



## Tracy W. Hillman, Ph.D., CEO

### *Certified Senior Ecologist—Ecological Society of America Boise Office*

Dr. Hillman is an Ecological Society of America board-certified senior ecologist and CEO of BioAnalysts, Inc. Within his 33 years of experience, he has studied effects of hatcheries and land-use activities such as forestry, grazing, mining, and hydroelectric development on streams and fish, authoring more than 200 scientific reports, including biological assessments and evaluations, recovery plans, and technical reports for habitat conservation plans and biological opinions. Dr. Hillman has several years of experience designing, implementing, and managing projects on fisheries and aquatic ecology. He is an expert in monitoring, hatchery evaluations, fish and habitat sampling, population dynamics, winter ecology, experimental design and statistical analysis, and animal behavior.

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### **Experience and Expertise**

- ◆ Salmonid ecology and habitat requirements
- ◆ Assessing and developing criteria for habitats
- ◆ Evaluating threatened and endangered sp.
- ◆ Options to enhance and restore fish habitats
- ◆ Experimental design and statistics
- ◆ Expert testimony
- ◆ Facilitation
- ◆ Behavior and energetics of fish
- ◆ Habitat conservation plans
- ◆ Population dynamics
- ◆ Recovery plans
- ◆ Salmonid life history
- ◆ Methodology for sampling
- ◆ Monitoring and evaluations
- ◆ Stream habitat ecology
- ◆ Winter ecology

### **Education**

- ◆ Ph.D., 1991, Biology/Ecology, Idaho State University/Oregon State University
- ◆ M.S., 1987, Biology/Zoology, Idaho State University
- ◆ B.S., 1984, Biology/Education, Montana State University (Honors)

### **Professional Affiliations**

- ◆ American Fisheries Society
- ◆ American Institute of Fishery Res Biologists
- ◆ Ecological Society of America
- ◆ Society for Freshwater Science
- ◆ International Society for River Science
- ◆ Northwest Scientific Association
- ◆ American Statistical Association

## Special Studies

- ◆ Ph.D. and M.S. minors in Statistics/Experimental Design and Hydrology/Geology
- ◆ Graduate studies at Oregon State University (1989-1990)
- ◆ 1998 Law Seminars International – The Endangered Species Act
- ◆ Advanced Studies in Resource Selection, WEST INC, 2000
- ◆ Advanced Studies in Bootstrap Methods, American Statistical Association, 2001
- ◆ Advanced Studies in Remote Sensing, Pacific Northwest Aquatic Monitoring Partnership, 2005
- ◆ Advanced Survey Designs for Aquatic Resources Monitoring, Modeling, and Management, EPA and Oregon State University, 2005.
- ◆ Physical, Ecological, Engineering, and Social Considerations in Using Wood in Stream Restoration, AFS Workshop, 2013.

## Honors and Awards

- ◆ Certified Senior Ecologist, Ecological Society of America (2011-2022)
- ◆ Full Member in Sigma Xi, The Scientific Research Society
- ◆ One of the most significant papers published in the North American Journal of Fisheries Management, 1997
- ◆ 1991 Phi Kappa Phi Outstanding Graduate Student, Idaho State University
- ◆ 1988 Best Student Paper Award, Idaho Chapter AFS
- ◆ Selected by The Wild Salmon Center to participate in an international workshop to develop a monitoring program for the Pacific Rim.

## Teaching Experience

***2008-2013: Adjunct Professor, George Fox University, Boise, ID.***

Taught ecology and environmental science.

***2010: Lead Instructor, Productivity Workshop, Seattle, WA.***

Taught methods for estimating fish productivity and capacity using stock and recruitment data. Examined the usefulness of different stock-recruit models and how to apply the models to data.

***2004: Lead Instructor, Monitoring Workshop, Wenatchee, WA.***

Taught methods for developing valid monitoring designs, including lessons on statistical design, sampling design, classification, and measurement error.

***1999-2001: Adjunct Teaching Faculty, ITT Technical Institute, Boise, ID.***

Taught environmental science.

***1990-1991: Teaching Assistant, Idaho State University, Pocatello, ID.***

Taught zoology and lectured on experimental design/multivariate statistics, and fish ecology.

***1990: Assistant Instructor, Montana State University, Bozeman, MT.***

Lectured to graduate students on advanced population dynamics.

***1984: Biology Instructor, Billings High Schools, Billings, MT.***

Taught general biology and honors biology.

***1983: Teaching Assistant, Montana State University, Bozeman, MT.***

Taught general biology to biology majors.

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## Committee/Technical Workgroup Assignments

- ◆ State of Washington SRFB Monitoring Panel (2019-present).
- ◆ Priest Rapids Coordinating Committee Hatchery Subcommittee Chairman (2019-present).
- ◆ Upper Columbia HCP Hatchery Committees Chairman (2015-present).
- ◆ Priest Rapids Fish Forum Chairman (2011-present).
- ◆ Rocky Reach Fish Forum Chairman (2010-present).
- ◆ Fall Chinook Working Group Chairman (2008-present).
- ◆ Hanford Reach Working Group Chairman (2008-present).
- ◆ Action Agency/NOAA BiOp Fish Population Monitoring Implementation Workgroup Co-Chairman (2008-2016).
- ◆ Action Agency/NOAA BiOp Tributary Habitat RM&E Implementation Workgroup Co-Chairman (2008-2016).
- ◆ Action Agency/NOAA BiOp Hatchery/Harvest Implementation Workgroup (2008-2016).
- ◆ Upper Columbia HCP Tributary Committees Chairman (2007-present).
- ◆ Upper Columbia Regional Technical Team (2005-present); Chairman (2016-present).
- ◆ Pacific Northwest Aquatic Monitoring Partnership (PNAMP) Watershed Monitoring Group (2005-present).
- ◆ PNAMP Project Effectiveness Group (2005-present).
- ◆ PNAMP Fish Population Group (2005-present).
- ◆ Upper Columbia HCP Hatchery Evaluation Technical Team (2006-present).
- ◆ Federal Columbia River Power System (FCRPS) BiOp Collaboration Habitat Technical Team (2006-2016).
- ◆ FCRPS BiOp Collaboration Harvest and Hatchery Technical Team (2006-2016).
- ◆ FCRPS BiOp Collaboration RM&E Technical Team (2006-2016).
- ◆ Upper Columbia Recovery Planning Habitat Coordination Committee (2004-2007).
- ◆ Upper Columbia River Steelhead and Spring Chinook Salmon Analytical Committee (2001-2002).
- ◆ Upper Columbia River Steelhead and Spring Chinook Salmon Biological Requirements Committee (2001-2002).

## Additional Qualifications

- ◆ Associate Editor for the North American Journal of Fisheries Management for anadromous fish, bull trout, and statistics, 1993-1996.
- ◆ Certified Master SCUBA diver, rescue and medic diver. Specialty ratings as research diver, night diver, underwater vehicle operator, deep diver, and equipment specialist.

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## **Professional Experience with BioAnalysts, Inc. (1991-Present)**

### **Airport Communities Coalition**

Examined the potential effects of the proposed construction of a third runway at Sea-Tac airport on Miller, Walker, and Des Moines creeks. Conducted habitat surveys and classification, salmon and trout spawning surveys, carcass surveys, and examined life history characteristics of coho salmon and coastal cutthroat in the drainages. Provided consultation on the Draft Environmental Impact Statement and Biological Assessment.

### **ASARCO, Inc.**

Consulted on bull trout ecology in Rock Creek and the lower Clark Fork River, MT. Conducted a critical review of fisheries, aquatic habitat evaluations, and statistical issues.

### **ASARCO, Inc., and seven other mining companies in the Coeur d'Alene Basin**

Critically reviewed and offered expert opinions on fisheries and habitat information collected within the South Fork Coeur d'Alene River basin. Provided expert opinions regarding status of fish habitat, fish populations, sampling methodology, and limiting factors analysis. Described various ways to improve fish abundance and aquatic habitat.

### **Atlanta Gold / Tetra Tech / Maxim Technologies**

Described the status of fish populations, macroinvertebrates, and physical/environmental conditions within the upper Middle Fork Boise River. Assessing the effects of a proposed open-pit mining operation on fish and their habitat in the Middle Fork Boise River.

### **Baker County Association of Conservation Districts**

Assessed the validity and feasibility of bull trout habitat conservation measures in the Powder River Basin. Evaluated critical habitat designations for bull trout in the basin.

### **Boise Cascade Corporation**

Consulted on bull trout ecology and sampling methodology.

### **Bonneville Power Administration / Army Corps of Engineers / Bureau of Reclamation**

Technical analyst in the Fish Population, Habitat, Hatchery, and Harvest FCRPS Remand Working Groups. Developed methods for assessing benefits and potential long-term risks associated with habitat, harvest, and hatchery recovery actions. Developed performance standards and measures for operation of federal hydroelectric facilities. These standards and measures protect ESA-listed resident and anadromous fish populations in the Columbia Basin. Wrote an implementation plan and a monitoring plan for the Federal Columbia River Power System. Developing a basin-wide monitoring plan for assessing the effectiveness of Agency-funded projects on physical/environmental and biological conditions. Plan includes identification of "key" indicator variables, methods for measuring indicator variables, and description of valid sampling and monitoring designs. Consulting with the Pacific Northwest Aquatic Monitoring Partnership (PNAMP) on valid monitoring strategies and protocols. Developed performance objectives for monitoring management actions associated with the operation of federal dams in the Willamette River Basin.

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**Bureau of Reclamation**

Assessed the biological effects of a diversion dam in the Lemhi River, Idaho, on ESA-listed Chinook salmon, steelhead, and bull trout. Assisted with writing a status/trend and effectiveness monitoring plan for the Methow River Basin, Washington. Evaluated and provided recommendations on restoration methods, measurement of fish response, model development, and statistical analyses, and assisting in the identification of performance measures for the Trinity River, California. Evaluated the effects of enhancement actions on salmon and steelhead populations within the Methow River basin, Washington.

**California Farm Bureau Federation**

Examined the status of delta smelt in Suisun Bay and the Sacramento-San Joaquin estuary. Review included assessment of sampling procedures, abundance estimates, and time series analysis of abundance over time.

**Chelan County**

Developed a monitoring guidance document that the County and other sponsors can use to develop effectiveness monitoring plans for habitat restoration projects. The document provides monitoring guidelines for all types of habitat restoration projects. Assisted with developing methods for prioritizing habitat actions.

**Chelan County Public Utility District**

Currently involved with evaluating the performance of the HCP Hatchery Programs, including the development of management decision rules and conducting statistical power analysis for the evaluation of the program. Developed a long-term monitoring program to evaluate hatchery supplementation in the Chiwawa River. Conducting ongoing studies on the production of juvenile Chinook salmon in the Chiwawa River basin. Described the abundance and distribution of redds, and timing of spawning of Chinook salmon in tributaries upstream from Wells Dam. Modeled stock and recruitment relationships of summer/fall Chinook salmon in the upper mid-Columbia River basin. Was a member of the Quantitative Analytical Report workgroup charged with analyzing the biological requirements of listed species and assisted with the development of an extinction model for listed species in the mid-Columbia Basin. Examined the historical occurrence of anadromous fish in the Chelan Basin. Estimated the potential production of introduced anadromous salmonids in the Chelan Basin. Completed a status report on Pacific lamprey in the mid-Columbia region. Described sediment dynamics, the role of LWD, and structure and function of fishes in the Rocky Reach Project Area. Assessed sportsman access on the Wenatchee River. Described the spawning habitat requirements of late-run Chinook in the Chelan River. Currently studying the effects of Rocky Reach Dam on adult bull trout passage and behavior and the effects of temporary shutdowns of the Chelan powerhouse on the incubation success of summer/fall Chinook salmon in the Chelan River. Identified recovery criteria for bull trout in the Upper Columbia Recovery Unit.

**Chelan, Douglas, and Grant County Public Utility Districts**

Developed decision rules for evaluating the performance of PUD hatchery programs in the Upper Columbia Basin. Completed status reports on summer Chinook salmon, spring Chinook salmon, sockeye salmon, and steelhead proposed by petition for listing as threatened or endangered. Provided statistical evaluation of factors affecting rates of migration of juvenile salmon and

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steelhead in the mid-Columbia River. Consulted on habitat requirements of salmon and trout as part of a Habitat Conservation Plan.

### **Columbia River Inter-Tribal Fish Commission and HDR Engineering**

Developed a framework for Pacific lamprey supplementation research in the Columbia River basin. Research, monitoring, and evaluation needs were identified for adult translocation, larval outplanting, and juvenile outplanting.

### **Colville Confederated Tribes**

Evaluating the effects of hatchery programs on steelhead production in the Okanogan River basin. Developed a research plan to assess the location and timing of Chinook spawning in the Okanogan Basin relative to the time of passage at Wells Dam. Also developed a research program to assess the behavior of Chinook salmon as they approach Chief Joseph Dam.

### **Douglas County Public Utility District**

Developed stock and recruitment relationships for steelhead and spring Chinook salmon in the Methow Basin. Examined migration and survival rates of PIT-tagged sockeye salmon smolts migrating downstream through hydroelectric projects in the mid-Columbia River.

### **ESSA Technologies Limited, Canada**

Invited to participate in a workshop to assess effects of past habitat restoration projects, structure multi-watershed hypothesis tests, and to develop valid experimental designs and monitoring protocols. Identified as one of 20 experts in the region on habitat restoration and monitoring.

### **Grant County Public Utility District**

Currently involved with evaluating the performance of Grant PUD's Hatchery Programs, including the development of management decision rules and conducting statistical power analysis for the evaluation of the program. Conducting studies on the production of juvenile Chinook salmon in Nason Creek and the White River basins. Described the abundance and distribution of redds, and timing of spawning of summer Chinook salmon in the Wenatchee River. Modeled stock and recruitment relationships of steelhead, sockeye salmon, spring Chinook, and summer/fall Chinook salmon in the upper mid-Columbia River basin. Assisted in designing an experiment to assess migration and mortality of smolts passing through mid-Columbia River dams. Assisted with writing a pre-listing plan for recovery of steelhead in the upper Columbia River Basin. Developed models that track numbers and survival of steelhead originating from various locations in the upper Columbia River Basin. Examined the efficacy of proposed temperature standards on salmonids in the mid-Columbia River region. Examined the presence and movements of adult bull trout in Priest Rapids and Wanapum reservoirs.

### **Harza Engineering Company / Bonneville Power Administration**

Provided expert consultation on habitat improvement projects for anadromous fish in the Columbia and Snake River basins. Identified projects that would be highly beneficial to salmon and steelhead recovery.

### **Hydrometrics / USDA Forest Service, Salmon National Forest**

Assisted in the writing of an environmental impact statement on the possible effects of the proposed Idaho Cobalt Project (underground cobalt-copper-gold mine) on fish and aquatic habitat in the Panther Creek drainage, a Salmon River tributary.

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**Idaho Division of Environmental Quality**

Developed temperature criteria and standards for bull trout in Idaho streams. Evaluated the thermal tolerance, resistance, and preference of cold and cool-water fishes of Idaho, and identified the spawning and incubation times of Chinook salmon, steelhead/rainbow trout, and cutthroat trout in Idaho streams. Evaluated the application of new approaches to water quality temperature criteria.

**Idaho Power Company**

Compiled information on current and historical stream conditions, land-use activities, water quality, and fish distribution within the Snake River basin upstream from the Hells Canyon Complex.

**Idaho Watersheds Project**

Evaluated the effects of livestock grazing on riverine-riparian habitat conditions within the BLM Salmon River allotment, upper Salmon Falls Creek, Nevada.

**Intermountain Forest Industry Association**

Developed a survey plan to detect the presence of bull trout on lands owned by association members. Prepared a status report on bull trout in California, Idaho, Montana, Nevada, Oregon, and Washington.

**Kronick, Moskovitz, Tiedemann, and Girard**

Examined the validity of smolt survival studies in the Sacramento-San Joaquin Delta. Statistically and biologically evaluated the relationships between stream flows and Chinook smolt survival.

**L. B. Industries**

Provided consultation on experimental design and statistical analyses of habitat and biological data collected in the Snake River, ID.

**Los Angeles Department of Water and Power**

Completed a literature review on the stream habitat ecology of brown trout. Developed a fisheries monitoring plan to assess stream rehabilitation actions in Mono Basin, CA. Served as expert witness on experimental design, statistics, sampling methodology, and brown trout ecology.

**Meridian Gold Company**

Evaluated the habitat composition and distribution and abundance of fish above, below, and within Napias Falls on Napias Creek, Idaho. Described the spawning distribution of bull trout within the Napias Creek watershed. Assisted in Section 7 consultation and prepared a Biological Assessment and Biological Evaluation on Chinook, steelhead, sockeye, and bull trout. Identified minimum flow requirements of salmonids in Napias Creek and Camp Creek. Conducted biomonitoring studies upstream and downstream from the ore processing discharge in Napias Creek.

**Montana Power Company**

Described the biological implications of providing fish passage at Milltown Dam on the Clark Fork River, MT.

**NOAA Fisheries**

Developing methods for integrating recovery actions across habitat, harvest, hydropower, and hatcheries. Assisted NOAA Fisheries with writing recovery plans for ESA-listed spring Chinook,

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spring-summer Chinook, Snake River fall Chinook, steelhead, and Snake River sockeye salmon ESUs/DPSs within the Columbia Basin. Developed monitoring and evaluation plans and adaptive management plans for recovery plans throughout the Columbia Basin. Evaluated the success of intensively monitored watersheds implemented throughout the Pacific Northwest.

#### **O'Connor Environmental / TFW Monitoring Advisory Group**

Developed a watershed-scale monitoring plan for evaluating fine sediment input in the Quartz Mountain Watershed Analysis Unit, Washington. Described survey sampling methods and statistical techniques. Estimated sample sizes using power analysis. Implemented studies to assess sediment dynamics in Class III streams in northern California.

#### **Pacific Lumber Company (PALCO)**

Developed a survey protocol for assessing the presence or absence of coho salmon on PALCO lands. Conducted surveys of coho salmon within the Eel and Van Duzen River basins. Developed sampling protocols for assessing the abundance and distribution of amphibians on PALCO lands. Statistically evaluated the relationship between discharge and turbidity. Provided written and oral testimony on the relationship between discharge and turbidity before the State of California Water Resources Control Board. Evaluated erosion and sedimentation processes in Class III streams in the Elk River, Van Duzen River, Lower Eel River, and Freshwater Creek.

#### **Pacific Northwest Utilities Conference Committee**

Described the effects of hydroelectric facilities on the abundance, behavior, and distribution of bull trout. Evaluated models used to assess smolt survival in the Columbia River. Evaluated the validity of salmon and steelhead transportation data. Statistically analyzed population data on white sturgeon.

#### **Pend Oreille County Public Utility District**

Examined factors (water management, predation, mysids, harvest, nutrients, and spawning habitat) affecting the production, survival, and abundance of kokanee in Lake Pend Oreille. Also examined the food habits and consumption rates of bull trout in the lake.

#### **Phelps Dodge Mining Company**

Provided consultation on the potential aquatic resource effects from the proposed McDonald Gold Project near Lincoln, Montana. Prepared a Biological Evaluation as part of the non-degradation analysis for project permits. Critically reviewed literature on the ecology of cutthroat and bull trout in the Blackfoot Basin. Designed and implemented studies (production, habitat, and creel) to assess baseline aquatic conditions. Designed and implemented a monitoring program for assessing potential impacts on aquatic resources. Prepared a Biological Assessment on bull trout.

#### **Plum Creek Timber Company**

Consulted on bull trout ecology and sampling methodology. Analyzed the relationship between bull trout distribution and abundance and several physical and biological variables. Designed studies to assess bull trout guild structure. Statistically analyzed physical and biological data associated with various guild structures. Provided technical guidance during Section 10 consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service and prepared a Habitat Conservation Plan, which covers 1.7 million acres of land supporting bull trout, steelhead, and westslope cutthroat trout. Developed temperature criteria and metrics for use in



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modeling bull trout habitat. Designed adaptive management studies to assess cause-effect relationships. Designed monitoring studies for assessing effects of various harvest strategies on the abundance and distribution of tailed frogs. Provided statistical consultation on analysis of spotted owl data. Designed experimental studies to assess effects of various grazing BMP on stream habitat and biological conditions. Evaluated the effects of different physical factors on sediment erosion on forest roads.

### **Potlatch Corporation**

Evaluated the thermal and toxic effects of the Potlatch pulp and paper mill effluent on threatened and endangered salmon and trout in the Snake and Clearwater rivers. Evaluated the effects of water quality in the Snake River on the spawning and incubation success of fall Chinook.

### **Shoshone-Paiute Tribes**

Assisted with the writing of a subbasin plan and developing a research, monitoring, and evaluation plan for the Owyhee Basin. Also developed a status/trend and effectiveness monitoring program for the Duck Valley Indian Reservation.

### **Snowmass Creek Caucus**

Conducted a stream habitat survey of Snowmass Creek, CO. Consulted on the summer and winter ecology of brown, brook, and rainbow trout and sampling methodology. Developed winter minimum flow requirements for trout in Snowmass Creek. Developed a monitoring program to assess the effects of winter water withdrawals on trout in Snowmass Creek.

### **State of Idaho**

Investigated effects of metals pollution on salmon and trout in the Panther Creek Drainage, ID. Consulted on experimental design and sampling methodology.

### **State of Montana**

Investigated the effects of metals pollution on fish in the Clark Fork River, MT. Statistically analyzed three decades of population data collected in the Clark Fork River, MT. Served as expert witness on summer and winter ecology of brown and rainbow trout.

### **State of Washington and Anchor QEA**

Examined the potential effects of a proposed flood retention structure on fish and amphibians in the Chehalis River. The study also evaluated the effects of various restoration scenarios on fish and amphibians in the river. Assisted in the preparation of an Aquatic Species Enhancement Plan for the Chehalis River basin.

### **U.S. Fish and Wildlife Service**

Conducted stream and riparian habitat surveys within 14 miles of Crab Creek in Central Washington. Identified actions that would restore habitat conditions for native species of fish and riparian vegetation.

### **Upper Columbia Salmon Recovery Board/Region Technical Team**

Selected as a member and Chair of the Upper Columbia Regional Technical Team. Responsible for evaluating proposed aquatic enhancement and monitoring projects in the Upper Columbia Basin. Helped develop a tool for prioritizing fish barrier projects in the Upper Columbia and currently developing a tool for prioritizing enhancement and protection actions in the Upper

Columbia basin. Wrote a status/trend and effectiveness monitoring strategy for the Upper Columbia Basin. The Plan includes discussions on statistical design, sampling design, sampling at different spatial scales, landscape classification, selection of indicators, measurement protocols, and implementation strategies. Selected by the Region Technical Team to help coordinate monitoring activities within the Wenatchee Basin. Serving as a technical advisor on recovery issues related to ESA-listed species and wrote a draft recovery plan for spring Chinook, summer steelhead, and bull trout in the Upper Columbia Basin.

### **Warm Springs Reservation**

Statistically analyzed biological and habitat data collected from streams on the reservation before and after habitat was altered. Prepared the final report on fisheries studies conducted on the reservation.

### **Washington Department of Natural Resources / Terrapin Environmental**

Validated a water-typing model that described the relationship between fish presence (and habitat presence) and several geomorphic variables. Examined the relationship between riparian buffer widths and stream temperatures suitable for bull trout spawning and rearing.

### **World Forestry Center**

Member of an independent scientific review team charged with evaluating the science base and methodology of the feasibility and implications of land exchange in the Umpqua Basin, Oregon, in relation to improving ecological health and maintaining timber supply. Served as a technical reviewer of aquatic issues related to the development of the draft EIS and HCPs.

### **Yakama Nation**

Provide expert consultation on tributary habitat restoration actions including evaluating biological benefits of proposed actions. Developed a monitoring and evaluation plan for assessing salmonid responses to enhancement actions and climate change.

### **Yakima Subbasin Fish and Wildlife Planning Board**

Assisted with writing a recovery plan for steelhead and bull trout in the Yakima subbasin.

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## Other Professional Experience (1985-1991)

### **Summer, 1991: Consulting Statistician, Department of Energy, Idaho National Engineering Laboratory, Arco, ID.**

Statistically analyzed and managed safety and environmental data for the Department of Energy. Submitted reports to Idaho National Engineering Laboratory that summarized analyses and conclusions.

### **1990-1991: Fisheries Research Biologist, Idaho State University, Pocatello, ID.**

Assisted research on the winter ecology of juvenile and adult rainbow trout in the Henry's Fork of the Snake River, ID. Studied the day and night habitat, movement, and mortality of rainbow trout in different thermal regimes.

### **1990-1991: Fisheries Research Biologist, Idaho Department of Fish and Game, Idaho Falls, ID.**

Engaged in research on the winter habitat and stream-flow requirements of cutthroat and brown trout in the Snake River downstream from Palisades Dam.

### **Fall, 1989: Fisheries Research Biologist (voluntary), U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Forestry Sciences Laboratory, Corvallis, OR.**

Designed, organized, and conducted a study on the interaction between juvenile Chinook salmon and redbreast shiners in laboratory streams. Assessed the influence of stream temperature on their behavior, production, and distribution, and statistically assessed their morphological similarity.

### **Summer, 1989: Fisheries Research Biologist, Hardin-Davis Consultants, Inc., Albany, OR.**

Assisted in the design and data collection of an IFIM study on the McKenzie River, OR. Described the microhabitat use of juvenile rainbow trout, adult rainbow trout and steelhead, and juvenile Chinook salmon in diverted and un-diverted river segments.

### **1986-1989: Fisheries Research Biologist, Don Chapman Consultants, Inc., Boise, ID.**

Coordinated research activities, supervised up to 10 fisheries technicians and up to 8 fisheries aides, and engaged in research on the summer and winter ecology of juvenile Chinook salmon and steelhead in the Wenatchee River, WA.

Assessed the stream residence, downstream drift, and growth of juvenile Chinook salmon and steelhead, and identified factors that possibly limit their abundance in the Wenatchee River. Studied the seasonal and diel microhabitat utilization by different sized Chinook salmon, steelhead, and redbreast shiners, and assessed degree of spatial interaction among the species. Supervised and engaged in a field study of effects of introducing coho salmon into an existing Chinook salmon/steelhead community. Studied the occurrence of nighttime predation by sculpins on wild Chinook salmon and steelhead, with emphasis on relating predator size to numbers of fry consumed. Evaluated the effects of hatchery-reared Chinook salmon and steelhead juveniles on abundance and behavior of wild salmon and steelhead. Evaluated the negative effects of planted steelhead smolts and catchable-sized rainbow trout on abundance and behavior of wild steelhead. Assisted in a two-year study of genetic makeup of mid-Columbia River salmon and steelhead.

**Spring, 1988: Fisheries Biologist, U.S. Fish and Wildlife Service, Leavenworth, WA.**

Developed statistical models that estimated salmonid abundance and biomass in the mid-Columbia River basin by using habitat quality index (HQI) variables.

**Spring, 1988: Consulting Biologist, Don Chapman Consultants, Inc., Boise, ID.**

Technical advisor to the Yakima Indian Nation on species interactions resulting from proposed introductions of coho salmon and steelhead into the Yakima River above Rosa Dam. Advised the Interactions Committee on salmon and trout ecology, experimental design, and research methods.

**Summer, 1986: Fisheries Research Assistant, U. S. Fish and Wildlife Service and Idaho State University, Pocatello, ID.**

Assessed population structure and abundance of fish in the Methow River, WA.

**1985-1986: Graduate Research Assistant, Idaho State University, Pocatello, ID.**

Conducted M.S. research on effects of fine sediment on production, summer and winter habitat use, and egg-to-fry survival of Chinook salmon in Red River, a tributary of South Fork Clearwater River, ID.

**Winter, 1985: Fisheries Research Assistant (voluntary), U.S. Forest Service, Elk City Ranger District, Elk City, ID**

Engaged in an experiment to assess the winter rearing capacity of newly constructed habitat structures, with emphasis on rearing juvenile anadromous fish, in the Crooked River, a Clearwater River tributary, ID.

**Summer, 1985: Fisheries Research Assistant (voluntary), U.S. Fish and Wildlife Service and Idaho State University, Pocatello, ID.**

Engaged in research targeted at assessing abundance and hooking mortality of rainbow and brown trout in the Firehole River, Yellowstone National Park.

**Spring, 1985: Fisheries Technician, Don Chapman Consultants, Inc., Boise, ID.**

Assessed population structure, distribution, and abundance of fish in Patterson Creek, a Salmon River tributary, ID. Revised and implemented a computer program originally designed for a Hewlett-Packard 9845 that calculated population estimates using a removal-depletion maximum-likelihood formula.

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## Publications and Reports

- Hillman, T. 2019. A primer of mark-recapture models. BioAnalysts, Inc. Report to the Rocky Reach Fish Forum, Wenatchee, WA.
- Hillman, T., M. Miller, M. Johnson, M. Hughes, C. Moran, J. Williams, M. Tonseth, C. Willard, S. Hopkins, J. Caisman, T. Pearsons, and P. Graf. 2019. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2018 annual report. Report to the HCP Hatchery Committees and the PRCC Hatchery Subcommittee, Wenatchee and Ephrata, WA.
- Hillman, T. 2019. Abundance and total numbers of Chinook salmon and trout in the Chiwawa River basin, Washington, 2018. BioAnalysts, Inc. Report to the HCP Hatchery Committees, Wenatchee, WA.
- Hillman, T., G. Pess, and T. Beechie. 2019. Evaluation of intensively monitored watershed projects. Report to NOAA Fisheries, Portland, OR.
- Baxter, M., J. Parzych, G. Johnston, and T. Hillman. 2019. Methow River subbasin effectiveness monitoring program. Report to Pacific Northwest Region, Bureau of Reclamation, Boise, ID.
- Hillman, T., M. Miller, M. Johnson, M. Hughes, C. Moran, J. Williams, M. Tonseth, C. Willard, S. Hopkins, B. Ishida, C. Kamphaus, T. Pearsons, and P. Graf. 2018. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2017 annual report. Report to the HCP and PRCC Hatchery Committees, Wenatchee and Ephrata, WA.
- Hillman, T. 2018. Abundance and total numbers of Chinook salmon and trout in the Chiwawa River basin, Washington, 2017. BioAnalysts, Inc. Report to the HCP Hatchery Committees, Wenatchee, WA.
- Hillman, T. and A. Murdoch. 2017. Estimation of carrying capacity. Report to the HCP and PRCC Hatchery Committees, Wenatchee and Ephrata, WA.
- Hillman, T., T. Kahler, G. Mackey, Andrew Murdoch, K. Murdoch, T. Pearsons, M. Tonseth, and C. Willard. 2017. Monitoring and evaluation plan for PUD hatchery programs: 2017 update. Report to the HCP and PRCC Hatchery Committees, Wenatchee and Ephrata, WA.
- Hillman, T., M. Miller, M. Johnson, C. Moran, J. Williams, M. Tonseth, C. Willard, S. Hopkins, B. Ishida, C. Kamphaus, T. Pearsons, and P. Graf. 2017. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2016 annual report. Report to the HCP and PRCC Hatchery Committees, Wenatchee and Ephrata, WA.
- Hillman, T., B. Rogers, K. Murdoch, T. Iverson, and B. Rose. 2017. Monitoring framework to assess salmonid response to enhancement actions and climate change. Report to the Yakama Nation, Toppenish, WA.
- Jorgensen, J., A. Murdoch, J. Cram, M. Sorel, T. Hillman, G. Maier, C. Paulsen, T. Cooney, R. Zabel, and C. Jordan. 2017. Wenatchee River spring-run Chinook salmon life-cycle model. Report to the Northwest Power and Conservation Council, Portland, OR.

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