IDAHO CHAPTER AMERICAN FISHERIES SOCIETY
ANNUAL MEETING 2000
HELD WITH PARTICIPATION OF MEMBERS FROM THE
NORTH PACIFIC INTERNATIONAL CHAPTER
Coeur d'Alene Idaho March 13-15, 2000

Sunday, March 12

1600-1800 Registration
1730-2100 EXCOM Meeting

Monday, March 13

0700-1000 Registration
0900-0915 Introductions and Housekeeping
0915-0930 American Fisheries Society President Address- *Christine Moffit*

Plenary Session
– Native Fish; Do they have to go to the ocean to be important.

0930-1000 *Native Fish and the Wilford Brimley, Winston Churchill, and Aldo Leopold Principles*- Chip Corsi
1000-1045 *Landscapes and the Conservation of Native Fishes (or Why we don't need genetics to protect native fish)* - Bruce Rieman
1045-1100 Break
1100-1140 *Genes- Why Native Fish won't survive without them* – Paul Spruell
1140-1220 *Washington's Native Non-Game Management*- Paul Mongillo

Lunch

1400-1440 *Idaho's Native Game Fish Management* – Virgil Moore
1440-1500 *Prioritizing Restoration* - Rick Stowell
1500-1540 *Idaho Forest Practices Act and Fish Protection* – Joe Dupont
1540-1600 Break
1600 Until Completed – Round Table With Participants

1900 - Pizza Feed with the Palouse Unit – Location to be Announced

Tuesday, March 14

0830-0850 -- **Underwater video monitoring of adult chinook salmon escapement in Lake Creek Idaho.** Dave Faurot, Paul Kucera, and Jay Hesse Nez Perce Tribe, Department of Fisheries Resources Management, Lapwai, Idaho.

0850-0910 -- **Concentrations of selected trace elements in fish tissue and streambed sediment in the Clark Fork, Pend Oreille and Spokane River Basins, Idaho, Montana, and Washington.** Terry R. Maret, U.S. Geological Survey, Boise,

0910-0930 -- **A comparison of grazed watersheds and reference watersheds in central Idaho: How feasible are large-scale monitoring efforts?** Henderson, R., J. L. Kershner, A. K. Archer, and C.J. Abbruzzese.

0930-0950 -- **How repeatable are in-channel and riparian habitat surveys.** Archer, A. K., J. L. Kershner, R.C. Henderson, A. Archer, and C.J. Abbruzzese.

0950-1010 -- Break

1010-1040 -- **Resumption of a limited harvest fishery for bull trout in Lake Pend Oreille, Idaho: Could we, should we, ...would we?** Charles Corsi and Chris Downs Idaho Department of Fish and Game, 2750 Kathleen Ave., Coeur d' Alene, Id 83815

1040-1100 -- **Detection of resident bull trout populations in headwater streams in the Weiser River and Brownlee Reservoir subbasins.** Rodger Nelson, Eric Veach, Dave Burns. Payette National Forest.

1100-1120 -- **Monitoring the adfluvial bull trout populations in Anderson Ranch Reservoir and South Fork Boise River.** Fred Partridge, Chuck Warren, Karen Frank,Idaho Department of Fish and Game, 868 East Main, PO Box 428, Jerome, Idaho 83338

1120-1140 -- **Migration Timing and Abundance Trends in an adfluvial Bull Trout Population in Kootenay Lake, British Columbia.** W.R. Olmsted, D. den Biesen and G.J. Birch BC Hydro, Kootenay Generation Area, 601-18th Street, Castlegar, British Columbia V1N 4G7

1140-1200 -- **Does Idaho's Forest Practices Act protect bull trout habitat.** Joe DuPont, Idaho Department of Lands 3780 Industrial Avenue S. Coeur d'Alene, Idaho 83815

1200-1345 Lunch

1345-1405 -- **Overview of major influences on eutrophication trends in Coeur d'Alene Lake, Historical to Present.** Paul F. Woods, U.S. Geological Survey, 230 Collins Road, Boise, ID 83702

1405-1425 -- **Defining the determinants limiting wild trout production in the South Fork Coeur d'Alene Basin, Idaho using a reference stream approach** Dudley W. Reiser, Eric Jeanes, Edward Connor, and Keith Binkley. R2 Resource Consultants, Inc. 15250 NE 95th St. Redmond, Washington 98052-2518

1425-1445 -- **Status and recovery potential for westslope cutthroat trout (*Oncorhynchus clarki lewisi* in waters of the Coeur d'Alene Indian Reservation.** Angelo J. Vitale Coeur d'Alene Tribe Fisheries Program P.O. Box 408 Plummer, Idaho 83851.

1445-1505 -- **Supplementation of westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in tributaries of Coeur d'Alene Lake located on the Coeur d'Alene Indian Reservation.** Ronald L. Peters. Coeur d'Alene Tribe Fisheries Program. P.O. Box 408 Plummer, Idaho 83851

1505-1520 -- Break

1520-1540 -- **Effect of an artificial side channel on fry production and rearing densities of rainbow trout in Murphy Creek, Southeastern British Columbia.** Arndt, S.K.A. Columbia Basin Fish & Wildlife Compensation Program, 103-333 Victoria St., Nelson, British Columbia, Canada V1L 4K3.

1540-1600 -- **The effect of three education strategies on angler ability to recite fishing regulations and to identify salmonids with special emphasis on Bull Trout.** Dan Schill and Tony Lamansky. Idaho Dept of Fish and Game,1414 Locust Road Nampa, ID 83703

1600-1620 --**Evaluation of a Pressure and Temperature Data Storage Tag with a Radio Transmitter in Adult Salmon and Steelhead on the Snake River.** Tami Reischel*, Theodore C. Bjornn, Rudy Ringe, Megan Heinrich, Chris Peery, and Travis Dick, U.S. Geological Survey, Idaho Cooperative Fish and Wildlife Research Unit University of Idaho, Moscow, ID 83844-1141.

1620-1640 -- **The long-term effects of climate on change on Canadian salmon productivity.** David Welch. High Seas Salmon Research, Department of Fisheries and Oceans, Nanaimo, British Columbia.

1900 – **Raffle at the Coeur d'Alene Resort**

Wednesday, March 15

0830-0850 -- **Healing of electroshock-induced hemorrhages in hatchery rainbow trout.** F. Steven Elle and Daniel J. Schill. Idaho Department of Fish and Game, 1414 East Locust Lane, Nampa, Idaho 83686, USA.

0850-0910 -- **Endangered Species Habitat Conservation Planning in the Rocky Mountains,and Plum Creek Timber Company's Native Fish Plan** Ted Koch, U.S. Fish and Wildlife Service, Boise, Idaho

0910-0930 -- **Analysis of Historical Mountain Whitefish Data from the Lower Columbia and Kootenay Rivers**. Dana Schmidt R. L. & L. Environmental Services Ltd., 201 Columbia Ave., Castlegar, British Columbia, Canada, V1N 1A2

0930-0950 -- **Variation in focal spawning location of Kootenai River white sturgeon and some factors that affect it.** Vaughn L. Paragamian, Virginia Wakkinen, and Gretchen Kruse Idaho Department of Fish and Game,2750 Kathleen Avenue Coeur d'Alene, Idaho 83815

0950-1010 Break

1010-1030 -- **Effects of water level fluctuations on benthic macroinvertebrates in the Hanford Reach, Columbia River, Washington.** Eric J. Stark, David H. Bennett, Dept. of Fish & Wildlife, College of Natural Resources, University of Idaho, Moscow, ID

1030-1050 -- **The Distribution of introgression in Westslope Cutthroat Trout populations in the North Fork Clearwater Basin, Idaho.** D. E. Weigel, J. T. Peterson, P. Spruell, and J. Zakrajsek

1050-1120 -- **Stream surveys: If they are the answer what is the question?** Brett Roper, Idaho Panhandle National Forest, 3815 Schreiber Way, Couer d'Alene, Idaho 83815

ABSTRACTS

Tuesday, March 14

0830-0850 -- **Underwater video monitoring of adult chinook salmon escapement in Lake Creek Idaho.** *Dave Faurot, Paul Kucera, and Jay Hesse Nez Perce Tribe, Department of Fisheries Resources Management, Lapwai, Idaho.*

Underwater time-lapse video technology was used to monitor adult spring and summer chinook salmon escapement into spawning areas of the Secesh River and Lake Creek, Idaho, in 1998. This was the second year of testing the remote application of this methodology in the Secesh River drainage. Underwater time-lapse videography is a passive methodology that does not trap or handle this Endangered Species Act listed species. Secesh River chinook salmon represent a wild spawning aggregate that has not been directly supplemented with hatchery fish. The Secesh River is also a control population under the Idaho Salmon Supplementation study.

Migrating salmon in the Secesh River and Lake Creek exhibited two distinct segments of fish movement, separated by a period of no fish movements. The first segment consisted of male and female upstream movement with very little downstream movement. The second segment followed the period of no fish movements and was primarily males moving upstream and downstream with much less net upstream movement. The first upstream migrating adult chinook salmon passed the Secesh River fish counting station prior to installation on July 10. The first passage on Lake Creek was recorded on July 9, 16 days after installation of the fish counting station. Peak net upstream adult movement at the Secesh River site occurred from July 17 to 19, and on July 18 at the Lake Creek site. The peak of total movement was August 13 to September 1 at Secesh River and August 6 at Lake Creek. The last fish passed through the Secesh River fish counting station on September 9 and on August 26 at Lake Creek. An estimated 148 adult chinook salmon migrated upstream past the Secesh River fish counting station to spawning areas within the drainage. An estimated 49 of those migrated into an upstream tributary, Lake Creek, and 99 spawned in the remainder of the drainage. Abundance was compared to single and multiple-pass redd count surveys within the drainage. There were differences among the three methodologies. Video methodology provided the lowest estimate of adult spawning abundance. There were no unusual changes in stream temperature or stream discharge during periods of no salmon passage. Salmon movements were not impeded by the fish counting stations, nor was spawning displaced downstream. Fish moved freely upstream and downstream through the fish counting structures. Fish movement was greatest between the period of 10:00 PM and 4:00 AM. There appeared to be a segment of "nomadic" males that moved into and out of the spawning area, apparently seeking other mates to spawn with.

This methodology has the potential to provide more consistent and accurate salmon spawning escapement information than single-pass and multiple-pass spawning ground surveys. Accurate adult escapement information would allow managers to determine if recovery actions were benefiting these salmon spawning aggregates.

0850-0910 -- **Concentrations of selected trace elements in fish tissue and streambed sediment in the Clark Fork, Pend Oreille and Spokane River Basins, Idaho, Montana, and Washington.** *Terry R. Maret, U.S. Geological Survey, Boise,*

NO ABSTRACT SUMITTED

0910-0930 -- **A comparison of grazed watersheds and reference watersheds in central Idaho: How feasible are large-scale monitoring efforts?** *Henderson, R., J. L. Kershner, A. K. Archer, and C.J. Abbruzzese.*

NO ABSTRACT SUMITTED

0930-0950 -- **How repeatable are in-channel and riparian habitat surveys.** *Archer, A. K., J. L. Kershner, R.C. Henderson, A. Archer, and C.J. Abbruzzese.*

NO ABSTRACT SUMITTED

1010-1040 -- **Resumption of a limited harvest fishery for bull trout in Lake Pend Oreille, Idaho: Could we, should we, ...would we?** *Charles Corsi and Chris Downs Idaho Department of Fish and Game, 2750 Kathleen Ave., Coeur d' Alene, Id 83815*

Lake Pend Oreille bull trout have long been recognized for their recreational fishery value. Early 20th century travel brochures promoted the fishery, encouraging anglers to come to northern Idaho to fish for them. In 1949 the world record bull trout was harvested from Lake Pend Oreille. As early as the mid-1940's, special fishing regulations were enacted by the Idaho Fish and Game Commission to protect spawning bull trout in Lake Pend Oreille tributaries. Since then, ten additional regulation changes have been enacted to conserve bull trout in Lake Pend Oreille. As recently as 1995, anglers still had an opportunity to harvest bull trout from Lake Pend Oreille under restrictive regulations. Habitat degradation due factors such as hydroelectric development, timber harvest, road construction, urbanization, and fire have reduced the effectiveness of fishing regulations to protect bull trout in tributaries. In 1996, Lake Pend Oreille was closed to the harvest of bull trout to protect the weak spawning stocks in several tributaries. In 1999, the Lake Pend Oreille Bull Tout Watershed Advisory Group completed a bull trout conservation plan for the Lake Pend Oreille system. One of the recovery targets identified by the group is "An overall bull trout population sufficient to provide an annual harvestable surplus." Is it possible to selectively harvest bull trout without placing the Lake Pend Oreille population as a whole, in jeopardy? A long-term redd count data set (17 years) exists which suggests a relatively strong and stable bull trout spawning population using Trestle Creek. A recent population estimate conducted by the US Forest Service Rocky Mountain Research Station indicates a spawning population of approximately 1,400 fish utilizing only 11 km of stream, at a density of approximately 235 fish per hectare. Recent genetic information from the University of Montana for Pend Oreille bull trout indicates high fidelity of adult bull trout to their natal streams, suggesting a loss of fish from one tributary population is not likely to significantly influence refounding or bolstering of stocks in other tributaries. We believe the available information suggests a pre-determined number of post-spawning adults could be marked at a weir on Trestle Creek and then released to enter the lake to provide some harvest opportunity with no adverse consequences to either the Trestle Creek population or the lake as a whole. Anglers capturing a marked bull trout in the lake could harvest it. A mandatory reporting system could be used to track the harvest. There appears to be potential to restore fishing opportunity, while continuing to strengthen weaker stocks of bull trout, and contributing to the overall recovery of the Lake Pend Oreille bull trout population.

1040-1100 -- **Detection of resident bull trout populations in headwater streams in the Weiser River and Brownlee Reservoir subbasins.** *Rodger Nelson, Eric Veach, Dave Burns. Payette National Forest.*

The distribution and abundance of bull trout (Salvelinus confluentus) in the Weiser River and Brownlee Reservoir subbasins is poorly known and, in some instances, controversial. Since formal listing of this species under the Endangered Species Act, this information has become increasingly important for prioritizing watershed restoration efforts, determining risks of ongoing and planned Forest activities to bull trout persistence, and for consulting effectively with regulatory agencies. To assist with required consultation in 1998, we identified habitat areas (patches) within these watersheds that we deemed likely to support headwaters populations of resident bull trout. This initial modeling was based on the work of Rieman and McIntyre, and it was our intent to follow up later in 1998 and in subsequent years with population surveys. We have now surveyed two areas conforming to our model where bull trout had never been formally documented (Bear Creek and Crooked River), and another where they were known to have occurred (Middle Fork Weiser River). In the former, despite the use of a cursory sampling approach, apparently robust populations of bull trout were found within the identified patches. In the Middle Fork Weiser, however, we used intensive sampling, and failed to locate any bull trout. In the Middle Fork Weiser River watershed, anthropogenic impacts to fish habitat are extensive; it is reasonable to believe that they have finally led to the loss of bull trout. In the other two watersheds, however, while road densities and forest management levels are high, impacts to fish habitat have been low to moderate. We believe that the combination of these techniques has been an effective way to identify where bull trout are present, and has helped us discern how the results of similar Forest management activities can have varying effects on disjunct bull trout populations.

1100-1120 -- **Monitoring the adfluvial bull trout populations in Anderson Ranch Reservoir and South Fork Boise River.** *Fred Partridge, Chuck Warren, Karen Frank,Idaho Department of Fish and Game, 868 East Main, PO Box 428, Jerome, Idaho 83338*

With the construction of Anderson Ranch Dam in the 1940's, a migratory fluvial bull trout *Salvelinus confluentus* population which historically was found in the South Fork Boise River became an adfluvial population residing in the reservoir during winter months. Since little was known of the status on this population, the Bureau of Reclamation provided funds for a cooperative study with Idaho Department of Fish and Game to determine potential loss of fish through the dam, determine when the fish were in the reservoir and locate main summer rearing and spawning areas.

Bull trout in Anderson Ranch Reservoir and the South Fork Boise River were monitored in 1998 and 1999 by netting, trapping and following radio tagged fish. Sampling in the reservoir was accomplished with gill nets checked every 30 minutes and a weir and trap was used in the fall to capture downstream moving fish just prior to their entering the reservoir. A total of 74 and 64 bull trout were netted in the reservoir in the spring of 1998 and 1999, respectively. The trap in the river sampled 293 bull trout in the fall of 1998. Based on the marking of fish in the fall and their recapture the following spring, an estimated 368 $\pm$ 86 bull trout, 300 mm or greater resided in the reservoir the winter of 1998-1999.

Bull trout sampled during the study ranged from 220 mm, 88 grams to 740 mm, 4,200 grams with the sample caught in the river trap having less gear type size selectivity. The average size of bull trout sampled in the river trap was 350 mm with 36 percent being between 220 and 299 mm. For fish recaptured, the average increase in size was 36 mm and 93 grams over the summer months and 30 mm and 202 grams for the winter months.

During the two year study, 48 bull trout were implanted with radios. Movement patterns of radio tagged fish found most bull trout leaving the reservoir and heading upriver by the end of May and reaching headwater streams by the end of July. Some of the fish traveled over 70 km to their spawning areas. Fish began to drop back down river in early September after spawning. None of the radio tagged fish passed through the dam into the lower river.

1120-1140 -- **Migration Timing and Abundance Trends in an adfluvial Bull Trout Population in Kootenay Lake, British Columbia.** *W.R. Olmsted, D. den Biesen and G.J. Birch BC Hydro, Kootenay Generation Area, 601-18th Street, Castlegar, British Columbia V1N 4G7*

Kootenay Lake, a large waterbody in southeastern British Columbia, supports a population of trophy-sized bull trout (*Salvelinus confluentus*) which are highly prized among recreational fishers. Bull trout use Duncan River, a tributary to Kootenay Lake, to spawn. BC Hydro constructed a storage dam on lower Duncan River in the 1960s under the terms of the Columbia River Treaty to provide flood control and to deliver hydropower generation for the Canadian and US portions of the Columbia River basin. As no formal provision for fish passage was considered, Duncan Dam could effectively block bull trout ascent to spawning tributaries in the upper watershed. However, BC Hydro provides upstream fish passage through the dam using discharge tunnels.

Since 1995, bull trout that have ascended Duncan Dam have been captured, sampled and marked in an energy dissipating structure in the afterbay. In 1997, bull trout in the lower Duncan River were also tagged by angling capture, and data on timing and location of recaptures were collected. Fish sampled at Duncan Dam were a migratory population of spawners, while those angled downstream of the dam were *ad fluvial* bull trout from Kootenay Lake that entered lower Duncan River to feed on spawning kokanee (*Oncorhynchus nerka*).

From 1995 to the present, over 2800 bull trout >50 cm in length have been sampled in the dam and by angling. The five-year period of mark and recapture provides a unique opportunity to characterize a large *adfluvial* spawning population moving between Kootenay Lake and a major tributary, to examine movement and growth among recaptured fish, and to assess relative abundance. Recapture data from recreational fisheries on Kootenay and Trout lakes and Duncan Reservoir also describe the post-spawn distribution of bull trout, and provide time-at-large between marking and recapture.

This presentation compares results of bull trout studies conducted from 1995-1997 at Duncan Dam with those acquired from an angling capture program in the lower Duncan River in 1997.

1140-1200 -- **Does Idaho's Forest Practices Act protect bull trout habitat.** *Joe DuPont, Idaho Department of Lands 3780 Industrial Avenue S. Coeur d'Alene, Idaho 83815.*

As required in Idaho's 1988 Water Quality Management Plan, the Idaho Department of Lands conducted internal forest practices audits during the summer and fall of 1999. Past audits have focused on evaluating the extent to which Idaho's Forest Practices Act (FPA) rules were implemented and whether they functioned as intended. This approach has generally worked well and resulted in significant changes to FPA rules. However, because of the qualitative nature of information collected at one point in time, these audits were not sufficiently rigorous to statistically evaluate whether Idaho's Forest Practices Act is adequately protecting beneficial uses in streams. To better address this concern, the 1999 internal forest practices water quality audit was designed to take a more comprehensive look at this issue. Specifically, the audit focused on the effectiveness of the FPA in protecting bull trout habitat.

To evaluate the extent Idaho Forest Practices Act protects bull trout habitat, we compared the habitat from recently logged stream segments where bull trout are known to occur with the habitat from streams with known strong bull trout populations (reference streams). What we wanted to determine was if forest management that followed the current FPA rules maintained the quality of stream habitat necessary to support a strong/healthy bull trout population.

During the 1999 audit we inspected 26 timber sales and 36 reference stream reaches to evaluate whether timber management activities maintained similar habitat found in streams with strong bull trout populations. The 26 timber sales we inspected represented over 85% of all known non-federal timber sales that have occurred on bull trout spawning and early rearing streams in the past five years. Six of the practices had minor noncompliance with FPA rules that, at least qualitatively, resulted in minor and temporary amounts of sediment delivery to streams. No significant FPA violations were found. This rate of compliance is an improvement over past audit findings. This may be a result of heightened landowner awareness that these are important streams to protect and a requirement on many of the streams to conduct a pre-operational inspections.

Statistical testing showed that significant differences in habitat did occur between reference stream reaches and stream reaches that had timber management in the past five years adjacent to them. These tests show that logged stream reaches had fewer ($P < 0.05$) pools, less large organic debris (LOD), fewer trees (less basal area) along the stream banks, and more raw banks than reference streams. Although these findings suggest that timber management practices may not be providing the habitat found in streams with strong/healthy bull trout populations, it is not clear whether the current FPA standards are responsible for these significant differences. Most of the logged stream reaches that had low quantities of LOD, pools and standing riparian trees and more raw banks also had historic logging practices occur along them and/or were influenced by other land uses beyond control of the FPA.

To help determine what role the current FPA rules play in the condition of the logged stream reaches we audited, we are suggesting that the year 2000 interagency audit required by the 1988 water quality plan be designed to better answer the questions and concerns brought up in this audit.

1345-1405 -- **Overview of major influences on eutrophication trends in Coeur d'Alene Lake, Historical to Present.** *Paul F. Woods, U.S. Geological Survey, 230 Collins Road, Boise, ID 83702*

A comprehensive review of historical information and water-quality studies was done as part of a 1991-92 limnological study of Coeur d'Alene Lake. The study of the 129-square-kilometer, natural lake in northern Idaho was undertaken to assess the potential interaction of eutrophication with highly enriched trace elements in the lakebed sediments. The review yielded important insights into how the lake has responded to human development of its 9,690-square-kilometer watershed.

Beginning in the late-1880's, the lake received substantial loads of nutrients, trace elements, and oxygen-demanding substances, largely as a consequence of the development or support of major mining and ore-processing operations in its watershed. Post Falls Dam raised the lake level in 1906 and inundated shallow lakes and wetlands at the lake's southern end, its shoreline, and the lower reaches of the Coeur d'Alene and St. Joe Rivers. Substantial hypolimnetic dissolved-oxygen deficits were measured in the lake in 1911 and 1912. Increasing intensities of mining and ore processing, timber harvest, and railroad construction, coupled with population increases, produced a lake that was mesotrophic in 1975 when sampled during the U.S. Environmental Protection Agency's National Eutrophication Survey. Until the late-1960's, the lake's trophic response was probably muted by two factors: shallow euphotic zones resulting from highly turbid inflows, and trace-element concentrations inhibitory to phytoplankton.

The lake's trophic state had returned to oligotrophic during the 1991-92 study because of a 50-percent reduction in nutrient loads between 1975 and the early 1990's. Nutrient load reductions were due, in part, to elimination of direct discharges of mining and smelting wastes to the South Fork Coeur d'Alene River, diversion of untreated sewage to municipal wastewater-treatment plants, and implementation of best-management practices by the timber harvest and agricultural industries.

At present, the hypolimnetic dissolved-oxygen deficit still develops in the lake's deep, northern basin during late summer stratification. The deficit is hypothesized to result from oxygen demands exerted by zinc-inhibited phytoplankton that settle into the hypolimnion after being advectively transported from the lake's shallow, productive southern end.

1405-1425 -- **Defining the determinants limiting wild trout production in the South Fork Coeur d'Alene Basin, Idaho using a reference stream approach.** *Dudley W. Reiser, Eric Jeanes, Edward Connor, and Keith Binkley . R2 Resource Consultants, Inc. 15250 NE 95th St. Redmond, Washington 98052-2518*

In this paper, we present the results of a study focused on identifying the primary factors limiting trout production in the South Fork Coeur d'Alene River (SF), Idaho. The SF has been subjected to a variety of land-use related impacts, most notably mining and smelting operations, channelization due to highway and railroad construction (much of the stream parallels Interstate I-90), and urbanization. Because there are no suitable upstream control areas in the upper SF that represent conditions and anthropogenic impacts similar to those in the lower river, we used a reference watershed/stream approach from which to make comparisons of biotic and abiotic parameters at five sites. We selected the St. Regis River (RG) as the reference stream, based in part on watershed location and its similarity to the SF in a number of geomorphological and hydrological characteristics, and the type of land-use impacts to which the RG has been exposed. The benthic invertebrate community was assessed at each paired study site using Hester-Dendy samplers. Water quality parameters were assessed at each paired study site throughout the period of study. We used electrofishing to estimate the production of wild trout at each site pairing. Habitat quality within each of the paired sites was determined using the rapid bioassessment protocols (RBP) methods, and an assessment of overall channel stability was made using the Stream Reach Inventory and Channel Stability Evaluation (SRI/CSE) procedure. The results of our paired stream comparisons suggest that the determinants of wild trout populations in the SF vary spatially, primarily as a result of differences in water quality and physical habitat, and perhaps temporally as a function of seasonal and diurnal changes in water temperature. Our assessment of various potential limiting factors in the system indicate that wild trout populations within the five sites are controlled longitudinally (progressing from SF 1 (lower site) to SF 5 (upper site), and primarily by heavy metals concentrations in the lower three sites (SF 1-3). A combination of physical habitat and channel alteration, water quality, and perhaps several yet undefined factors at SF 4, and primarily by physical habitat characteristics in the upper site (SF 5).

1425-1445 -- **Status and recovery potential for westslope cutthroat trout (*Oncorhynchus clarki lewisi* in waters of the Coeur d'Alene Indian Reservation.** *Angelo J. Vitale Coeur d'Alene Tribe Fisheries Program P.O. Box 408 Plummer, Idaho 83851.*

Nineteen tributary streams (totaling 110.3 stream miles) located wholly or partially on the Coeur d'Alene Indian Reservation were identified as probable historic cutthroat trout bearing streams (Graves et. al. 1990). Currently, nine of these streams (26.7 stream miles) are identified as having habitat and water quality conditions that result in little or no use by cutthroat trout (Lillengreen et. al. 1991). This represents a 24% reduction in geographic distribution for waters of the Reservation. Cumulative impacts from construction of Post Falls Dam in 1906, major changes in land cover types, roads construction, and introduction of exotic fish species are cited as the main reasons for population declines. Due to the persistence of adverse conditions in Reservation streams and Coeur d'Alene Lake, cutthroat trout populations are thought to be at least moderately damaged (i.e. average spawning escapements fall between the minimum viable population and the number of adults needed to produce 50% of the carrying capacity of the stream environment).

1445-1505 -- **Supplementation of westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in tributaries of Coeur d'Alene Lake located on the Coeur d'Alene Indian Reservation.** *Ronald L. Peters. Coeur d'Alene Tribe Fisheries Program. P.O. Box 408 Plummer, Idaho 83851*

Recent declines in native salmonid fish populations, particularly westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and bull trout (*Salvelinus confluentus*), in the Coeur d'Alene basin have been the focus of study by the Coeur d'Alene Fisheries program since 1990. In fact, early studies on Coeur d'Alene Lake showed that significant declines had occurred as early as 1932. Primary among the reasons for these declines is the anthropogenic alteration of the habitat in which these fish reside. This presentation will describe the management objectives of the Coeur d'Alene Tribe for recovery of westslope cutthroat trout on the Reservation and the methods to be employed to achieve these desired results. It is the goal of the Coeur d'Alene Tribe to restore the degraded habitat on the Reservation and concurrently supplement existing natural populations of adfluvial westslope cutthroat trout such that sufficient numbers of adults will return to fully seed available habitat and provide a surplus of fish for harvest.

1520-1540 -- **Effect of an artificial side channel on fry production and rearing densities of rainbow trout in Murphy Creek, Southeastern British Columbia.** *Arndt, S.K.A. Columbia Basin Fish & Wildlife Compensation Program, 103-333 Victoria St., Nelson, British Columbia, Canada V1L 4K3.*

Murphy Creek is a small, high gradient tributary of the Columbia River which experiences severe freshets in spring and low flows in late summer. Upstream spawning migration of rainbow trout from the Columbia River is blocked by a highway culvert 0.8 km from the confluence. The objectives of this study were to assess the effect of an artificial side channel (250 m) on trout production from Murphy Creek by: (a) determining the contribution of the side channel to production of fry which emigrate after emergence, and (b) determining the effect of the side channel on densities of trout rearing in the creek. Emigrating fry were quantified using drift nets at the upstream and downstream ends of the side channel and adjacent main channel, and rearing densities were estimated by electrofishing at sites in: (1) the side channel, (2) main channel adjacent to the side channel, and (3) main channel below the confluence with the side channel, during late summer in 1997 and 1998. Results showed that the side channel produced three quarters of the fry which emigrate to the Columbia River shortly after emergence. Number of rearing fish in the side channel area (combined side channel and adjacent main channel) was about twice as high as in the main channel below the confluence for both young-of-the-year and older juveniles in 1997. In 1998, a relatively dry year, numbers of rearing juveniles were only slightly higher in the side channel area.

1540-1600 -- **The effect of three education strategies on angler ability to recite fishing regulations and to identify salmonids with special emphasis on Bull Trout.** *Dan Schill and Tony Lamansky. Idaho Dept of Fish and Game,1414 Locust Road Nampa, ID 83703*

Research conducted during the 1998 fishing season indicated that only about a third of upper Boise River anglers could correctly identify bull trout and that less than two thirds were aware of the no-harvest bull trout restriction. Prior to the 1999 angling season, we devised and implemented three angler education strategies designed to improve bull trout identification skills and regulation awareness. Approaches included construction and on-site posting of large 1.2x1.2m metal signs with 0.9m color bull trout images along access roads, placing two styles of smaller posters along streams and at select license vendors, and distribution of sticky-backed business cards containing identification information to anglers at regional license vendors. Following a single year of elevated education, angler ability to recite the no-harvest bull trout regulation increased from 64.5% to 89.5% in the Middle Fork Boise drainage and from 58.2% to 76.9% in the South Fork Boise. Angler ability to identify bull trout on the Middle Fork nearly doubled from pre-education levels (30.0%) to 55.6% while identification rates on the South Fork increased slightly from 32.8% to 38.7% following education. Signing intensity may explain differences in results between drainages. Four times as many large 1.2X1.2m signs and 3-4 times as many posters were displayed in the Middle Fork Boise drainage. Large signs appeared the most effective of the three education options tested. About half of anglers surveyed that correctly recited the bull trout regulations used the large signs as their primary information source while approximately 25% of anglers used the standard regulation pamphlet. Less than 6% of anglers aware of the regulation relied on the posters and less than 1% on stickers. In regard to bull trout identification, the large signs played a greater role in the Middle Fork drainage where they were more numerous relative to the South Fork. However, personal experience was the most common information source cited by anglers with correct bull trout ID answers (32-43%). Despite remaining room for improvement in identification and regulation awareness rates, illegal harvest rates due to misidentification declined from 1.6% to 0.0% in both waters (n=1278). Our results demonstrate that aggressive angler education programs can prove effective in reducing accidental bull trout harvest due to misidentification. Additionally, our results suggest a single species ID campaign can also improve identification rates for other species.

1600-1620 --**Evaluation of a Pressure and Temperature Data Storage Tag with a Radio Transmitter in Adult Salmon and Steelhead on the Snake River.** *Tami Reischel*, Theodore C. Bjornn, Rudy Ringe, Megan Heinrich, Chris Peery, and Travis Dick, U.S. Geological Survey, Idaho Cooperative Fish and Wildlife Research Unit University of Idaho, Moscow, ID 83844-1141.*

During August through October 1999, we field tested a data storage tag (DST) that consisted of a component that recorded pressure and temperature, and a radio transmitter that was used to determine the location of tagged fish. Sixty-two steelhead *Oncorhynchus mykiss* and 30 fall chinook salmon *Oncorhynchus tshawytscha* were trapped and tagged at Ice Harbor Dam. We inserted a 90 mm x 20 mm, 34 g, DST tag into the stomachs of fish and released them into the forebay at the north shore boat landing. Pressure was recorded at 5 sec intervals and temperature was recorded at 1 min intervals as the fish migrated from Ice Harbor to Lower Granite Dam, where the fish were recaptured and the tag removed. We monitored fish movements with fixed site receivers at dams and along their migration route in the lower Snake River reservoirs, and at the Hanford reach and Priest Rapids Dam in the mid Columbia River. Location data from fixed-site receivers was supplemented with mobile tracking by boat and truck. Depth (m) and temperature (C) profiles over time for adult salmon and steelhead were prepared by integrating daily, hourly, and minute means for depth and temperature with radio telemetry records. Special antenna setups were placed in the transition pools of Lower Monumental, Little Goose, and Lower Granite dams to assess the time and depth of fish as they passed through the fishways.

Forty-five tags were purchased, and some tags were reused four times. Travel time from release to recapture ranged from 5 to 47 d for 75 tags that have been recovered so far. With the tags set to record pressure every 5 sec, 17,280 records are stored each day the tag is running. We are currently evaluating the need to record pressure as often as every 5 sec. Both depth and temperature data obtained from the DST tags appears to be accurate based on a test at Lower Granite Dam, and the data examined so far on depth of fish while in the fishways; the fish are never deeper than the known depth of the water in the fishway.

From preliminary analyses, both steelhead and fall chinook swim through the reservoirs at depths less than 6 m most of the time, but they frequently moved up to 1 m depths and at times down to more than 20 m. In the fishways, both species migrated close to the bottom of the collection channels, transition pools, and ladders, with occasional moves up to within a meter of the surface. Most fish appear to pass the weirs in the ladders primarily through the underwater orifices rather than the over flow weirs.

1620-1640 -- **The long term effects of climate on change on Canadian salmon produtivity.** Dr. David Welch. High Seas Salmon Research, Department of Fisheries and Oceans, Nanaimo, British Columbia.
NO ABSTRACT SUBMITTED

Wednesday, March 15

0830-0850 -- **Healing of electroshock-induced hemorrhages in hatchery rainbow trout.** *F. Steven Elle and Daniel J. Schill. Idaho Department of Fish and Game, 1414 East Locust Lane, Nampa, Idaho 83686, USA.*

We monitored the healing of electroshock-induced hemorrhages in myomere blood vessels produced by individually exposing hatchery rainbow trout Oncorhynchus mykiss to direct current (n=502) and pulsed direct current (n=708). We used voltage gradients and exposure times suspected to produce high injury rates to facilitate observation of their duration in muscle tissue. Thus our overall injury levels should not be considered reflective of field conditions. At 1 day post-exposure, 86.1% of the test fish exposed to direct current (DC) and 81.6% of those exposed to PDC had at least one hemorrhage. Fish exposed to DC averaged 1.86 injuries 1 d post-exposure and those exposed to pulsed direct current (PDC) averaged 1.45 injuries. Number of hemorrhage injuries per fish began declining by 15 d post-exposure in both groups. The severity of injuries initially increased through 15 d post-exposure and then decreased through the remaining 3-5 weeks of the tests. Injuries induced by DC declined by 78.0% at 36 d post-exposure. Those induced by PDC declined by 92.4% at 57 d post-exposure. A total of 1.8% of all fish exposed to DC and 1.1% exposed to PDC died during the study. Our data for hatchery rainbow trout suggest hemorrhage injuries in salmonids caused by electrofishing exposure exist for a relatively short time and do not represent a significant long-term mortality or health risk to the fish. Because of the ephemeral nature of blood vessel hemorrhages compared to spinal injuries, future studies that evaluate electrofishing injuries should clearly separate hemorrhage from spinal injuries and abandon the practice of combining these data.

0850-0910 -- **Endangered Species Habitat Conservation Planning in the Rocky Mountains, and Plum Creek Timber Company's Native Fish Plan.** *Ted Koch, U.S. Fish and Wildlife Service, Boise, Idaho*

The federal Endangered Species Act of 1973 (Act) includes provisions for federal wildlife agencies to authorize incidental take by non-federal entities of native species listed under the Act. A private individual, a state, or a county government can apply for a permit from the wildlife agencies to take listed species consistent with an approved Habitat Conservation Plan, submitted by the permit applicant. Such permits are intended to be "creative partnerships" that help ensure recovery of imperiled species, and that any adverse impacts to listed species resulting from otherwise lawful activities conducted by permittees are authorized.

An HCP must include: (1) the potential impacts of the proposed actions; (2) steps to minimize and mitigate those impacts; (3) alternative actions considered; and (4) other measures that the Services may require. To issue a permit, the wildlife agencies must find that: (1) the taking will be incidental; (2) the applicant will minimize and mitigate the impacts; (3) the applicant will ensure that adequate funding for the plan will be available; (4) other specified measures will be met.

In 1997, Plum Creek Timber Company began preparations for submitting Native Fish Habitat Conservation Plan (NFHCP) as part of a permit application. The NFHCP would include take authorization for a period of 30 years for bull trout (*Salvelinus confluentus*) and sixteen (16) additional native resident and anadromous salmonid species over 1.7 million acres in Montana, Idaho and Washington states.

On December 17, 1999, the wildlife agencies published a draft Environmental Impact Statement along with Plum Creek's draft HCP, disclosing the decision-making process to the public on whether to issue a take permit to Plum Creek. The public comment period for these draft documents ends on March 17, 2000. The wildlife agencies anticipate making a decision whether to issue a permit by late summer, 2000.

The proposed NFHCP would result in greater improvement to fish habitat, as compared to three other alternatives analyzed, for six of the seven proposed conservation commitment categories proposed by Plum Creek. These categories include: Road and Upland Management; Range Management; Land Use Planning; Legacy and Restoration; Administration and Implementation; and Monitoring and Adaptive Management. For the seventh conservation commitment category – Riparian – the Simplified Prescriptions alternative, which would allow for much wider (30 m. wide) universally-applied no harvest riparian timber buffers, would provide the greatest conservation benefit to permit species.

0910-0930 -- **Analysis of Historical Mountain Whitefish Data from the Lower Columbia and Kootenay Rivers**. *Dana Schmidt R. L. & L. Environmental Services Ltd., 201 Columbia Ave., Castlegar, British Columbia, Canada, V1N 1A2*

Mountain whitefish populations in the lower Columbia River in Canada are subject to flow regulation and water quality influences from hydro-electric projects on the Kootenay and Columbia Rivers. The hypothesis that the mountain whitefish population of this region is in or is approaching a critical state was critically evaluated. In addition, the influences of environmental variables on spawning timing and population parameters were also examined. The mountain whitefish egg deposition rates as evaluated in this investigation provided indications of variability of mean time of spawning in the Kootenay and Columbia river's mountain whitefish population among the 1995-1996, 1996-1997, and 1997-1998 spawning seasons. The spawning timing of the Kootenay River mountain whitefish population was substantially earlier than the Columbia River population (two to three weeks). The differences between the spawning timing of the two systems were not explained by the environmental variables examined (i.e., discharge, discharge variance, and temperature). The spawning season end cumulative abundance index of egg deposition rates was not distinguishable among years in either system (with 1994-1995 excluded because of sampling changes). The mountain whitefish relative abundance was assessed using catch-per-unit-effort (CPUE) data in concert with tag recovery information, during the period from 1990 to 1997. The study confirmed earlier investigations that boat electrofishing catches in the 1990s had a smaller proportion of juveniles than observed in catch samples collected during the early 1980s. However, examination of length frequencies over time and growth rates from mark-recapture data did not suggest any changes in the population during the 1990s. Analysis of adult and juvenile CPUE trends from the 1980s through the 1990s indicated an increase in adult abundance in the 1990s and no significant trends in juvenile abundance over the same time period were apparent. Lack of trends in the adult CPUE during the 1990s suggest a stable population, with limited juvenile data in 1996 suggesting a possible increase in recruitment. The trend in adult CPUE is consistent with mark-recapture population estimates and with the egg abundance from the 1995-1996 to the 1997-1998 egg deposition studies. These three sets of information suggest the population has remained stable during the 1990s and most likely equal or above the levels observed in the 1980s. Additional risk analysis studies of the trend in mountain whitefish populations and evaluation of alternative flow regimes during the spawning and incubation period may provide some guidance as to how to measure the effectiveness of flow manipulation in maintaining mountain whitefish populations.

0930-0950 -- **Variation in focal spawning location of Kootenai River white sturgeon and some factors that affect it.** *Vaughn L. Paragamian, Virginia Wakkinen, and Gretchen Kruse Idaho Department of Fish and Game,2750 Kathleen AvenueCoeur d'Alene, Idaho 83815*

We studied spatial segregation of Kootenai River white sturgeon *Acipenser transmontanus* spawning groups, focal spawning locations, presence or absence of discrete spawner groups, and factors that may affect movement of spawning groups. The Kootenai River white sturgeon is an Endangered Species and spawn within an 18 km reach in Idaho. Spawning occurs well below Libby Dam, completed in 1972 for flood control and hydropower. Concomitant to Libby Dam construction, the elevation of Kootenay Lake, British Columbia, was lowered two-m. Kootenay Lake is downstream 108 km of the spawning reach but lake elevation has a backwater affect on the sturgeon spawning reach. Recovery efforts have provided for improved spawning but sufficient survival of eggs and larvae is still in question. This sturgeon spawns in sand and fine gravel substrate (thought to be poor habitat when compared to spawning habitat of other populations) and is downstream of cobble substrate, which is better for egg survival. Sturgeon also demonstrated a peculiar pattern of shifting focal spawning locations. Adult white sturgeon were monitored with radio and sonic transmitters for movement throughout the spawning reach from 1994 through 1998 and eggs were sampled to document approximate spawning locations and timing. The spawning reach was divided into three sections. The objective was to locate late vitellogenic females and males moving through the reach during the spawning season. Spawning groups of sturgeon were not discrete. Our analysis investigated the hypothesis egg collection over a given date/period for the years 1994-1998 were independent of river kilometer location. The null hypothesis was rejected: the number of times eggs were collected during a given date/period in 1994-1998 was independent of rkm location. Analysis of telemetry locations, for all years independently, 1994 through 1998, and for the combined years 1994 through 1998, suggests the number of telemetry observations of expected spawners in the lower and upper reach was not independent of date for the period May 7 to July 1. Sturgeon may be seeking preferred velocities that may be independent of substrate. A distinct pattern emerged in our analysis of sturgeon spawning location and the elevation of Kootenay Lake, BC. As lake elevation rose during any given spawning season sturgeon progressively spawned further upstream, 64% of the variation in spawning location was attributable to Kootenay Lake elevation. A linear regression model indicated higher lake elevations might promote spawning further upstream over cobble substrate. This hypothesis must be tested but it presents an enormous social problem. Encroachment of the lake shoreline by landowners has occurred since 1972 and higher lake elevations may cause serious property losses and hydropower concerns. If this hypothesis is true and the social issue cannot be eliminated modification of the present spawning location may be necessary to improve survival of white sturgeon eggs and larvae.

1010-1030 -- **Effects of water level fluctuations on benthic macroinvertebrates in the Hanford Reach, Columbia River, Washington.** *Eric J. Stark, David H. Bennett, Dept. of Fish & Wildlife, College of Natural Resources, University of Idaho, Moscow, ID*

We evaluated effects of typical water level fluctuations ($\leq$1.6m•day^{-1}), due to upstream hydroelectric operations of Priest Rapids Dam, on benthic macroinvertebrates in the Hanford Reach of the Columbia River during 1998 and 1999. Macroinvertebrates serve as a critical food source for the major 'strong hold' of wild fall chinook salmon *Oncorhynchus tshawytscha* in the Columbia River. Artificial substrates were deployed, colonized for 4 weeks, then repositioned at selected elevations along transects for

3 weeks to assess long-term exposure effects and 1-10hrs for short-term effects. Long-term tests in 1999 revealed decreased density, biomass, and species richness with increasing frequency and duration of exposure to air. Artificial substrates subjected to the lower exposure durations exhibited reductions in macroinvertebrate density up to 80%. Drift net sampling was also conducted to assess macroinvertebrate vulnerability and mobility with fluctuating water levels. Short-term exposures of colonized artificial substrates and drift sampling indicated *Ephemerella* spp. mayfly and *Hydropsyche* spp. caddisfly which were greatly reduced within the fluctuation zone tend to be the most mobile, whereas Chironomids exhibited reduced mobility and remained on dewatered substrates. Our findings suggest benthic macroinvertebrate community structure is affected by diel water level fluctuations in the Hanford Reach.

1030-1050 -- **The Distribution of introgression in Westslope Cutthroat Trout populations in the North Fork Clearwater Basin, Idaho.** *D. E. Weigel, J. T. Peterson, P. Spruell, and J. Zakrajsek*

Introgression from exotic trout has been identified as the greatest threat to native cutthroat trout populations in the western U.S. Genetically pure westslope cutthroat trout inhabit less than 2.5% of its historic range in Montana. In Idaho, the distribution of genetically pure populations of westslope cutthroat trout is thought to be substantially reduced by introgression. Introgression is believed to be detrimental to the survival, fitness, and local adaptations of native species by disrupting co-adapted gene complexes, and directly affecting the productivity of the fishery. To determine the extent of introgression, we used non-coding sequences of nuclear DNA to determine the genetic status of westslope cutthroat trout at 89 sites in the North Fork Clearwater Basin in northcentral Idaho. We found introgression in approximately 66% of the sites tested. The proportion of westslope cutthroat trout at each site showed a bimodal frequency distribution. A preliminary logit analysis did not find a statisitically significant relationship between genetic status and Oncorhynchus sp. densities, width, gradient, pool depth, cover, or distance to stocking. Elevation was the only statistically significant variable examined. These results indicated that introgression is a substantial impact in the basin, and coincide with other fish distribution studies where native trout are found in higher elevation sites, and exotic trout are found in the lower elevation stream sites.

1050-1120 -- **Stream surveys: If they are the answer what is the question?** Brett Roper, Idaho Panhandle National Forest, 3815 Schreiber Way, Couer d'Alene, Idaho 83815

Streams surveys using methods modified from Hankin and Reeves have now been around for 10 years Many federal and state management agencies are currently using approach to collect data for several objectives including baseline and time trend monitoring. This presentation is intended to; (1) Review some of the strengths and weakness of collecting and applying the results of Hankin and Reeves type surveys, (2) Discuss possible unintended consequences of land managers using data generated by this method and (3) discuss where we need to go from here. It is my hope information presented in this talk will make the results of the next decade's stream surveys more informative the last.