm. Size-dependent changes in feeding habits should be considered in bioenergetics modeling, particularly when diet composition is assumed.

Use Of Complementary Surveys In Fishery Management

Jim Davis and Tom McArthur
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2750 Kathleen Ave, Couer d'Alene, ID 83814

We combined a angler creel survey with an opinion survey of anglers fishing the St. Joe and Coeur d'Alene rivers. The goal was to obtain creel information that could be compared to previous creel surveys and to determine angler preferences and opinions about the current fishery management and potential changes in fishery management of the St. Joe and Coeur d'Alene rivers through the use of a modified Tillman approach mail survey.

The survey was designed to determine the opinions from all anglers and be able to separate angler opinions from particular sections. The questionnaire was divided into seven sections. Each section covered one main topic. The topics were: fishery management of the St. Joe or Coeur d'Alene rivers in general, fishery management of the St. Joe or Coeur d'Alene rivers below the catch-and-release section, fishery management of the tributaries to the St. Joe or Coeur d'Alene rivers, general angler attitudes, guided fishing trips, perception of the Department of Fish and Game's ability to manage fishery resources and general angler demographics.

The questionnaire design allowed us to separate the opinions of anglers from sections of the rivers that were most affected by potential changes. The overall opinion of anglers from the St. Joe River was to support the expansion of the catch-and-release area, 67%. Whereas, only 46% of the anglers from the section most affected by the potential change (the harvest area) supported the change, 39% did not support the change and 15% were undecided. There was not an overwhelming majority in favor of the change. This design allowed us to consider the displacement of anglers affected by the potential change.

Attitudes in the Coeur d'Alene River were generally for the status quo. In the same question as above, all anglers combined supported expansion by 48% to 39% with 18% of the anglers were undecided. Anglers from the harvest section that would be affected by the expansion of the catch-and-release area favored the change 43% to 40% opposed and 16% of the anglers were undecided. There was not a demanding preference for expansion.

Recent Flood Effects On The Nez Perce National Forest And Adjacent Areas

Nick Gerhardt
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The Nez Perce National Forest and adjacent areas experienced a series of storms and floods in May 1995, November 1995, February 1996, and January 1997. There was also above-average spring runoff in May and June of 1996. On the Forest, the four storms resulted in about 330 inventoried landslides or other events. Reconnaissance surveys suggest that about 65% of these were natural and 35% were management-related. The May storm struck developed areas of the Forest, but the November and February storms affected more undeveloped areas. The January, 1997 flood primarily affected the Little Salmon River drainage. Post-flood responses included road and trail repair work and obliteration of some failed roads.

The Horse Creek Watershed Study presented a unique opportunity to observe storm effects in paired developed and undeveloped watersheds. The study was initiated in 1965, with treatments beginning in 1978. The recent storms apparently resulted in significantly more sediment yield, most notably gravel-size bedload, in treated versus untreated watersheds. Observations suggest this was the case in first and second order tributaries, and in the two third order forks of Horse Creek. The primary hypothesis to explain the greater bedload movement in the developed watersheds is increased peak flows in headwater streams, resulting in channel erosion, and subsequent bedload delivery to the third order Main Fork of Horse Creek.

The primarily-agricultural Camas Prairie was affected by the February, 1996 storms. These watersheds experienced surface erosion and channel erosion in their headwaters. Lower main stem channels typically aggraded, resulting in lateral migration and damage to structures and facilities. The most common post-flood response in the lower channels was to bulldoze the flood-deposited materials. This work commonly resulted in riparian and stream habitat damage and is often counterproductive to the goal of reducing future flood damages. Future in-channel restoration work should be more thoughtfully designed and implemented.

Observations On Possible Effects Of The 1995-96 Winter Floods On Northern Idaho Fish Populations

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During the period from late November 1995 to April 1996, northern Idaho watersheds were subjected to three substantial flood events. Flooding altered many stream channels, and damaged private property and public works projects. Flood damage to fish and wildlife habitat included loss of aquatic habitat diversity, loss of stream channel diversity, high rates of sedimentation, and lost or damaged riparian habitats. In some cases, flooding actually increased aquatic habitat diversity, and may improve riparian conditions over the long term.

Flood control and flood damage repair operations often damaged fish habitat by channelizing streams, destabilizing stream channels, and eliminating riparian habitat. Lack of maintenance on forest roads and stream crossings, land management practices, development of private property and infrastructure in floodplains, and past flood control efforts were problems most typically associated with negative impacts to fish habitats. Paired pre- and post-flood data suggest westslope cutthroat trout populations may have been negatively affected. Use of available flow and bull trout spawning escapement data, and sampling for young-of-the-year bull trout suggest the 1995 year class of bull trout was negatively affected by mid-winter flooding. Other likely impacts to fish are discussed.

Stream Dynamics, Fish Habitat, and Public Perceptions

Glen Mendel
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In February 1996, much of the Northwest experienced severe flooding. I present two examples of flood events in southeast Washington for the Touchet and Tucannon rivers and subsequent public reactions. Many sections of these streams were channelized, diked or dozed along private land after the flooding. Trees and fish habitat protection were blamed for having caused the floods, even though a major rain-on-snow event with frozen ground caused the high river flows and flooding. Much of the general public blamed fish habitat protection laws administered by the Washington Department of Fish and Wildlife because landowners have been restricted from removing gravel bars or riparian vegetation along the stream channels. Local governments and private landowners were able to obtain State and Federal permit exemptions under emergency status to do whatever they felt was necessary for restoration and prevention of additional flooding in the near future. Most stream restoration efforts were conducted by untrained individuals that in some cases caused more damage and in other cases were relatively ineffective.

I contend that we, as professional fish biologists, can never win the simplified argument that pits fish and fish habitat against private or public property and human life. If we are to maintain suitable fish habitat in streams within private lands we must work with engineers and develop methods that stabilize streams and protect property while maintaining good fish habitat. We should also work with funding agencies such as FEMA to restrict the types of work allowed and take a more holistic approach to stream and flood management that maximizes long term stability and includes other benefits, while minimizing costs. Fish habitat and recreation are a few of the benefits that could be achieved with long term channel stabilization and bank protection. I offer a few suggestions of how we as professional biologists can facilitate a coordinated, holistic approach to flood reduction and bank protection.

Stream Structures for Fish Habitat Enhancement in East Fork Potlatch River

Dennis T. Schult and James L. Fridley
University of Washington

Terrance W. Cundy
Potlatch Corporation

Two hundred forty-seven structures placed to enhance fish habitat were evaluated one year after installation to determine effects on physical channels characteristics and fish populations. Types of structures placed included log deflectors, rock weirs, rock islands, stumps and revetments. Specific parameters measured included channel cross-sections immediately upstream and downstream of structures and fish numbers in both treated and untreated reaches. Ninety-eight percent of the structures survived the first year. Eighty-five percent of log deflectors and rock weirs created pools. The pool area increased by 137 m^2 and pool volume increased by 41 m^3 over the treated reach. Average salmonid density in treated reaches was 1.1/m^2 compared to 0.37/m^2 in untreated reaches.

A Hydraulic Approach to Fish Habitat Evaluation

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Neil Ringler
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Fifty-seven kilometers of stream channel larger than first order within the watershed of the South Branch of Onondaga Creek N.Y. were studied. Stream channel morphological features such as gradient, substrate size/sorting, width to depth and entrenchment ratios, bankfull width and sinuosity were examined at 14 sites, representative of the channels found in the valley. Stage/Discharge relationships were developed at 12 locations in the watershed. Hydraulic evaluations were made using Froude number to evaluate flow state at 31 cross sections at each site. Results from the hydraulic habitat modeling are used to evaluate aquatic habitat and compared to visual descriptive techniques of habitat evaluation (Platts et al. 1983).

The Tale of Two Jacks Creeks: Redband Trout Abundance in Relation to Stream Temperatures

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I examined redband trout (*Oncorhynchus mykiss gairdneri*) density and stream temperature with increasing distance from headwater springs in Big and Little Jacks creeks. These streams flow northeast from the Owyhee Mountains in southwestern Idaho. Despite strikingly similar stream habitats, trout abundance differed between the two streams. Redband trout density averaged 0.8 fish/m^2 (SE = 0.11, n = 6) for the upper 24 km of Little Jacks and 0.3 fish/m^2 (SE = 0.10, n = 6) for the upper 24 km of Big Jacks creek (P = 0.01). Trout densities in both streams near the headwaters were about 1.0 fish/m^2 and decreased with distance from headwater springs (P = 0.04). However, trout numbers declined more rapidly in Big Jacks drainage, decreasing to 0.2 fish/m^2 by 8 km downstream of the headwaters. Trout densities in Little Jacks creek declined to about 0.7 fish/m^2 by 12 km downstream of the headwaters and remained at that level to 24 km downstream. Water temperatures of headwater springs averaged 10°C in both drainages. Maximum water temperatures (measured 24 km downstream of headwaters) differed significantly between the streams (P < 0.001). Maximum temperatures in Little Jacks ranged from 18-22°C and from 20.2-26.0°C in Big Jacks creek during July 1996. Daily temperature fluctuations also differed between streams averaging 3.6°C for Little Jacks and 7.8°C for Big Jacks creek (P < 0.001). Differences in the composition of fish communities of the two streams also corresponded to the elevated water temperatures in Big Jacks creek. Temperature differences were likely due to lower levels of stream shading in the Big Jacks drainage.

Cutthroat Trout Abundance and Distribution in the Coeur d'Alene River Basin

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University of Idaho, College of Forest, Wildlife and Range
Moscow, ID 83844

Bruce E. Rieman
USDA Forest Service, Intermountain Research Station
316 E. Myrtle, Boise, ID 83702

James L. Dunnigan
USDA Forest Service, Fernan Ranger District
Fernan, ID

Sixty two streams in the Coeur d'Alene River basin between July and October, 1996, were electrofished using a single pass to determine the spatial distribution, relative abundance, and length frequency of westslope cutthroat trout *Oncorhynchus clarki lewisi*. A stratified random sampling scheme was used to locate nine-30 m sites within each stream. As in surveys conducted in 1994 and 1995, few rainbow trout *O. mykiss* and no bull trout *Salvelinus confluentus* were collected. Sculpin *Cottus* spp. distribution and densities were similar to previous survey results. Initial estimates of westslope cutthroat abundance were lower than those in 1994 and 1995 suggesting possible adverse affects from the winter 1996 floods. Age 0 westslope cutthroat trout were widely distributed in second and third order streams but were only located in the upper reaches of the North Fork of the Coeur d' Alene and main Coeur d' Alene rivers.

Smoltification, Stress, and Health Indices in Wild And Hatchery-reared Spring/Summer Chinook Salmon and Steelhead Smolts Sampled Before And After Barge Transportation[1]

Jim Congleton[2] and Bill LaVoie
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Carl Schreck[2] and Larry Davis
OCFRU, Department of Fisheries and Wildlife
Oregon State University

Diane Elliott[2] and Ron Pascho[2]
Northwest Biological Science Center, Seattle

Salmonid smolts migrating seaward from the Snake River basin must pass through eight hydroelectric dams on the Snake and Columbia Rivers. In an effort to improve survival, fish entering turbine intakes at upstream dams are diverted into bypass systems and loaded into fish-transport trucks or barges for transportation around the remaining dams. Several earlier studies examined stress or smoltification indices in smolts sampled at the dams or during transportation, but did not distinguish between fish of wild and hatchery origin. When State and Federal fish hatcheries in the Snake River basin began a fin-clipping program for juvenile salmonids in 1993, it became possible to identify hatchery (clipped) and wild (unclipped) fish sampled at downstream dams.

Migrating wild (**W**) and hatchery-reared (**H**) chinook salmon (**CS**) smolts were sampled by lift-net after loading into fish-transport barges at Lower Granite (**LGr**) Dam and after transportation to Bonneville (**Bonn**) dam on six dates in 1995. Similarly, W and H steelhead (**SH**) smolts were sampled before and after barge transportation to Bonn Dam in 1996. After anesthetization in a lethal dose of MS-222, the fish were weighed and measured. Blood, gill, kidney, spleen, and liver samples were taken for later analysis.

Smoltification, CS and SH.–Progressing smoltification of H fish (both CS in 1995 and SH in 1996) during the last week of April and first week of May was indicated by increases in gill Na^+, K+ -ATPase activity and decreases in condition factor. These trends were not observed in W fish: smoltification was as advanced in early W migrants as in later ones.

Stress and health indices in CS.–The most extreme values for stress indices (plasma cortisol, glucose, and Cl^-) in both H and W CS occurred when barge loading densities were highest. When barge loading densities were high, stress indices did not recover during barge transportation. Plasma cortisol concentrations in W CS smolts were strongly ($P < 0.001$) correlated and in H CS smolts weakly ($P = 0.1$) correlated with loading densities of SH in the barges. Cortisol concentrations were higher in W than in H CS, but plasma Cl^-, glucose and liver glycogen concentrations were similar. Metabolic indices (plasma cholesterol, triglyceride, and total protein) were higher in H than in W fish. Antioxidant defenses (resistance of red blood cells to peroxidative lysis) were higher in W than in H fish. The incidence of erythrocytic inclusion body syndrome was low in W fish but unexpectedly high in H fish.

Stress and health indices in SH.–Stress indices in SH sampled at LGr Dam increased throughout the migration, but were relatively low on all dates in SH sampled at Bonn Dam. No correlation was found between stress indices and loading densities of SH in the barges. Cortisol and glucose concentrations were higher in H than in W SH, in contrast to the observation that stress indices were higher in W than in H CS. Also in contrast to findings with CS, antioxidant defenses were higher in H than in W SH.

[1]*Funded by the Walla Walla District of the U.S. Army Corps of Engineers*
[2]*Employees of Biological Resources Division, US Geological Survey.*

Physiological Indices, Microbial Infection, and Short-term Survival of Descaled and Non-Descaled Chinook Salmon and Steelhead Smolts at Lower Snake River Dams[1]

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Oregon State University

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Descaling is the primary criterion used to determine the extent of physical damage to juvenile salmonids passing through fish collection systems at dams on the Snake and Columbia Rivers. Despite the reliance on descaling to quantify physical damage, little is known about the effects of descaling on the viability of juvenile salmonids.

Juvenile chinook salmon (**CS**) and steelhead (**SH**) were sampled from the Lower Granite smolt monitoring daily sample in 1995 and similarly in 1996 (SH only) from the Lower Granite, Little Goose, and Lower Monumental daily samples to determine the effects of scale-loss on physiological indices. Visual estimates of scale-loss were made, individuals were assigned to scale-loss categories, and blood samples were taken for analysis of stress and tissue damage indices. Descaled and non-descaled juvenile CS and SH were also sampled from the Lower Granite daily sample in 1995 and SH in 1996 to evaluate the susceptibility of descaled areas to microbial infections and short-term survival. Additional SH were experimentally descaled in 1996. All fish were marked with visual implant tags for identification, and examined at regular intervals for mortalities and to determine the presence and location of fungus.

Physiological Indices – In 1995, there were no significant differences in plasma cortisol, chloride, or glucose concentrations in either CS or SH among scale-loss categories indicating that stress levels did not increase with increased descaling . There was, however, a significant increase in alanine aminotransferase (**ALT**; $P = 0.02$) and aspartate aminotransferase (**AST**; $P \leq 0.0001$) concentrations in CS as scale-loss increased suggesting that degree of tissue damage was associated with degree of descaling. ALT and AST concentrations in 1995 SH also increased with scale-loss, but differences were not significant. Results were similar in 1996 with no differences being found in SH cortisol, chloride, or glucose concentrations among descaling classes and a significant increase in AST ($P = 0.02$), ALT ($P = 0.02$), and creatine kinase ($P \leq 0.0001$) concentrations with increased descaling.

Microbial Infection – In 1995, mortality among all CS was 11%, of which 75% were descaled and 75% had prior fungus growth. Mortality among all SH was 23%, of which 60% were descaled and 44% had prior fungus growth. Fungus was predominately found on fins rather than on descaled areas of both species. In 1996, results were variable between trials. In the first trial, few SH developed fungus (11.5%) and mortality was extremely low (1.5%). In two later trials, concurrent with high river discharge and turbidity, fungus growth (63 and 67%) and mortality (73 and 78%) was frequent, but there were no noticeable differences between descaled and non-descaled SH. A high percentage of mortalities (74 and 82%) among all treatment groups had prior fungus growth and 89 and 93% of those fish died within 6 d after fungus was first detected. As in 1995, fungus was predominately found on fins rather than on descaled areas.

[1]*Funded by the Walla Walla District of the U.S. Army Corps of Engineers.*
[2]*Employees of Biological Resources Division, US Geological Survey*

The Origin of Fishes in the Big Lost River Idaho, Drainage

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There has been considerable disagreement as to the native fishes of the Big Lost River drainage and the means by which they were established. Although the isolated nature of this stream currently prevents fish from gaining access to the drainage, previous authors have proposed that cutthroat trout *Oncorhynchus clarki*, bull trout *Salvelinus confluentus*, shorthead sculpin *Cottus confusus*, mountain whitefish *Prosopium williamsoni*, and possibly rainbow trout *Oncorhynchus mykiss* were the native species. They believed these fish were established in the Big Lost River drainage through headwater stream capture from the Salmon River drainage and/or historical connections with the Snake River drainage. However, accounts from the late 1800's and present distribution patterns suggest that mountain whitefish, shorthead sculpin, and possibly Paiute sculpin *Cottus beldingi* are the only native species. The distribution pattern of the shorthead sculpin indicates this species was established in the Big Lost River, Little Lost River, and/or Birch Creek via headwater stream capture from the Salmon River drainage prior to or during the most recent existence of pluvial Lake Terreton. This species then gained access to and became established in the remaining Lost Streams via Lake Terreton. It is unclear how or when the mountain whitefish originated in the drainage. Although the means of establishment is not clear, the distribution pattern of the Paiute sculpin suggests that it has been established in the drainage since the most recent existence of Lake Terreton. The apparent historical lack of trout in the Big Lost River and Birch Creek suggests that trout were not present in any of the Lost Streams during the most recent existence of Lake Terreton.

Threats and Management Responses to the South Fork Snake River Yellowstone Cutthroat Trout Fishery: An Integrated Management Program

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The South Fork Snake River supports the most important Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) fishery outside of Yellowstone National Park. Since 1982 feral rainbow and rainbow/cutthroat hybrid trout have steadily increased their range of distribution, numbers and their proportion of the overall trout population (< 1% in 1982 to 15% in 1996) in the upper South Fork Snake River. The increase in rainbow and hybrid trout numbers in the fish population and the angling catch, is an issue of concern for fishery managers and anglers who believe that the South Fork cutthroat trout population is jeopardized by genetic introgression and competitive/predatory interaction with the rainbow trout population. We describe current efforts to assess the level of interaction of rainbow trout with the native Yellowstone cutthroat trout population in the South Fork. We also discuss implications for the stability and viability of the cutthroat population, potential management strategies for conserving cutthroat trout in the South Fork and conflicting expectations by South Fork anglers. Although some South Fork anglers are demanding fishery management changes to conserve cutthroat trout, at the expense of rainbow trout, other anglers may not support a management program to control or reduce rainbow trout numbers. Those expectations will have to be reconciled for conservation management strategies to succeed socially and politically.

Spawning Habits of Wild Rainbow/Hybrid Trout And Their Overlap With Native Cutthroat Trout In The South Fork Snake River

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The South Fork Snake River from Palisades Dam downstream to Heise is one of the few large river systems where native cutthroat trout still dominate the fishery. However, dramatic recent increases in rainbow and hybrid trout numbers is causing concern about the future of the native cutthroat population. The goals of our study were to 1) identify the location and timing of spawning for rainbow and hybrid trout, 2) define spawning overlap, both spatially and temporally, between rainbow, hybrid and cutthroat trout. In 1996, we radio-tagged twenty-five rainbow and hybrid trout and located them weekly throughout the spawning season. Mainstem electrofishing was used to supplement telemetry observations in order to determine the timing of spawning. Rainbow and hybrid trout spawned in the lower 4 km of Palisades and Pine creeks and throughout the side-channels in the SFSR. Spawning of rainbow, hybrid and cutthroat trout occurred from April to mid May, May to June and June to July, respectively. While rainbow trout spawned prior to cutthroat trout in most cases, overlap was observed between male cutthroat and female rainbow trout and between hybrid and cutthroat trout. Overlap in spawning location occurs between all trout in side-channels, but cutthroat trout appear to use more tributary habitat. Significant impacts may occur as rainbow and hybrid trout numbers increase and expanding spawning locations and timing continue to encroach on the native cutthroat trout.

Sediment Monitoring Below Large Mines on the Payette National Forest

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As required by law, the Payette National Forest is managed to provide for various, sometimes conflicting, uses. While some uses leave little or no obvious or long-term impact, others have obvious and sometimes persistent effects. This presentation discusses large mines on the Forest and our efforts to monitor and evaluate their effects on streambed sediment; we also consider the efficacy of various monitoring techniques and make suggestions about their use.

The mines considered, Stibnite and Thunder Mountain, are very large and have long and colorful histories. Both have been implicated in aquatic habitat degradation of streams that are important for federally listed (or proposed for listing) endangered salmonids; proposals to expand operations at both mines are currently under study. The Payette Forest Plan calls for monitoring aquatic conditions below these mines to evaluate the effectiveness of mitigation efforts implemented in response to known or potential problems. In general, these measures appear to have been effective, because the proportion of free particles relative to particles in the streambed that are embedded by fine sediments has increased or remained relatively stable in sites most affected by mine discharge, while the proportion of free particles in associated control sites has either remained relatively stable or declined.

Sediment monitoring is confounded by natural variability in the streams monitored, by weaknesses in methods, and by variability related to observer inconsistency and error. We discovered that a well-documented and expected relationship between the proportion of free particles measured by the 30-hoop free matrix technique and the average embeddedness measured by the cobble embeddedness technique existed from 1988 to 1991, but could not be found in our data after that. We also discovered that no relationships between median particles sizes and fines estimated by core sampling and pebble counts could be detected. We concluded that the free matrix technique appeared to be a reasonable method for monitoring streambed conditions, and that considerable attention must be paid to crew training when using the cobble embeddedness technique. We also determined that we agreed with the originator of the Wolman Pebble Count technique when he stated that it was not well suited to measurement of fine particles.

Adaptation of the Index of Biotic Integrity to Evaluate Idaho River Ecosystems

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Fish assemblage metrics (e.g., species richness, tolerant-intolerant, presence-absence, biomass) were included in a series of measures developed to assess medium river ecosystem integrity throughout the state of Idaho. At each of fifteen sites, a representative segment of river (300-500 meter length) was electrofished to determine species presence and abundance. All available habitats (riffle, pool, backwater, and river margin) were sampled to include data on both game and non-game species as well as evidence of salmonid reproduction. Results were compared to physical/chemical, macroinvertebrate, and habitat data collected previously at each site. Tolerant-intolerant and sculpin biomass metrics exhibited the strongest correlations with macroinvertebrate and substrate metrics. Species richness was found to be the least sensitive due to the depauperate nature of many higher elevation streams. Overall, use of fish assemblage metrics was found to be cheaper and quicker than macroinvertebrate metrics, but less sensitive to local perturbations.

Effects of "Bait Training" on Return to Creel of Put-and-Take Trout in Streams

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We speculated that catchability and return to creel of put-and-take rainbow trout in streams could be enhanced if the fish recognized common bait items as food. To test this hypothesis, we "trained" rainbow trout by feeding with night crawlers for 5-7 days prior to planting. Control "untrained" fish were maintained on pellet diets. We jaw-tagged and planted 250 trained and 250 untrained fish each in ten streams in southern Idaho, and monitored relative tag returns for each stream. Overall, trained fish had 10% higher return to creel than untrained fish (paired t-test, $p = .20$). Returns of trained fish were up to 75% higher in individual streams, but differences were not consistent among streams. We conclude that while "bait training" can improve returns of put-and-take trout in some stream fisheries, the benefits will vary with stream size and habitat type, and intensity of angling effort.

Using Auxiliary Data to Estimate Natural Mortality

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We are often faced with drawing conclusions from insufficient data. However, there are times when, by chance or design, we're fortunate enough to acquire auxiliary pieces of information that can shed light on a situation. During routine assessments of trout stocks in Southeast Alaska, I needed to estimate natural mortality (M) for a reservoir population of rainbow trout. I didn't feel comfortable with the assumptions of constant survival and recruitment inherent in catch curve analysis, so I employed a model (Pauly 1980) based on mean annual water temperature and von Bertalanffy (LVB) growth parameters. Although I had estimates of the LVB growth parameters, my data on mean annual water temperature were incomplete. I resorted to estimating M over a range of possible temperatures, and obtained values between 0.13 and 0.30. I used auxiliary information on the relationship between M and K (Brody growth coefficient in the LVB model), population longevity, between-season survival, and in-season fishing mortality to support a natural mortality estimate of 0.26.

Reintroduction of Coho Salmon To The Clearwater River Subbasin

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Historically, the Clearwater River subbasin supported a self sustaining run of coho salmon. The Lewiston Dam, constructed in 1927, lacked adequate fish passage facilities until at least 1939 and is believed to have extirpated coho salmon from the Clearwater River. In 1994, the Nez Perce Tribal Executive Committee directed their Fisheries Management Program to proceed with reintroduction of coho salmon to the Clearwater Subbasin to meet goals identified in the Nez Perce Tribe Cuhlii (Coho Salmon) Restoration Plan, the Clearwater River Subbasin Plan and the Tribal Recovery Plan. In December of 1994, approximately 630,000 certified-disease-free coho salmon eggs, that originated from the Cascade Hatchery in Oregon, were imported from Fish Pro (Port Orchard, Washington) to the Sweetwater Springs Hatchery, Idaho. The coho salmon were hatched and released at the hatchery until July, 1995 when they were outplanted as fingerlings into tributaries within the Clearwater River Subbasin. Outplanting sites consisted of Orofino Creek, Potlatch River, Lolo Creek, Eldorado Creek, Yoosa Creek and Meadow Creek (Selway River). Coho salmon grew in these streams during the summer and began their downstream migration in the spring of 1996. Following outplant, we monitored and evaluated diet, growth, interspecific interactions and outmigration of the coho salmon.

POSTER

Differentiation of two burbot stocks in the Kootenai River British Columbia, Idaho, and Montana, using mitochondrialDNA analysis

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Tissue samples from burbot (*Lota lota*) collected in the Kootenai River were examined for potential genetic differences in mitochondrial DNA haplotype. Differences, if evident, may suggest spatially or temporally segregated spawning populations of burbot and in turn, precipitate different approaches to management and conservation practices for each. Mitochondrial DNA was extracted from 96 burbot collected at various locations within the Kootenai River and Lake Koocanusa in British Columbia, Idaho, and Montana. Extracted DNA was amplified using the polymerase chain reaction (PCR) and primers specific for two gene regions of the mitochondrial genome, NADH Dehydrogenase 2 (ND 2), and Cytochrome b. The amplified DNA was screened for restriction fragment length polymorphisms (RLPs) using several restriction enzymes. Differences in restriction fragment patterns from the two amplified regions correspond to east and west geographic areas of the Kootenai River basin. Fish collected from the western reaches of the Kootenai River (British Columbia and Idaho) were monomorphic with regard to restriction fragment patterns generated from either the ND 2 or Cytochrome b region. Burbot collected from the eastern reaches of the Kootenai River or in Lake Koocanusa (Montana) were fixed for an alternative restriction fragment pattern in ND 2. Cytochrome B restriction fragment patterns from eastern fish were polymorphic but exclusive of the Cytochrome b pattern seen in the western fish. Management implications through these findings are; preservation of these unique stocks, unification of angling regulations in Idaho and British Columbia, distinction of the life histories using the Adaptive Ecosystem Assessment method, and the prospective need for different mitigative management for each stock.