Klamath Basin Science Conference

Medford, Oregon
February 1 – February 5, 2010

USGS
science for a changing world

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

National Fish and Wildlife Foundation

Science Conference Organizers

Pete Adams	National Marine Fisheries Service, Santa Cruz, CA
Debra Becker	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA
Mike Belchik	Yurok Tribal Fisheries Program, Weitchpec, CA
Crystal Bowman	Quartz Valley Indian Reservation, Tribal EPA Department, Fort Jones, CA
Susan Corum	Department of Natural Resources, Karuk Tribe, Orleans, CA
Clayton Creager	California Environmental Protection Agency, State Water Quality Board, Regional Water Quality Control Board, North Coast Region, Santa Rosa, CA
Debra Curry	U.S. Geological Survey, California Water Science Center, Sacramento, CA
Walt Duffy	California Cooperative Fishery Research Unit, Humboldt State University, Arcata, CA
Ken Fetcho	Yurok Tribe Environmental Program, Klamath, California
Tracy Fuentes	U.S. Geological Survey, Northwest Area Director's Office, Western Region, Seattle, WA
Churchill Grimes	NOAA-Fisheries, Southwest Fisheries Science Center, Santa Cruz, CA
Michael Hughes	The Klamath Tribes Research Station, Chiloquin, OR
George Kautsky	Hoopa Valley Tribe, Fisheries Department, Hoopa, CA
Steve Kirk	Oregon Department of Environmental Quality, Bend, OR
Curtis Knight	California Trout, Mt. Shasta Area, Mount Shasta, CA
Irma Lagomarsino	NOAA-Fisheries, Arcata Area Office, Arcata, CA
Dennis Lynch	U.S. Geological Survey, Northwest Area Director's Office, Western Region, Seattle, WA
William McFarland	U.S. Geological Survey, Oregon Water Science Center, Portland, OR
Linda Prendergast	PacifiCorp Energy, Portland, OR
Eric Peterson	U.S. Bureau of Reclamation, Trinity River Restoration Program, Weaverville, CA (SSAIC/Trinity R.R.)
Jim Sedell	National Fish and Wildlife Foundation, Portland, OR
Dan Snyder	U.S. Geological Survey, Oregon Water Science Center, Portland, OR
Lyman Thorsteinson	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA
Scott VanderKooi	U.S. Geological Survey, Western Fisheries Research Center, Klamath Falls Field Station, Klamath Falls, OR
Tommy Williams	NOAA, Southwest Fisheries Science Center, Santa Cruz, CA
Rod Wittler	U.S. Bureau of Reclamation, Trinity River Restoration Program, Weaverville, CA
Doug Woodcock	Oregon Water Resources Department, Salem, OR
David Woodson	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA

Table of Contents

Floor Plans 2

Welcome Letter from the U.S. Geological Survey, Regional Executive, Northwest Area 5

Conference Overview 6

Plenary Sessions and Plenary Session Abstracts 7

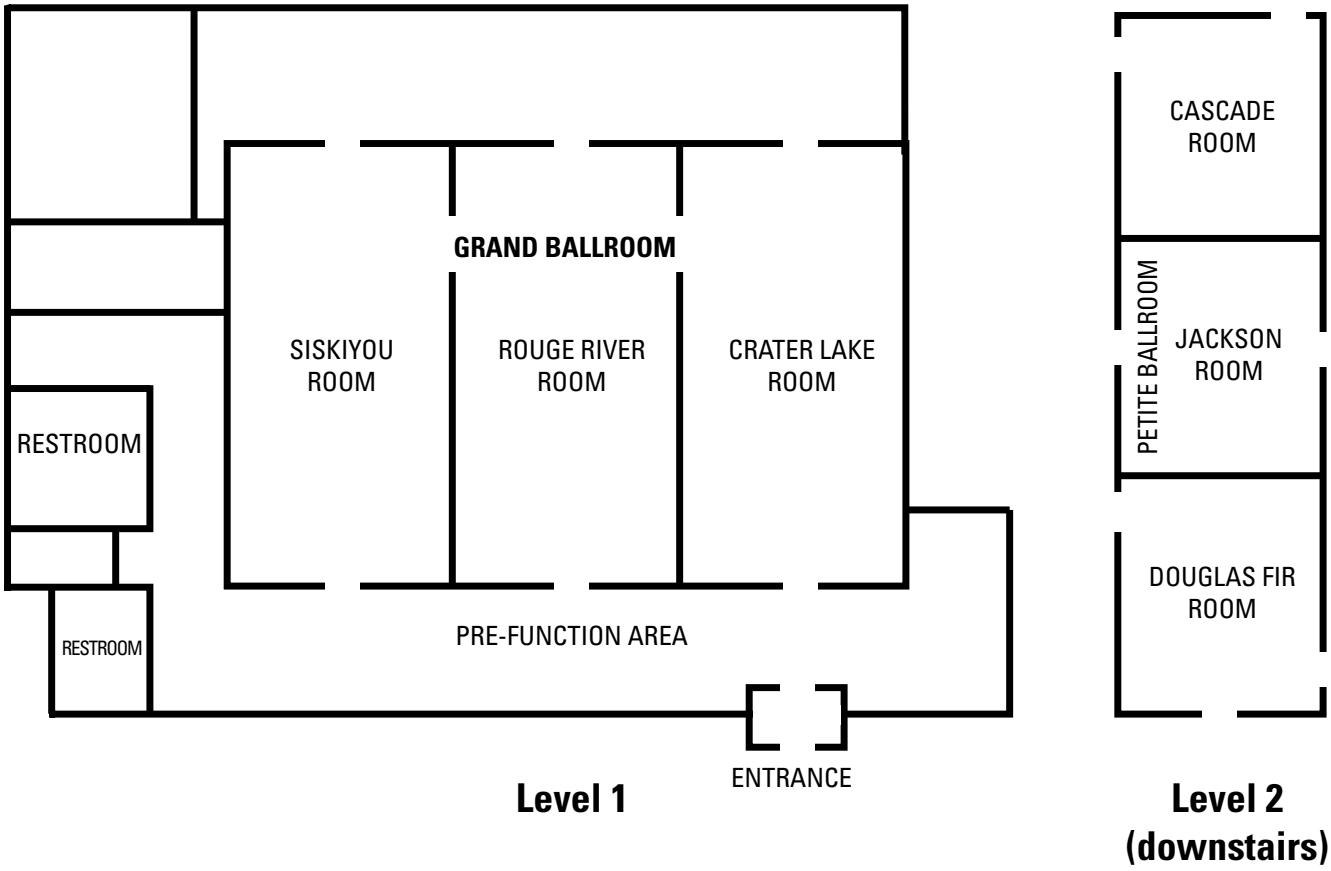
Schedule at a Glance 29

Schedule of Oral Presentations 33

- Tuesday, February 2 33
- Wednesday, February 3 35
- Thursday, February 4 37
- Friday, February 5 49

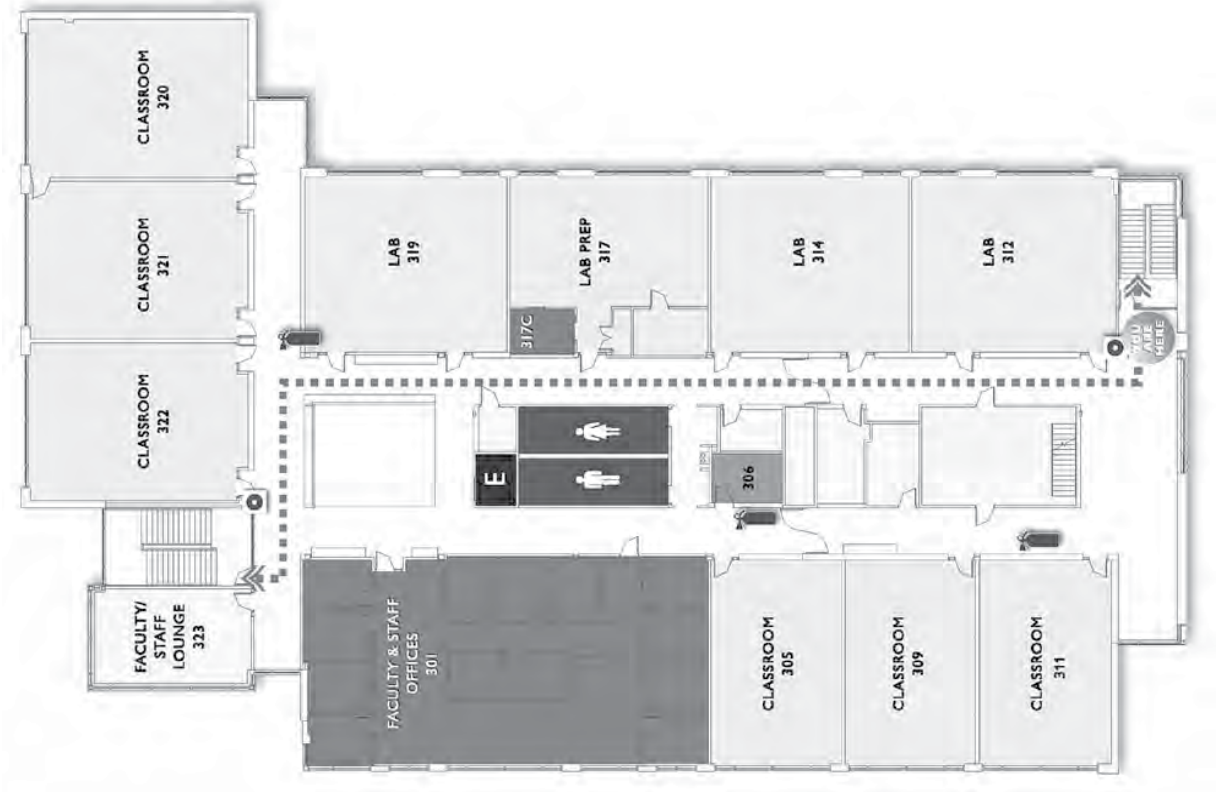
Poster Session 51

RED LION FLOOR PLAN



RCC/SOU HIGHER EDUCATION CENTER FLOOR PLAN

Level 1



Level 3

Welcome to the 2010 Klamath Basin Science Conference!

I would like to welcome each and every one of you to the 2010 Klamath Basin Science Conference!

The Klamath Basin embodies intense challenges, and in the last few years has drawn national attention from federal, state and tribal agencies relative to resource management planning. Managers are clamoring for an integrated science framework to address priority research and management needs in the watershed. The potential drivers of dam removal; climate change; threatened and endangered species; salmon recovery; invasive species, and water for agricultural and other human uses makes an integrated science framework even more critical. The pending Klamath Basin Restoration Agreement (KBRA), if finalized and implemented, could remove four dams on the Klamath by 2020. In 2012, the Department of the Interior Secretary will need to make a Determination regarding dam removal. Thus, this Conference is particularly timely since it is the planners' expectations that the science presented and interdisciplinary discussions at the Conference will set a framework to equip Department of the Interior, Department of Commerce, and other federal, state, tribal and local stakeholders with scientific information and direction needed to make decisions associated with the KBRA.

A primary purpose of the Conference is to describe a conceptual understanding of large-scale ecosystem processes and interactions – drivers, stressors, and indicators – and identify priority needs as they relate to the management of valued natural resources or environmental conditions. A related goal is to increase basin-wide collaboration and build trust and relationships across science and management entities by bringing together a diverse group of stakeholders from both the upper and lower basins. As a valued and participating Conference attendee, I ask you to take the time to formulate and share your thoughts and insights on science needs for you and your constituents, looking at the entire watershed, from the headwaters of the Klamath, to its major tributaries such as the Trinity River, to the Klamath River delta, and the nearshore marine environment. Doing this in preparation for attending will help collectively assemble and begin to synthesize the best and brightest ideas on how to proceed on building a list of both short- and long-term needs and potential science solutions. The time to do this for the Klamath Basin has never been more timely or more necessary.

The Conference organizers represent the diverse stakeholder community of the Klamath Basin. They have assembled an ambitious schedule of plenary and technical sessions, break-out workshops, and poster presentations, all meant to guide the gathering and prioritization of ideas and needs. Specific topics to be covered include water- and land-use trends; water quality; aquatic communities, including threatened and endangered fishes, fish health and disease; terrestrial, riparian, and wetland processes; and other ecologically and culturally significant species of interest. With your special knowledge, experience and expertise, I encourage your active participation for us to successfully achieve our stated goals.

Once again, welcome to Medford, Oregon and the Klamath Basin Science Conference. Have a great stay!

Leslie A. Dierauf, VMD
U.S. Geological Survey
Regional Executive, Northwest Area

Registration

Monday, February 1	Pre-Function Area	5:00 PM – 7:00 PM
Tuesday, February 2	Red Lion Lobby	7:00 AM – 4:00 PM
Wednesday, February 3	Red Lion Lobby	7:00 AM – 4:00 PM
Thursday, February 4	Red Lion Lobby	7:00 AM – 4:00 PM

Welcome Reception

When: Monday, February 1; 5:00 PM – 7:00 PM

Where: Grand Ballroom

Complimentary hors d'oeuvres and a no-host bar will be offered as a welcome to the Klamath Basin Science Conference on Monday evening at the Red Lion Hotel Medford. Please come and take advantage of this opportunity to socialize with your colleagues and to meet and make new contacts. Thank you to the Red Lion Hotel for helping to sponsor this event.

Poster Session

Poster Sessions will be held in the Grand Ballroom on Tuesday, February 2 and Wednesday February 3. Poster set-up will be from 5:00 PM to 6:30 PM Tuesday and Wednesday. Poster authors will be on hand from 6:30 PM to 9:00 PM for the Poster Socials Tuesday and Wednesday evening. Hors d'oeuvres will be served each evening and a no-host bar will be available.

Posters must be taken down by 9:30 PM on Wednesday evening. Unless alternative arrangements are made in advance, posters that are not removed from display boards by 10:00 PM will be discarded.

Abstracts

Abstracts for the Plenary Sessions are printed in the Program. Abstracts for the Concurrent Technical Sessions can be found on the web at http://wfrc.usgs.gov/klamath_conference_website/kbsc2010/home.htm.

Grand Ballroom

Science Needs and Priorities

Convener/Moderator *– Walt Duffy, U.S. Geological Survey, California Cooperative Fish and Wildlife Research Unit*

Panel on Tribal Perspectives and Science Needs

Description: The panel on Tribal Perspectives will consist of representatives of Yurok, Hoopa Valley, Karuk, and The Klamath Tribes, and the Quartz Valley Indian Reservation. Tribal representatives identified possess a first-hand knowledge of the Klamath Basin Ecosystem as well as knowledge of the importance of the ecosystem to Native culture. Each representative will be asked to identify and describe what they believe are the most important science needs in the Klamath Basin during the next 5 to 10 years.

Purpose: The purpose of this panel is to articulate, to the broader audience, those science needs most important to Klamath Basin Tribes.

Desired outcome: The desired outcomes of this panel are twofold. First, representatives will articulate the science needs of Tribal people living within the basin whose lives are dependent on the ecosystem services it provides. Second, science needs identified will serve as a point of reference during break-out sessions later in the conference.

Panel on County Perspectives

Description: The panel on County Government Perspectives will consist of Commissioners, Supervisors from within the Klamath Basin or their designees. These elected officials each address the complexities of the Klamath Basin Ecosystem on a daily basis and are particularly well versed in the human dimensions of the ecosystem. Each will be asked to identify and describe what they believe are the most important science needs in the Klamath Basin during the next 5 to 10 years.

Purpose: The purpose of this panel is to articulate, to the broader audience, those science needs most important or challenging to county governments with responsibilities for managing land use, infrastructure and resources within the Klamath Basin Ecosystem.

Desired outcome: The desired outcomes of this panel are to communicate to the audience science needs and gaps in information that may county governments in contributing to management and restoration of the Klamath Basin Ecosystem. Science needs identified by Commissioners and Supervisors will also serve as a point of reference during break-out sessions later in the conference.

Panel on Federal and State Management Perspectives

Description: The panel on Agency Perspectives will consist of resource managers from State and Federal agencies having responsibilities in the Klamath Basin. These managers each possess knowledge of the complexities of the Klamath Basin Ecosystem as well as the challenges of managing resources within this ecosystem. Managers will be asked to identify and describe what they believe are the most important science needs in the Klamath Basin during the next 5 to 10 years.

Purpose: The purpose of this panel is to articulate, to the broader audience, those science needs most important or challenging to the agencies charged with managing resources within the Klamath Basin Ecosystem.

Desired outcome: The desired outcomes of this panel are to communicate to the audience science needs and gaps in information that may hinder management and restoration of the Klamath Basin Ecosystem. Science needs identified by managers will also serve as a point of reference during break-out sessions later in the conference.

Panel on Non-Governmental Organization Perspectives

Description: The panel on NGO/Industry Perspectives will consist of representatives from conservation organizations, water users, commercial fishers, and the power industry. The perspective of these groups ranges from those of direct users of resources in the Klamath Basin Ecosystem to those of conservationists. Perspectives of this group may also range from economic interests to non-monetary values of the ecosystem. As such, this panel may offer a diverse view of science needs within the basin. Representatives will be asked to identify and describe what they believe are the most important science needs in the Klamath Basin during the next 5 to 10 years.

Purpose: The purpose of this panel is to articulate, to the broader audience, those science needs most important or challenging to the water users, commercial fishers, the power industry, and conservation organizations within or impacted by the Klamath Basin Ecosystem.

Desired outcome: The desired outcomes of this panel are to communicate to the audience science needs and gaps in information on the Klamath Basin Ecosystem identified by these interest groups. Science needs identified by this panel will also serve as a point of reference during break-out sessions later in the conference.

Conceptual Foundations Plenary Session

Convener/Moderator *– Tommy Williams, NOAA Fisheries*

Session Organizers**:** Lyman Thorsteinson, U.S. Geological Survey, Western Fisheries Research Center, Tommy Williams, Fisheries Ecology Division, Southwest Fisheries Science Center, Jim Sedell, National Fish and Wildlife Foundation, Linda Prendergast, PacifiCorp Energy, Walt Duffy, California Cooperative Fishery Research Unit, Humboldt State University, Scott VanderKooi, U.S. Geological Survey, WFRC, Klamath Falls Field Station, Clayton Creager, North Coast Region, California Regional Water Quality Control Board, Steve Kirk, Oregon Department of Environmental Quality, and Tracey Fuentes, U.S. Geological Survey, Northwest Area Director's Office, Western Region.

As we consider present and future science needs for the Klamath Basin, it is critical that this planning is based on a strong conceptual foundation to best guide research and monitoring in relevant areas of concern. A description of our current conceptual understanding of ecosystem structure and function will provide a platform on which to connect science, management, and policy within an integrated watershed context. Previous reviews of Klamath Basin science have highlighted the need for broad-scale conceptual modeling to identify critical uncertainties to more closely tie science information needs to management priorities. The timing for a scientifically valid conceptual model for the basin is especially urgent as dramatic plans, such as the reestablishment of Pacific salmon in the upper portions of the basin, or shifts in environmental conditions by climate change, will require landscape approaches for resource protection, mitigation, and restoration activities. This session is meant to set the context for the remainder of the conference by providing a big picture overview of the major abiotic and biotic influences on the basin, their interactions, and how this environmental setting has been influence by natural and human uses over time and may be used to forecast future changes. In addition, we explore how conceptual models in another location were instrumental in developing an integrated science framework to guide science and restoration efforts across time and spatial scales germane to the Klamath Basin.

Natural History of Klamath Basin—Jim O'Connor, U.S. Geological Survey, and Douglas Markle, Oregon State University

Physical Geography of the Klamath Basin—A River Upside Down

The geology and physical geography provide the framework supporting Klamath Basin ecosystems as well as human activities. The unique position of the 40,790 km^2 watershed—on the leading mid-latitude western continental edge and at the complicated juxtaposition of the Basin-and Range, Cascade Range, and Klamath Mountains tectonic provinces—has subjected the Klamath watershed to a long history of geologic and climatologic events that have turned the basin 'upside down.' Expansive alluvial and lacustrine basins in the hydrologically and topographically complex upper basin transition downstream (in an order opposite to most drainage basins) to a steep and closely confined mountain river system in the lower basin. While the overall upside-down basin geometry was probably established by Cenozoic tectonism, volcanism, and capture of the upper basin from the Pit River headwaters, much of character of the natural landscape at the scale of individual basins, river reaches and hillslopes owes to more recent geologic events and processes, such as (1) the massive Mount Mazama eruption of 7700 years ago which profoundly affected much of the upper basin; (2) meteorologically driven hillslope and channel processes from intense Pacific storms, such as the 1964 flood, which shape the more energetic fluvial systems of the lower basin with episodic inputs of water, sediment and wood; and (3) annual- and decadal-scale climate variations which control hydrologic fluxes throughout the basin.

Zoogeography of Klamath Fishes

Fish faunas are determined by coarse-scale, geological and hydrological processes that set the possibilities for which taxa might be present in a drainage and by finer-scale, life history processes that determine whether possibilities are realized. The Klamath River Basin is an ancient river with a complex geological history and a diverse fish fauna, including the richest lamprey fauna in the world. In many respects it is two faunas - an upper basin fauna of 12 species with relationships to the Sacramento, Snake and Columbia and a lower basin fauna of 14 mostly anadromous and amphidromous species. Only three species are shared and all show evidence of upper basin and lower basin differences. Different life histories add fuzziness to the boundary between the two faunas with lower basin species dispersing upstream (Chinook), upper basin species dispersing downstream (Klamath River lamprey), and genes dispersing in both directions.

Historical Development of the Klamath Basin (1800s To Present Day)—Mark Clark, Oregon Institute of Technology

Who are the inhabitants of the Klamath River Basin, and how have their historical experiences shaped their political and social views? This presentation will examine these questions through a focus on three topics. First, the nature of white settlement—who settled in the region, when, and why—and how those settlers interacted with the indigenous populations. Second, the economic development of the region as a source of natural resources to be consumed elsewhere. Finally, the political evolution of the region as an isolated periphery, often at odds with state and federal authorities. These forces have combined to create the local cultures and perspectives of this region.

Forecast of Future Conditions in the Klamath Basin—Roger Hamilton, University of Oregon

The presentation will summarize the results of studies modeling conditions in the Oregon and California portions of the Klamath River watershed including historical conditions for the past century and projected conditions for the next century. The 2009 analysis was conducted by the National Center for Conservation Science and Policy (NCCSP) and the CLI with the assistance of the MAPPS program of the USDA Pacific Northwest Research Station at Oregon State University. The analysis was based on three IPCC climate models and integrated with a vegetation model to show projections for temperature, precipitation, stream flows in selected tributaries, vegetation condition changes, and wildfire. The global climate models and vegetation model were downscaled to provide a spatial resolution that takes into account topography and micro climates at the 8 km grid scale. The projections in all models showed substantial warming over the next century, and varying precipitation changes. Vegetation conditions in some areas were shown to shift from favoring conifers to favoring more hardwoods on the west side of the watershed, and grasses over shrubs on the east side.

Workshops attended by experts in natural, economic, built, human service, and cultural systems provided feedback on the modeling results in terms of expected impacts, vulnerabilities and suggested strategies for system resistance and resilience. Protecting cold water refugia for aquatic species and groundwater storage for multiple consumptive uses were high priorities for the expert panels. The presentation will provide a brief summary of these responses and recommendations.

A Conceptual Foundation for Ecosystem Restoration—Jack Stanford, University of Montana

The Klamath River Basin in southern Oregon and Northern California has been an epicenter of debate over how to restore and sustain water quality, salmon runs and other natural goods and services of a damaged river ecosystem without unduly compromising current uses of water for agriculture and hydropower, among other cultural issues. Historically the Klamath River was the third largest producer of salmon on the west coast and the watershed included some 350,000 acres of wetlands, marshes and shallow lakes supporting huge numbers of migratory birds and waterfowl. Today development and irrigation have drained 75% of the wetlands and water diversions from the Klamath, Trinity, Shasta and Scott Rivers have reduced the total annual flow of the river by 40% on the average year. Ten major impoundments facilitate flow alteration to promote agriculture and hydropower. Construction of six main-stem dams in the middle reach of the river increased flow regulation in the lower river and extirpated anadromous fishes in Klamath Lake and upstream. Altered water flux by the plethora of human activities in the basin is interactive with other problems, notably nutrient and other water pollution, high summer water temperatures, toxic algae blooms and fish diseases, that have reduced ecosystem integrity to the point that sustaining natural attributes, like clean water and wild salmon runs, is doubtful. The issue is finding common ground to restore and sustain natural and cultural goods and services in a functional ecosystem context. In this presentation I will propose a conceptual foundation or model to underpin plans for restoration of salmon runs and other key attributes of the Klamath River Ecosystem. Included in the presentation will be the discussion of boundaries, principles, and assumptions for the Klamath River Ecosystem, with a scientific retrospective analysis serving as the basis for a conceptual foundation. A view of what a conceptual foundation would look like will be presented as will descriptions of Klamath Basin physiography and geopolitics. In addition, a retrospective analysis of the Klamath biogeography and human influences on aquatic species in relation to functional domains of the river system will be discussed. The presentation concludes with a conceptual foundation for the Klamath ecosystem as derived from a collective understanding of natural and cultural attributes, interactions, constraints and opportunities in a restoration context.

An Integrated Science Framework from South Florida—Matthew Harwell, U.S. Fish and Wildlife Service

More than a decade ago, the effort to restore America's Everglades focused on the importance of applying system-wide science to the planning, evaluation, and decision making process. Starting with a conceptual basis for science in the restoration process, an interdisciplinary, interagency approach led to the current restoration program. This presentation will provide a brief overview of the history of science in the Everglades restoration process, the lessons' learned from the past decade since authorization in WRDA 2000, and the future role for system-wide science to continue restoration efforts. The goal is for the audience to build upon the conceptual basis for science in the restoration process and identify potential lessons from a case study that could be modified and applied to the Klamath.

A Call for an Integrated Science Framework in the Klamath Basin—Jim Sedell, National Fish and Wildlife Foundation

Successful watershed approaches to habitat restoration and population recovery acknowledge ecosystem complexities and the role of science information in decision making processes. Societal values and priorities must play a larger, more transparent role in strategic policy and management decisions, science directions, and public expenditures given the magnitude of the problems and their costs. This conference highlights the need for basin-wide, process-oriented science linking upper and lower river ecosystems to key information needs for restoration, salmon reintroduction, and other issues related to the Klamath Basin Restoration Agreement and potential dam removals. Examples from South Florida and other large ecosystem restoration programs demonstrate the importance of having knowledge about key indicators, stressors, as well as trajectories of change. Long term monitoring with metrics of key ecosystem attributes will be critical for adaptive approaches that ensure societal goals are met.

Water Resources Plenary Session

Convener/Moderator *– William McFarland, Acting Director, U.S. Geological Survey—Oregon Water Science Center*

Session Organizers**:** Bill McFarland, U.S. Geological Survey, Oregon Water Science Center, and Susan Corum, Department of Natural Resources, Karuk Tribe.

The Klamath River is one of the few rivers in the West that flows from the semi-arid interior region, through the humid Cascade Range and coastal mountains, to the Pacific Ocean. This unique hydrologic environment, which includes both rivers, large inland lakes such as Upper Klamath Lake, and extensive wetlands, provides thousands of square miles of habitat for aquatic and terrestrial wildlife. This hydrologic system is also an important resource for agriculture, power generation, recreation, and other human needs. The quality of water throughout the Klamath Basin, in the mainstem, lakes, and tributaries, reflects this unique and diverse setting as well as the effects of human influences. The large size of the basin and wide diversity of landscapes presents a particular challenge to scientists and resource managers working to describe, understand, and manage water in the basin. This session is intended to bring together scientists working in the basin to evaluate the present understanding and explore future science needs. Invited speakers in this Plenary Session will provide background regarding the current scientific understanding of basin hydrology and water quality as a prelude to later presentations and discussions.

Hydrology of the Upper Klamath Basin – Present Understanding and Future Directions—Marshall Gannett, U.S. Geological Survey

The Klamath Basin above Iron Gate Dam encompasses approximately 8,000 square miles of diverse terrain that includes the Cascade Range volcanic arc on the western margin, several large sediment-filled structural lowlands in the central basin, and older volcanic uplands along the eastern margin. The interaction of this diverse landscape with prevailing weather patterns creates the template for the hydrology of the basin, in which most perennial streams originate in the Cascade Range and uplands along the eastern margin of the basin and flow toward the interior structural lowlands. As a result, the flat floors of the sedimentary basins were historically occupied by broad, shallow lakes and extensive wetlands. Much of the runoff from the upper basin eventually flows to Upper Klamath Lake, the head of the Klamath River. Historically, however, not all runoff from the basin drained to the Klamath River; for example, the Lost River drained to the closed basin of Tule Lake and was only intermittently connected to the Klamath River during floods.

The upper Klamath Basin also has a substantial regional groundwater system due to the generally permeable nature of the late Cenozoic volcanic rocks prevalent throughout the area. As a result, many of the major streams in the upper Klamath Basin have a large groundwater component and, hence, robust late season flows. Some streams, such as the Wood River, are almost entirely groundwater fed. Because of the limited surface-water storage in the basin, late season streamflow fed by groundwater is critical to both irrigation and wildlife.

The hydrology of the upper Klamath Basin has been extensively modified for agriculture over the past century. The modifications include development of diversion structures, canals, and drains in most stream valleys, and extensive draining of wetlands in broad lowlands. Larger modifications, undertaken mostly by the Federal Government, include the draining of Lower Klamath Lake by isolating it from the Klamath River, and the draining of Tule Lake by diverting the Lost River to the Klamath River at certain times of the year.

Present understanding of the hydrology of the upper Klamath Basin results from over a century of data collection, studies, and observations by a wide range of individuals and institutions. Managing water resources to meet all of the competing needs in the basin in the future will require considerable quantitative understanding and predictive capability. Meeting this challenge will necessitate expanding traditional data collection activities, such as stream gaging and groundwater monitoring, as well as adopting emerging technologies, such as hydrologic applications of remote sensing and geophysics.

Hydrology of the Lower Klamath Basin – Present Understanding and Future Directions—Mike Belchik, Yurok Tribe

Water ties the Upper and Lower Klamath Basins together, and understanding the hydrology of the Klamath is key to developing effective fisheries and water quality restoration efforts. This presentation will describe the current understanding and future direction of water and groundwater science on the mainstem Klamath, Shasta, Scott, Salmon, Trinity, and other small tributaries to the lower Klamath. Topics will include but not be limited to: 1) major hydrologic regimes contributing to flow in the lower Klamath Basin (i.e. groundwater, snowmelt, and rain systems); 2) current and historic mainstem flows; 3) flood events; and 4) the hydrologic characteristics and hydrologic science of the Shasta, Scott, Salmon, Trinity Rivers and smaller tributaries.

Factors Controlling the *Aphanizomenon flos-aquae* Bloom in Upper Klamath Lake—Tammy Wood, U.S. Geological Survey

The question "What controls *Aphanizomenon flos aquae* (AFA) bloom dynamics in Upper Klamath Lake?" must be addressed in two parts: first, what limits growth of AFA when the bloom is rapidly expanding, and second, what brings on a rapid decline in the bloom. Three hypotheses are considered with regard to the first part. The possibility that phosphorus, iron, or carbon limits growth is considered. Orthophosphate samples collected weekly over several years indicate that phosphorus probably limits the rate of bloom growth early in the season, and in doing so may limit the peak of the first bloom, but probably does not limit subsequent blooms. There is no clear evidence of iron limitation, although this conclusion is based on a limited dataset and short-term, localized iron limitation cannot be ruled out. The average buoyancy characteristics of the AFA, however, are consistent with AFA being limited by the availability of inorganic carbon.

When considering phosphorus limitation of early growth of the bloom, one must consider the forms of sediment phosphorus, as loading from the sediments contributes much of the phosphorus load to the water column. Total phosphorus and total iron in the bed sediments are not well-correlated. Data from extractions of bed sediment cores indicate that phosphorus in fractions other than amorphous iron hydroxides is an important component of the phosphorus stored in the sediments. It also has been demonstrated that removing iron-bound phosphorus from the sediments under aerobic conditions is difficult, even at high pH, although the release of the phosphorus by the reduction of ferric hydroxides cannot be ruled out. It seems reasonable, however, to hypothesize that organic phosphorus is an important source of phosphorus to the water column. Given this scenario, the important consideration for the purposes of determining the likelihood that water column phosphorus levels can be reduced is not the size of the sediment reservoir, which is considerable, but rather the mechanisms of transfer between the sediments and the water column. In order to account for the internal load of phosphorus that is implicated, several mechanisms must be operating together. When one considers benthic diffusive exchange enhanced by bioturbation, and the metabolic release of phosphorus by a large benthic invertebrate community, the potential for transfer between the sediment reservoir of phosphorus and the water column approaches the amount necessary to produce the observed rate of bloom growth.

With regard to what factors might bring on a rapid collapse in the bloom, two possible hypotheses are considered: cell death in response to stressors in the environment, or viral infection. Time series of acoustic backscatter, when converted to a surrogate for water column mass, indicate that mass can be lost rapidly from the water column (within a few hours) when water column stratification persists for more than a single day, and that these episodes of rapid loss of mass in succession contribute to the larger scale collapse of the AFA bloom that often occurs in mid-summer. Multiple causes for the bloom collapse cannot be ruled out, but the loss of mass under stratified conditions over the course of a few hours, usually at night, is consistent with cyanophage-induced algal lysis, and this hypothesis is a good starting point for further investigation of the bloom collapse.

Overview of Trends in Phytoplankton and Toxic Cyanobacteria in the Klamath River Basin of Oregon and California—Jacob Kann Ph.D., Aquatic Ecosystem Sciences LLC

Phytoplankton, particularly cyanobacteria (blue-green algae), are important drivers of water quality dynamics in the Klamath River Basin of Oregon and California. Beginning in the upper portions of the basin, both natural and anthropogenic watershed processes, Upper Klamath Lake (UKL) characteristics, and in-lake alterations such as wetland loss contribute to large May-October cyanobacterial blooms dominated by *Aphanizomenon flos-aquae* (APFA). Inter-annual variability in such factors as inflow (both discharge and nutrient loads), climate (primarily temperature and wind), and circulation influence inter-annual variability in algal blooms and water quality dynamics, including fish kills. Additional UKL bloom components include spring diatom blooms and periodic, but generally low level occurrences of *Anabaena flos-aquae* and toxigenic *Microcystis aeruginosa* (MSAE). Despite low MSAE levels relative to APFA, recent USGS sampling indicates possible toxic effects on juvenile suckers in UKL.

Although high levels of APFA and low levels of MSAE exit UKL to the Klamath River, both species generally diminish with distance downstream and are replaced primarily by diatoms in free-flowing river reaches above Copco and Iron Gate Reservoirs. Directly above Copco and Iron Gate, APFA can still be detected at low levels (relative to UKL), and MSAE and associated microcystin toxin are only rarely detected, or are detected at very low levels. In the impounded reaches that include Copco and Iron Gate Reservoirs both APFA and MSAE again increase, with mid-July through September dominance by toxigenic MSAE and associated levels of microcystin that greatly exceed public health guideline levels. Calmer and generally warmer conditions created by the reservoirs allow MSAE (which is not a nitrogen fixer) to exploit available nitrogen stemming from the in-river and in-reservoir transformation of upstream nitrogenous organic matter to ammonia and/or nitrate. Copco/Iron Gate algal bioassays indicate stimulation of MSAE with the addition of nitrogen alone, but higher biomass was often achieved when phosphorus was added in tandem (assays performed by Pia Moisander; U.C. Santa Cruz). Available nitrogen and the ratio of nitrogen to phosphorus (which is low in UKL) likely explains the dominance switch from APFA (which is a nitrogen fixer) in UKL to MSAE in the Copco/Iron Gate impoundments.

Cyanobacteria levels exported from the impoundments generally diminish with distance downstream in the free-flowing river between Iron Gate Dam and the Klamath River Estuary. However, relative to river reaches above the impoundments, MSAE occurs at higher levels; and both MSAE and microcystin can exceed public health guideline values. MSAE has also been shown to accumulate in slower velocity river edge habitats, often dominating the phytoplankton in those habitats relative to mid-channel habitats which tended to be dominated by diatoms. In addition, bioaccumulation of microcystin in both freshwater mussels and various fish species has been shown to exceed public health guideline values in both the impounded Copco/Iron Gate reaches and free-flowing reaches downstream. This plenary talk will provide an overview of cyanobacteria distribution, potential influencing factors, and bloom related public health issues in the Klamath River Basin.

Klamath River Water Quality Ecological Risk Assessment Conceptual Model: A Proposal for a Comprehensive Assessment—Clayton S. Creager, California Regional Water Quality Control Board and Steve Kirk, Oregon Department of Environmental Quality

There are numerous overlapping physical, chemical, and biological factors that are currently contributing to impairment of water quality standards in the Klamath River. The size and complexity of the Klamath basin presents an enormous assessment challenge for resource management agencies. The Klamath River TMDL interagency team developed an ecological risk assessment framework for water quality related impacts to coordinate assessment activities and to identify key mitigation activities. The challenge associated with the Klamath River TMDL assessment was to develop a clear roadmap between the TMDL listing parameters of nutrients, temperature, and DO and their impacts on beneficial uses. In the case of Upper Klamath Lake (UKL), the transition from a natural background condition of eutrophic to its current hypereutrophic status has had profound water quality implications and has resulted in impairment of beneficial uses within the UKL and in downstream waters. Studies have indicated that UKL has not always been hypereutrophic and that its past impact on downstream trophic status was therefore likely not as profound as it is today. There have been clear shifts in UKL productivity and species composition in the past 100 years, consistent with large scale land disturbance activities, which can be strongly implicated as the cause of the lake's current hypereutrophic character.

There are several issues that must be addressed as part of the assessment challenge. Nutrients and temperature often interact together and with other watershed factors to influence processes within the aquatic ecosystem that then impact ecological elements associated with Klamath River beneficial uses. With multiple factors impacting multiple ecosystem components, impacts on beneficial uses can be cumulative and involve effects from several different pathways. The Klamath River TMDL ecological risk assessment conceptual model clearly identifies impacts on beneficial uses from multiple concurrent stressors.

This Klamath River ecological risk assessment conceptual model presents a series of hypotheses regarding the likelihood that adverse ecological impacts may occur in response to one or more stressors by identifying (1) the pathways by which stressors cause ecological effects and (2) informative and representative assessment endpoints. The Klamath River assessment endpoints are the link between scientifically measurable endpoints and the objectives of stakeholders and resource managers (i.e., support of beneficial uses). The selected endpoints are ecologically relevant, related to environmental management objectives, and susceptible to stressors.

The Klamath River TMDL conceptual model identifies nutrients and temperature as the primary stressors. This presentation focuses on the nutrient conceptual model. Assessment endpoints in the conceptual models are provided for several ecosystem components including: A – Driver/Stressor, B – Environmental Conditions, C – Risk Co-factors (e.g., flow); D – Response/Outcome, and E – Beneficial Use (BU) Impairment. There are a total of thirty-nine assessment endpoints included in the Klamath River nutrient conceptual model. The presentation focuses on the pathway reflecting the connection between water quality conditions and fish disease. Recommendations are provided as to how the TMDL water quality conceptual models can be expanded to serve the larger assessment needs in the basin.

Ecological Sciences and Engineering Needs for the Secretarial Determination Process Plenary Session

Convener/Moderator *– Dennis Lynch, U.S. Geological Survey*

Session Organizers**:** Dennis Lynch, U.S. Geological Survey, Northwest Area Director's Office, Western Region, Lyman Thorsteinson, U.S. Geological Survey, Western Fisheries Research Center, Bill McFarland, U.S. Geological Survey, Oregon Water Science Center, and Irma Lagomarsino, NOAA-Fisheries, Arcata Area Office

This session is organized to provide overview talks on several science/engineering activities being undertaken in order to obtain information needed for the Secretary of the Interior to make an informed determination as to whether four PacifiCorp hydropower dams on the Klamath River should be removed. Dam removal, and many other major habitat restoration activities, would be undertaken if they were deemed to be in the public interest (with an emphasis on local communities and tribes), would improve fisheries in the basin, and could be done within a prescribed budget. Critical science/engineering activities are focused on developing an understanding of: (1) the probable effects of basin restoration activities and dam removal on the Klamath River flow regime, water quality, and water temperature; (2) the costs associated with dam removal and site remediation; (3) identification of possible liabilities and environmental risks associated with dam removal (short term and long term); (4) the transport and fate of sediments behind the four reservoirs (and any associated contaminants) on downstream ecosystems and water uses; and (5) the probable response of multiple fish populations to dam removal and basin restoration, including salmon, suckers, steelhead, lamprey, and trout.

Overview of the Secretarial Determination Process—Dennis Lynch, U.S. Geological Survey

Engineering—Tom Hepler, Bureau of Reclamation

Hydrology and Climate Change—Nancy Parker, Bureau of Reclamation

Water Quality and Sediment Quality—Chauncey Anderson, U.S. Geological Survey or Paul Zedonis, U.S. Fish and Wildlife Service

Sediment Transport and Geomorphology—Blair Greimann, Bureau of Reclamation

Biology – Anadromous Fishes and Marine Species—Jim Simondet, NOAA Fisheries

Biology – Resident Fishes and Terrestrial Species—John Hamilton, U.S. Fish and Wildlife Service

Watershed Processes Plenary Session

Convener/Moderator *– Michael Hughes, The Klamath Tribes*

Session Organizers: Tracy Fuentes, U.S. Geological Survey, and Michael Hughes, The Klamath Tribes Research Station, Chiloquin, OR

Watershed processes influence the function, spatial pattern, and variability of terrestrial, riparian, and aquatic ecosystems. Understanding how these processes interact and operate at different scales, rates, magnitudes, and frequencies can lead to improved management and restoration outcomes. We invite papers addressing any aspect of Klamath Basin watershed processes. In particular, we seek papers addressing land-cover and land-use change; terrestrial, riparian, and wetland functions, disturbance dynamics; water, sediment, and nutrient cycling; potential climate change impacts, interactions between abiotic and biotic factors, bioindicators of landscape-scale processes, process linkages and/or coupling, and biogeomorphology.

Riparian Areas in Landscapes of Frequent Fires and Associated Patterns of Fire Severity—Carl Skinner, U.S. Forest Service

Surprisingly little fire history information is available for riparian environments considering their ecological importance. Thus, there is a great deal of uncertainty about the ecological role of fire in riparian environments. Considering the Mediterranean climate and the general pattern of frequent low-moderate severity fires in most vegetation types of the Klamath Mountains, it is logical to assume that fires regularly affected many riparian areas in the past. Over the last decade several studies of both fire history and contemporary fire patterns have been undertaken. Fire histories have indicated that the range of fire-return-intervals (FRIs: how often fires visited a particular area) were frequent for both riparian reserves and nearby upland sites. However, the median FRIs were approximately double in the riparian reserve sites compared to the adjacent upland sites and thus fire regimes in riparian reserves may be more variable than in adjacent uplands. Further, riparian areas (i.e., those with year-round water) appear to have been boundaries to many fires before the fire suppression period and thus may have enhanced the spatial and temporal diversity of landscapes. Upper reaches that do not have permanent water appear to have had fire regimes similar to the surrounding areas. The more recent, large, fire events (i.e., 1987, 1999, 2002, 2006, 2008) have shown that topography is strongly associated with fire severity and that the lower canyons suffer far less high-severity effects than do other topographic positions. Upper thirds of slopes and ridgetops suffer the highest proportion of high-severity effects.

Hillslope-Channel Coupling in the Lower Klamath Basin: Implications for Sediment Transport and Aquatic Ecology—Tom Lisle, U.S. Forest Service

Lithology, tectonics, and climate exert regional controls on the distribution and magnitude of geomorphic processes that shape river systems and influence the dynamics of riparian and aquatic habitats. In the Klamath-Siskiyou Mountains, lithology is diverse but generally produces large, hard rocks and little suspended sediment; rates of uplift and erosion are high; and a climate of high seasonal rainfall and episodic flooding creates high transport capacity. This combination of factors produces process domains in which landslides convert to debris flows that mix with high stormflows and travel long distances down tributaries with little intermediate storage. Such events can obliterate pre-existing channel topography and strip riparian zones of vegetation. Subsequent channel recovery is rapid insofar as beds armor and channel morphology stabilizes after an event, but re-establishment of riparian stands and recruitment of wood commonly require several decades.

A signature of this distribution of process domains is high channel gradients for a given drainage area compared to other geomorphic provinces. Channel gradients typifying plane-bed channels are prevalent, and pool formation is generally limited to where they can be forced by large bedrock outcrops and sharp bends. Such habitat conditions favor steelhead trout over coho salmon and highlight the potential value of the rare low-gradient reaches of river such as those in the Shasta and Scott Rivers.

During climate change, riparian and aquatic ecosystems may be reset frequently to early stages of recovery if the period between disturbances from wildfire and floods decreases. Reduced riparian canopies would exacerbate high stream temperatures caused by warmer summer temperatures. Opportunities for effective channel restoration are limited in the steep channels of the Klamath-Siskiyou Mountains. However, hillslope stabilization can help to reduce the magnitude and frequency of debris-flow events.

Fluvial Processes and Landforms in Low-Gradient Upper Basin Riparian Systems—Patricia F. McDowell, University of Oregon

Tributary rivers of Upper Klamath Lake are dominated by low gradient valley segments with highly sinuous channels and floodplains studded with wetlands and springs. Understanding the geomorphic and hydrologic processes of these systems is essential for effective restoration planning. Recent research in Australia, Canada, and elsewhere has shown that not all meandering streams have similar processes and rates of geomorphic processes. Generalizations based on “classic” meandering rivers may not be an appropriate basis for restoration design. We reconstructed patterns of channel change and floodplain formation for the Sprague and Sycan Rivers using 19th century land survey data, historical and modern aerial photos, and floodplain stratigraphic analysis. The hydrologically and geomorphically active floodplain of the Sprague has been constructed since about 7,000 years ago, following a major disturbance at the time of the Mt. Mazama eruption. The dominant process of channel change is meander cutoff, and lateral migration rates are low. Meander cutoff also appears to play a role in forming and connecting floodplain springs to the active channel. Geomorphic evidence indicates that the channel has not incised significantly during the historical period. Floodplain deposits were formed predominantly by vertical accretion, with lesser amounts of lateral accretion and possibly oblique accretion, a process typical of low gradient, suspended-load rivers. The paucity of modern point bars is consistent with the limited amount of lateral accretion deposits in the floodplain. Findings from the Sprague are generally consistent with low gradient meandering rivers from other parts of the world. Following the model of Nanson and Croke (1992), low stream power sets these less active meanderings rivers apart from the classic, laterally active meandering rivers. Low stream power is the result of geologically imposed valley gradient. Understanding these unique characteristics of low stream power meandering rivers will improve restoration planning and design.

Concurrent Measurement of Geomorphic Hydrologic and Vegetation Characteristics in Riparian Zones: A Needed Synthesis for Integrated Ecological Monitoring—Chris Massingill, University of Oregon

While the science and monitoring of riparian zones have substantially progressed in recent decades, they currently lack a functional synthesis of fundamental hydrologic, geomorphic, and vegetation concepts. In an effort to move toward such a synthesis, this paper presents research conducted in the Sprague River basin that documents and interprets the hydrologic, geomorphic, and vegetation characteristics of local riparian zones. In this basin, like others in the intermountain U.S. west, valley width exerts a control on the relative occurrence and position of woody (trees and shrubs) and herbaceous (grasses, sedges, and rushes) riparian vegetation. This control rises from structural differences in the confinement of the valley floor and is expressed through spatial variation in floodplain width and height, which in turn control variability in inundation and fluvial energy. In comparison to reaches with broad valleys, reaches in narrow canyons generally possess higher and drier floodplains with more woody vegetation. Seventy-five bank-transect surveys, distributed throughout the basin and sited on depositional surfaces, indicated that physiognomic groups of plants occupied relatively distinct elevation bands extending vertically above the greenline. In most cases, lateral distance from the channel and soil texture were less important determinants of vegetation type than the above-greenline elevation. The obligate-wetland rush *Eleocharis* sp. typically dominated the lowermost band, occupying heights from approximately 0 to 0.5 m above the greenline. Where it occurred in dominant patches, reed canary grass (*Phalaris arundinacea*), an aggressive invasive plant, occupied a band ranging between 0.49 and 1.23 meters above the greenline, exhibiting a preference for 1.0 meter. *Salix* sp. were most prevalent among types of woody vegetation, but were generally sparse. *Salix* sp. occupied a mean elevation of 1.3 meters above the greenline, with a preference for areas between 1.3 and 1.7 meters. Woody vegetation was seldom found lower than 0.5 meters above the greenline, where soils were too moist. These results show the utility of integrated hydrogeomorphic data analysis in differentiating hydrogeomorphic controls on vegetation patterns and suggest that the biogeomorphic monitoring of riparian zones in basins similar to the Sprague would benefit from an increased awareness of the types and hydrologic variability of geomorphic surfaces within the riparian zone. In particular, relationships (herein inferred from soil moisture gradients) between the elevation and hydrology of the channel banks and floodplain, and the way in which this relationship structures different vegetation zones along the river corridor, are important factors in the development of biogeomorphic riparian monitoring plans. These factors are conspicuously absent from most riparian monitoring protocols, and therefore represent an important area for emphasis and growth in riparian monitoring, ecological assessment and restoration planning.

Improving Ecosystem Management and Restoration Through a Comprehensive Regional Bird Monitoring Network in the Klamath Basin—John Alexander, Klamath Bird Observatory

Through an innovative partnership with many collaborators, the Klamath Bird Observatory and U.S. Forest Service have worked to develop the Klamath Bird Monitoring Network, a comprehensive bird-monitoring network in southern Oregon and northern California. The network houses data for hundreds of bird species dating back to 1990 and before. It includes tens of thousands of extensive bird and habitat survey stations and dozens of intensive population demographic monitoring stations. This network integrates bird conservation objectives into Klamath Basin ecosystem management and informs our understanding of watershed processes. We describe and explore species and community response to such watershed processes as land-cover and land-use change, fire and flood disturbance, climate-change, riparian/wetland ecology and process linkages. Monitoring birds at different spatial and temporal scales has helped to inform restoration design; measure the effectiveness of fire-adapted ecosystem restoration efforts; understand the effects of long-term restoration on wetland and riparian ecosystems; and integrate bird monitoring into large scale anadromous fish and wildlife restoration efforts below Lewiston Dam on the Trinity River.

Watershed Processes Breakout Session

The breakout session will take place after the plenary session and involve as many as 10 to 11 working groups of attendees to discuss specific aspects of the broad science themes of the plenary session. Attendees will have the opportunity to ask questions, make comments, explore, and engage in discussions related to future scientific needs for the Basin.

Each working group will involve a facilitated discussion.

	Facilitator	Reporter
1.	Marshall Gannet	Tim Mayer
2.	David Busch	Dan Snyder
3.	Tamara Wood	Annett Sullivan
4.	Stewart Rounds	Jason Cameron
5.	Michael Hughes	Kris Fischer
6.	Susan Corum	Crystal Bowman
7.	Clayton Creager	Steve Hinkle
8.	Linda Prendergast	Sue Mattenberger
9.	Leslie Bach	Allison Aldous
10.	Ken Fetcho	Andy Hamilton
11.	Tracy Fuentes	TBD

Freshwater and Marine Habitats and Communities Plenary Session

Convener/Moderator *– Pete Adams, NOAA Fisheries*

Session Organizers: Scott VanderKooi, U.S. Geological Survey, Klamath Falls Field Station, Pete Adams, Fisheries Ecology Division, NOAA Fisheries, Thomas Williams, Fisheries Ecology Division, Southwest Fisheries Science Center, George Kautsky, Hoopa Valley Tribe, Fisheries Department, and Josh Strange, Yurok Tribe

This session will focus on the fishes of the Klamath-Trinity Basin from the headwaters to the nearshore ocean. The primary focus of the presentations will be on fish. Through fish, biological linkages throughout the Basin will be examined within the context of biological communities that fish strongly influence. Presenters will discuss the fishes of the Basin, their connection to their habitats, and potential future scenarios including anadromous fish re-introduction into the upper portions of the basin, dam removal, and climate change. This session is envisioned as a "jumping off" point for planning research and monitoring that will be needed to manage these fishes under the conditions of change they may experience in the near future.

Fishes and Aquatic Communities of the Upper Klamath Basin—Scott VanderKooi, U.S. Geological Survey

The aquatic habitats of the Upper Klamath Basin are dominated by large shallow lakes, extensive marshlands, and relatively low gradient rivers. Other defining features include a semi-arid climate, nutrient-rich volcanic soils, high elevation; ranging from 1257 to 2865 m with a mean elevation of 1545 m, and numerous springs. The unique features of the basin combined with its geologic history has led to high levels of endemism for native fish species. Historically the upper watershed harbored at least 19 native fish species belonging to five families including lampreys, minnows, salmon and trout, sculpins, and suckers. There is also ample evidence that anadromous fishes migrated to and spawned in tributaries of the upper reaches of the Klamath River and above Upper Klamath Lake and suckers were among the most abundant fishes in upper basin lakes and large rivers. Settlement and development in the basin brought about a number of changes that have directly and indirectly affected native fish populations. Some of these include channelizing, damming and diverting rivers and streams, diking and draining of wetlands, overharvest of suckers, and introduction of non-native fishes. Adverse effects of these actions include the extirpation of anadromous fishes and the associated loss of marine derived nutrient inputs from the upper basin, the loss of critical rearing habitats for young fishes, habitat fragmentation, degradation in water quality, declines in sucker populations, and the introduction of exotic predators and competitors. At least 18 exotic fish species from five families are currently present including catfish, minnows, perch, salmon and trout, and sunfish. In an effort to recover and restore key native fish populations, numerous restoration projects have been completed, are in progress, or are planned in the Upper Klamath Basin. Areas of emphasis include restoring key habitats, providing access to restored and existing habitats, and the reintroduction of extirpated anadromous species. Continued research and monitoring is needed to guide restoration and reintroduction efforts and evaluate the effectiveness of these actions.

Fishes and Aquatic Communities of the Lower Klamath River and its Tributaries—Tommy Williams, NOAA Fisheries

The portion of the Klamath Basin from the estuary upstream to the back-arc of the Cascadia margin provides a diverse and dynamic environment for fish and aquatic communities. This portion of the Klamath Basin is quite different in its abiotic and biotic components than the upper basin. Unlike most watersheds, the greatest relief and topographic complexity occurs here rater than in the headwaters. Anadromous fish provide a useful example for examining the complexity and interconnections within the lower basin and throughout the whole basin. A diversity of habitat and processes are needed to provide the necessary capacity for a system to sustain viable populations of fish. The viability of all populations of anadromous fish in the basin is of great concern; where data are available low abundances continue to be observed. In this talk I will discuss the multiple constraints that affect the viability of anadromous fish in the Klamath Basin. In addition, I will explore the interdependence of habitat, communities, and fish populations throughout the basin in terms of resilience and as a pathway to building diverse habitats and viable populations.

Ecology and Fishes of the Estuary and Nearshore Marine Environments—Josh Strange, Yurok Tribe

The Klamath estuary is a unique ecosystem due to the freshwater and marine interface, but the estuary is also the endpoint of all impacts that have occurred up river and the entry point for anadromous fishes reentering the Klamath system. Nearshore marine environments have strong influence on anadromous fish production as recent events have clearly shown. The Klamath Estuary has experienced substantial changes due to local and upriver impacts that can be difficult to separate. Local impacts include water quality, modification of wetlands and channel habit. Upriver impacts include changes in flow, water quality, and changes in biological communities. One example of these changes is the eulachon which has been reduced from once abundant levels to near extinction. Poor ocean conditions and resulting low density of prey have lead to poor adult salmon returns and serious reductions in west coast salmon fisheries in recent years. Ocean conditions are an essential part of the Klamath anadromous fishes and better understanding of these interactions are necessary to restore the Klamath ecosystem. To be effective, restoration of estuarine habitats and integration of ocean conditions will require an understanding of the historical and evolutionary framework of the way these habitats operated and were integrated with biological communities.

Freshwater and Marine Habitats and Communities Breakout Session

The breakout session will take place after the plenary session and involve as many as 10 to 11 working groups of attendees to discuss specific aspects of the broad science themes of the plenary session. Attendees will have the opportunity to ask questions, make comments, explore, and engage in discussions related to future scientific needs for the Basin.

Each working group will involve a facilitated discussion

	Facilitator	Reporter
1.	George Kautsky	TBD
2.	Pete Adams	Aaron Greenberg
3.	Mike Belchik	TBD
4.	Scott VanderKooi	Brian Hayes
5.	Eric Janney	Mark Johnson
6.	Robert Franklin	Travis Ciotti
7.	Tommy Williams	David Banks
8.	Steve Lindley	Jared Bottcher
9.	Walt Duffy	TBD
10.	Eric Danner	Kim Brewitt
11.	Ron Larson	Dan Brown

Climate Change Plenary Session

Convener/Moderator *– William Woodson, U.S. Geological Survey*

Session Organizers: William D. Woodson, U.S. Geological Survey, Western Fisheries Research Center, and Debra Curry, U.S. Geological Survey, California Water Science Center, CSUS Campus

Recent climatic changes are already causing significant ecological changes in the Klamath Basin and if global emissions continue on their current trajectory the rate of change is expected to accelerate. This session will explore the possible future conditions of the basin closely examining the changes in temperature and water. Presenters will bring climate change impacts to the local level. This session is intended to bring together scientists working in the basin to evaluate the present understanding and explore future science needs related to climate change in the basin. Invited speakers in this Plenary Session will present the current scientific understanding of climate change in the basin, its expected impacts on basin hydrology and ecology.

Western Climate Change: Observations and Predictions—Kathie Dello, Oregon State University

Projections for climate change in the Pacific Northwest from GCMs show a warmer 21st century and an uncertain future for precipitation. It is possible that there will be seasonal changes in precipitation, including wetter winters and drier summers, which could subsequently affect streamflows in the Klamath Basin. GCMs operate at such a coarse scale and they make it difficult to talk about climate change on a regional scale. The launch of a regional modeling effort, climateprediction.net, in 2010 will allow climatologists to study regional climate change at a much finer scale than what is found in GCMs.

Hydrologic Implications of Climate Change for the Klamath River Basin—Lori Flint, U.S. Geological Survey

The Klamath River Basin spans from coastally-dominated moderate climates in mountainous terrain to snow-dominated mountains surrounding broad high-elevation valleys. Changing climate is likely to have variable effects across the basin, with notable changes as a result of lower snowpack and earlier springtime snowmelt. Hydrologic implications include changes in the timing of peak flows, longer summer dry periods and droughts, increases in stream temperature, and increases in climatic water deficit affecting ecological landscapes, species distribution, and wildfire. Because of the complexity of the landscape in the Klamath River Basin, highly dissected tributaries, and a large range of climate, soils, and geology, fine-scale downscaling of climate projections to 270-m has been used in conjunction with grid-based watershed modeling to capture the detail in the landscape and identify areas in the basin that are most sensitive to climate change. Potential changes in runoff and recharge and moisture deficits that drive vegetation and species distributions will be presented for subbasins throughout the Klamath River basin for the next century.

Potential Impacts of Climate Change on Klamath Region Ecosystems and Water Resources—Ron Neilson, U.S. Forest Service

Robert H. Whittaker, one of the foremost Ecologists in U.S. history, wrote a seminal paper on the '… Central Significance of the Klamath Region…" (Whittaker, R.H. (1961). Vegetation history of the Pacific coast states and the "central" significance of the Klamath region. Madroño 16(1): 5-23). The region is, of course, dramatically complex, geologically. But, it is also a contact zone between 'Arcto-Tertiary Geoflora' and 'Madro-Tertiary Geoflora, that is, entire floristic mixtures that evolved, or migrated largely down from the north, versus a wholly different flora that arose from the south. The extensive topo-edaphic diversity allows this natural floristic diversity to flourish and also to act as a natural 'refugium' for the Northwest. As it happens, that contact zone is also located at the average winter position of the 'Polar Front', which separates wet, forested areas to the north from drier or more semi-arid domains to the south. These floristic and atmospheric contact zones are clearly related. Thus, the area resides on a steep, latitudinal moisture gradient, which places it, geographically, in an area of great year-to-year variability of precipitation, even under 'normal' conditions. Unfortunately, under most climate change scenarios examined by the Intergovernmental Panel on Climate Change (IPCC), the wet areas are more likely to get wetter and the dry areas drier, steepening the gradient even more. This is due to an expansion of the Subtropical High Pressure belt, which pushes the jetstream to the north. However, the picture is even cloudier. For the first time in the history of the IPCC, some of the General Circulation Models (GCM) of the planetary climate are forecasting a zone of drying in the Northwest, surrounded by increased precipitation both to the north and to the south. In fact, the water year of 2009 was about 25% low due to just this process. The Pacific High became locked over the Northwest, splitting the jetstream, sending considerable moisture into central California and north into Canada. Using a Dynamic General Vegetation Model (DGVM), designed from 'first principles,' just as are the GCMs, we (The MAPSS Group) simulated the dynamic changes in ecosystems under both 20th century historical and 9 future climate scenarios (3 GCMs X 3 emissions scenarios). We simulated vegetation distribution, productivity, carbon sequestration, fire and runoff, among many other variables. There appears to be a relatively consistent increase in the interdecadal variability of climate, which causes ecosystems to grow during sequential wet years, but to experience considerable, widespread drought and fire during the ensuing drying years. Many of the scenarios show increased productivity, but less carbon sequestration, due to higher decomposition and more fire. Fire increases under virtually all scenarios. Runoff, however, remains quite uncertain, given the location of the basin right at the wet-dry latitudinal transition. Since evaporative demand increases exponentially with temperature, many of the scenarios show decreased runoff. However, at least one scenario shows multi-decade episodes of step-change increases in runoff (likely floods), driven by well-known patterns of interdecadal variability and considerable enhancement of the hydrologic cycle. This hydrologic enhancement is driven by the growing heat load in the oceans, which forces the planet far from energy 'equilibrium' and into patterns of persistent 'meridional' jetstream configurations. These stationary, high-amplitude Rossby Waves efficiently transport equatorial, convective precipitation along high-altitude 'rivers' that conduct latent heat energy directly to the Polar Regions, where conversion back to precipitation releases the stored energy back out to space, helping to balance the ever-increasing Potential Energy gradient from the Tropics to the Poles. The familiar 'Pineapple Express' is just such a pattern. Thus, among the many management challenges will be to improve the resilience of the upland ecosystems to long-term drought, infestation and wind stress, which will help to maintain healthy forests and persistent streamflow. Although fire is a normal component of many parts of the basin, management efforts might help avoid the potential increase of large-scale, catastrophic fires. Increased 'invasions' of more southerly, but still 'native' species, will also complicate floristic management.

Potential Impacts of Climate Change on Infectious Diseases of Fish—Jim Winton, U.S. Geological Survey

In spite of obvious impacts to humans and captive animals, disease is often ignored by fisheries managers as a significant factor affecting the abundance of wild populations because the effects are difficult to observe and quantify. Historically, most fish health research has been directed towards identification, treatment, and prevention of diseases of hatchery fishes; however, more recent studies from marine, freshwater and terrestrial environments indicate that infectious and parasitic diseases can be responsible for population oscillations, extinction of endangered species, reduced host fitness and increased susceptibility to predation as well as an important component of natural mortality. The recognition of disease as a population-limiting factor for wild fish is partly the result of the emergence of high profile pathogens and changes in environmental conditions that shift the host-pathogen balance in favor of disease. This presentation will review some of the ways in which climate change is predicted to affect the ecology of fish diseases and will present examples of endemic and emerging diseases that have been associated with population-level effects. These examples will highlight the critical role played by the environment in the ecology of fish disease and suggest potential ways that climate change may affect the distribution or severity of infectious diseases of fish.

Findings from the Breakout Sessions—Debra Curry, U.S. Geological Survey

Lead experts for the "Watershed Processes" and "Freshwater and Marine Habitats and Communities" present synthesized findings regarding science needs resulting from breakout discussions.

Senior Science Managers Panel—Lyman Thorsteinson, U.S. Geological Survey

The panel of science organizations will consist of senior science managers from State and Federal agencies conducting research and providing science support in the Klamath Basin. These managers understand the need for science-based, ecosystem management across the entire basin. They will describe information needs and science priorities based on their organizations missions as well as what they learned at the conference. This panel provides a bookend to the Resource Management Perspectives panel that convened on the opening morning of the conference and thereby linking science and management and bringing relevance to future directions over the next 5-10 years. An academic representative on the panel will provide a source of independent peer review to all conference activities.

Notes

Schedule at a Glance

Monday, February 1	
5:00 PM	Registration and Welcome Reception – Grand Ballroom
Tuesday, February 2	
7:00 AM	Registration – Pre-Function Area (Continental Breakfast)
8:00 AM	Welcome and Opening Remarks – Grand Ballroom
	Science Needs and Priorities – Grand Ballroom
	Convener/Moderator – Walt Duffy, U.S. Geological Survey
8:50 AM	Panel on Tribal Perspectives and Science Needs
9:40 AM	BREAK (Snack and Beverage)
9:55 AM	Panel on County Perspectives
10:45 AM	Panel on Federal and State Management Perspectives
11:35 AM	Panel on Non-Governmental Organization Perspectives
12:30 PM	LUNCH (Provided)
	Conceptual Foundations Plenary Session – Grand Ballroom
	Convener/Moderator – Tommy Williams, NOAA Fisheries
1:30 PM	Introduction
1:40 PM	Natural History of Klamath Basin
2:10 PM	Historical Development of the Klamath Basin (1800s to Present Day)
2:40 PM	Forecast of Future Conditions in the Klamath Basin
3:10 PM	BREAK (Snack and Beverage)
3:25 PM	A Conceptual Foundation for Ecosystem Restoration
4:10 PM	An Integrated Science Framework from South Florida
4:40 PM	A Call for an Integrated Science Framework in the Klamath Basin
5:00 PM	Poster Set-Up
6:30 PM	**Poster and Evening Social – Grand Ballroom**
Wednesday, February 3	
7:00 AM	Registration - Pre-Function Area (Continental Breakfast)
	Water Resources Plenary Session – Grand Ballroom
	Convener/Moderator – William McFarland, U.S. Geological Survey
8:00 AM	Introduction
8:10 AM	Hydrology of the Upper Klamath Basin - Present Understanding and Future Directions
8:35 AM	Hydrology of the Lower Klamath Basin - Present Understanding and Future Directions
9:00 AM	Factors Controlling the *Aphanizomenon Flos-aquae* Bloom in Upper Klamath Lake
9:25 AM	Overview of Trends in Phytoplankton and Toxic Cyanobacteria in the Klamath River Basin of Oregon and California
9:50 AM	Klamath River Water Quality Ecological Risk Assessment Conceptual Model: A Proposal for a Comprehensive Assessment Framework
10:15 PM	BREAK (Snack and Beverage)

Schedule at a Glance

Wednesday, February 3—Continued	
	Ecological Sciences and Engineering Needs for the Secretarial Determination Process Plenary Session– Grand Ballroom
	Convener/Moderator – Dennis Lynch, U.S. Geological Survey
10:35 AM	Overview of the Secretarial Determination Process
10:50 AM	Engineering
11:00 AM	Hydrology and Climate Change
11:10 AM	Water Quality and Sediment Quality
11:20 AM	Sediment Transport and Geomorphology
11:30 AM	Biology - Anadromous Fishes and Marine Species
11:40 AM	Biology - Resident Fishes and Terrestrial Species
11:50 AM	Questions and Answers
12:30 PM	LUNCH (Provided)
	Watershed Processes Plenary Session – Grand Ballroom
	Convener/Moderator – Michael Hughes, The Klamath Tribes
1:30 PM	Introduction
1:40 PM	Riparian Areas in Landscapes of Frequent Fires and Associated Patterns of Fire Severity
2:00 PM	Hillslope-Channel Coupling in the Lower Klamath Basin: Implications for Sediment Transport and Aquatic Ecology
2:20 PM	Fluvial Processes and Landforms in Low-Gradient Upper Basin Riparian Systems
2:40 PM	Concurrent Measurement of Geomorphic Hydrologic and Vegetation Characteristics in Riparian Zones: A Needed Synthesis for Integrated Ecological Monitoring
3:00 PM	Improving Ecosystem Management and Restoration Through a Comprehensive Regional Bird Mentoring Network in the Klamath Basin
3:20 PM	BREAK (Snack and Beverage)
3:35 PM	**Watershed Processes Breakout Session**
Rooms	**Red Lion Hotel**
	Cascade Group 1; **Jackson** Group 2; **Douglas Fir** Group 3; **Crater Lake** Group 4; **Rogue River** Group 5; **Siskiyou** Group 6
Rooms	**Rogue Community College/Southern Oregon University Higher Education Center (101 S. Bartlett St.)**
	#127 Group 7; **#129** Group 8; **Presentation Hall** Group 9; **#311** Group 10; **#321** Group 11
5:05 – 6:30 PM	Poster Set-Up
6:30 PM	**Poster and Evening Social**
Thursday, February 4	
7:00 AM	Registration – Pre-Function Area (Continental Breakfast)
	Freshwater and Marine Habitats and Communities Plenary Session – Grand Ballroom
	Convener/Moderator – Pete Adams, NOAA Fisheries
8:00 AM	Introduction
8:15 AM	Fishes and Aquatic Communities of the Upper Klamath Basin
9:00 AM	Fishes and Aquatic Communities of the Lower Klamath River and its Tributaries
9:45 AM	Ecology and Fishes of the Estuary and Nearshore Marine Environments
10:15 AM	BREAK (Snack and Beverage)

Thursday, February 4—Continued

10:30 AM	**Freshwater and Marine Habitats and Communities Breakout Session**
Rooms	**Red Lion Hotel**

Cascade Group 1	**Jackson** Group 2	**Douglas Fir** Group 3	**Crater Lake** Group 4
Rogue River Group 5	**Siskiyou** Group 6		

Rooms	**Rogue Community College/Southern Oregon University Higher Education Center (101 S. Bartlett St.)**

#127 Group 7	**#129** Group 8	**Presentation Hall** Group 9	**#311** Group 10
#321 Group 11			

12:00 PM	LUNCH (Provided)
1:00 PM	**Concurrent Technical Sessions (See Thursday Daily Schedule for Detail)**
1:00 – 1:20 PM	Session Talk 1
1:20 – 1:40 PM	Session Talk 2
1:40 – 2:00 PM	Session Talk 3
2:00 – 2:20 PM	Session Talk 4
2:20 – 2:40 PM	Session Talk 5
2:40 PM	BREAK (Snack and Beverage)
3:10 PM	**Concurrent Technical Sessions (See Thursday Daily Schedule for Detail)**
3:10 – 3:30 PM	Session Talk 1
3:30 – 3:50 PM	Session Talk 2
3:50 – 4:10 PM	Session Talk 3
4:10 – 4:30 PM	Session Talk 4
4:30 – 4:50 PM	Session Talk 5

Friday, February 5

7:00 AM	Continental Breakfast
	Climate Change Plenary Session – Grand Ballroom
	Convener/Moderator – William Woodson, U.S. Geological Survey
8:00 AM	Western Climate Change: Observations and Predictions
8:25 AM	Hydrologic Implications of Climate Change for the Klamath River Basin
8:50 AM	Potential Impacts of Climate Change on Klamath Region Ecosystems and Water Resources
9:15 AM	Potential Impacts of Climate Change on Infectious Diseases of Fish
9:40 AM	Question and Answers
10:00 AM	BREAK (Snack and Beverage)
10:15 AM	**Findings from the Breakout Session – Grand Ballroom**
	Convener/Moderator – Debra Curry, U.S. Geological Survey
11:15 AM	**Senior Science Managers Panel – Grand Ballroom**
	Convener/Moderator – Lyman Thorsteinson, U.S. Geological Survey
	Perspectives on Klamath Basin Science Priorities
12:15 PM	**Closing Remarks: Where do we go from Here? – Grand Ballroom**
	Convener/Moderator – Debra Curry, U.S. Geological Survey
	Perspectives on Klamath Basin Science Conference
12:30 PM	**CONFERENCE ADJOURNS**

Notes

Tuesday February 2	Plenary Session
Room	Hotel Lobby
7:00	Registration
Room	Pre-Function Area
7:00—8:00	Continental Breakfast
Room	Grand Ballroom
8:00	Welcome and Opening Remarks – Walt Duffy
8:05	Purpose and Objectives of the Conference - Leslie Dierauf
8:20	Keynote Address – Secretary of the Interior (invited)
	Science Needs and Priorities
8:50	Panel on Tribal Perspectives and Science Needs
	Mike Belchik, Yurok Tribe
	Larry Dunsmoor, The Klamath Tribes
	Michael Orcutt, Hoopa Valley Tribe
	Susan Corum, Karuk Tribe
	Crystal Bowman, Quartz Valley Indian Reservation
	(Questions and Answers)
9:40	BREAK (Snack and Beverage)
9:55	Panel on County Perspectives
	Jill Duffy, Humboldt County
	TBD, Siskiyou County
	John Elliott, Klamath County
	Roger Jaegel, Trinity County
	Gerry Hemingsen, Del Norte County
	(Questions and Answers)
10:45	Panel on Federal and State Management Perspectives
	Mark Stopher, California Department of Fish and Game
	Robert Hooton, Oregon Department of Fish and Wildlife
	Kenneth McDermond, U.S. Fish and Wildlife Service
	Rodney McInnis, NOAA Fisheries
	Pablo Arroyave, Bureau of Reclamation
	(Questions and Answers)
11:35	Panel on Non-Governmental Organization Perspectives
	Dave Bitts, Pacific Coast Federation of Fisherman's Association
	Becky Hyde, Upper Klamath Water Users Association
	Greg Addington, Klamath Water Users Association
	Mark Stern, The Nature Conservancy
	Jack Williams, Trout Unlimited
	Dean Brockbank, PacifiCorp
	(Questions and Answers)
12:30	LUNCH (Provided)

Tuesday February 2—Continued	Plenary Session
	Conceptual Foundations Plenary Session
	Convener/Moderator – Tommy Williams, NOAA Fisheries
1:30	Introduction – Tommy Williams
1:40	Natural History of Klamath Basin – Jim O'Connor and Douglas Markle
2:10	Historical Development of the Klamath Basin (1800s to Present Day) – Mark Clark
2:40	Forecast of Future Conditions in the Klamath Basin – Roger Hamilton
3:10	BREAK (Snack and Beverage)
3:25	A Conceptual Foundation for Ecosystem Restoration – Jack Stanford
4:10	An Integrated Science Framework from South Florida – Matthew Harwell
4:40	A Call for an Integrated Science Framework in the Klamath Basin – Jim Sedell
5:00	Poster Set-up
6:30	Poster and Evening Social

Wednesday February 3	Plenary Session
Room	**Hotel Lobby**
7:00	Registration
Room	**Pre-Function Area**
7:00—8:00	Continental Breakfast
Room	**Grand Ballroom**
	Water Resources Plenary Session
	Convener/Moderator – William McFarland, U.S. Geological Survey
8:00	Introduction - Doug Woodcock
8:10	Hydrology of the Upper Klamath Basin - Present Understanding and Future Directions - Marshall Gannett
8:35	Hydrology of the Lower Klamath Basin - Present Understanding and Future Directions - Mike Belchik
9:00	Factors Controlling the *Aphanizomenon Flos-aquae* Bloom in Upper Klamath Lake - Tammy Wood
9:25	Overview of Trends in Phytoplankton and Toxic Cyanobacteria in the Klamath River Basin of Oregon and California - Jake Kann
9:50	Klamath River Water Quality Ecological Risk Assessment Conceptual Model: A Proposal for a Comprehensive Assessment Framework - Clayton Creager, and Steve Kirk
10:15	BREAK (Snack and Beverage)
	Ecological Sciences and Engineering Needs for the Secretarial Determination Process Plenary Session
	Convener/Moderator – Dennis Lynch, U.S. Geological Survey
10:35	Overview of the Secretarial Determination Process - Dennis Lynch
10:50	Engineering - Tom Hepler
11:00	Hydrology and Climate Change - Nancy Parker
11:10	Water Quality and Sediment Quality - Chauncey Anderson, or Paul Zedonis
11:20	Sediment Transport and Geomorphology - Blair Greimann
11:30	Biology - Anadromous Fishes and Marine Species - Jim Simondet
11:40	Biology - Resident Fishes and Terrestrial Species - John Hamilton
11:50	(Questions and Answers)
12:30	LUNCH (Provided)
	Watershed Processes Plenary Session
	Convener/Moderator – Michael Hughes, The Klamath Tribes
1:30	Introduction - Michael Hughes
1:40	Riparian Areas in Landscapes of Frequent Fires and Associated Patterns of Fire Severity – Carl Skinner
2:00	Hillslope-Channel Coupling in the Lower Klamath Basin: Implications for Sediment Transport and Aquatic Ecology – Tom Lisle
2:20	Fluvial Processes and Landforms in Low-Gradient Upper Basin Riparian Systems – Patricia McDowell
2:40	Concurrent Measurement of Geomorphic Hydrologic and Vegetation Characteristics in Riparian Zones: A Needed Synthesis for Integrated Ecological Monitoring – Chris Massingill
3:00	Improving Ecosystem Management and Restoration Through a Comprehensive Regional Bird Monitoring Network in the Klamath Basin – John Alexander

3:20	BREAK (Snack and Beverage)
Wednesday February 3—Continued	Plenary Session
3:35	**Watershed Processes Breakout Session**

The breakout session will take place after the plenary session and involve as many as 10 to 11 working groups of attendees to discuss specific aspects of the broad science themes of the plenary session. Attendees will have the opportunity to ask questions,make comments, explore, and engage in discussions related to future scientific needs for the Basin.

Each working group will involve a facilitated discussion.

Rooms	**Red Lion Hotel**			
	Cascade	**Jackson**	**Douglas Fir**	**Crater Lake**
	Group 1	Group 2	Group 3	Group 4
	Rogue River	**Siskiyou**		
	Group 5	Group 6		

Rooms	**Rogue Community College/Southern Oregon University Higher Education Center (101 S. Bartlett St.)**			
	#127	**#129**	**Presentation Hall**	**#311**
	Group 7	Group 8	Group 9	Group 10
	#321			
	Group 11			
5:05—6:30	Poster Set-Up			
6:30	**Poster and Evening Social**			

Thursday February 4	Plenary Session
Room	**Hotel Lobby**
7:00	Registration
Room	**Pre-Function Area**
7:00—8:00	Continental Breakfast
Room	**Grand Ballroom** **Freshwater and Marine Habitats and Communities Plenary Session**
	Convener/Moderator – Peter Adams, NOAA Fisheries
8:00	Introduction - Churchill Grimes
8:15	Fishes and Aquatic Communities of the Upper Klamath Basin – Scott VanderKooi
9:00	Fishes and Aquatic Communities of the Lower Klamath River and its Tributaries – Tommy Williams
9:45	Ecology and Fishes of the Estuary and Nearshore Marine Environments – Josh Strange
10:15	BREAK (Snack and Beverage)
10:30	**Freshwater and Marine Habitats and Communities Breakout Session**

The breakout session will take place after the plenary session and involve as many as 10 to 11 working groups of attendees to discuss specific aspects of the broad science themes of the plenary session. Attendees will have the opportunity to ask questions,make comments, explore, and engage in discussions related to future scientific needs for the Basin.

Each working group will involve a facilitated discussion.

Rooms	**Red Lion Hotel**			
	Cascade Group 1	**Jackson** Group 2	**Douglas Fir** Group 3	**Crater Lake** Group 4
	Rogue River Group 5	**Siskiyou** Group 6		

Rooms	**Rogue Community College/Southern Oregon University Higher Education Center (101 S. Bartlett St.)**			
	#127 Group 7	**#129** Group 8	**Presentation Hall** Group 9	**#311** Group 10
	#321 Group 11			

12:00	LUNCH (Provided)
1:00	**Concurrent Technical Sessions (See following pages for detail)**
2:40	BREAK (Snack and Beverage)
3:10	**Concurrent Technical Sessions (See following pages for detail)**

Thursday, February 4

Session 1 – Talk 1 (1:00 – 1:20 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 1	Water Quality Monitoring and Modeling	Toxic Algae in the Klamath Basin 1	Anadromous & Resident Fish 1
Moderator	**Walt Duffy**	**Dan Turner**	**Susan Corum**	**George Kautsky**
1:00 – 1:20	Habitat Enhancement in the Upper Klamath Basin Completed Projects and Future Opportunities	Water Management and Water Quality Monitoring at BLM Wood River Wetlands 2007–2009	Algae: The Forgotten Half of the Klamath River Phytoplankton	Fall Chinook Salmon Escapement and Run Characteristics for the Mainstream Klamath River, 2001–2008
	Troy Brandt	Andy Hamilton	Richard Raymond	Steve Gough
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 1	Environmental Influences on Endangered Sucker Ecology 1	Riparian Dependent Species 1	Environmental Assessment and Monitoring 1
Moderator	**Jim Simondet**	**Lyman Thorsteinson**	**John Alexander**	**Linda Pendergast**
1:00 – 1:20	Mercury Contamination in Lampreys of the Lower Klamath Basin	Lack of Recruitment to Spawning Sucker Populations and Timing of Juvenile Sucker Mortality in Upper Klamath Lake, Oregon	Oregon Spotted Frogs (*Rana pretiosa*) in the Klamath Basin: Status, Threats, and Local Restoration	Vegetation and Fluvial Geomorphology of the Riparian Greenline in the Sprague River Basin
	Jamie Bettaso	Summer Burdick	Christopher Pearl	Michael Hughes
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
	Trinity River	Physical Hydrology and Climate	Ecohydrology	
Moderator	**Rod Wittler**	**Jonathan LaMarche**	**Ken Fecho**	
1:00 – 1:20	Hatchery Impacts on the Genetic Structure of Native Stocks in the Klamath Trinity Basin	Simulation of Regional Groundwater Flow to Inform Resource Management in the Upper Klamath Basin, Oregon and California	Klamath River Stream Temperature Modeling and Use of Thermal Refugia by Salmonids	
	Andrew Kinsiger	Marshall Gannett	Eric Danner	

Session 1 – Talk 2 (1:20 – 1:40 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 1	Water Quality Monitoring and Modeling	Toxic Algae in the Klamath Basin 1	Anadromous & Resident Fish 1
Moderator	**Walt Duffy**	**Dan Turner**	**Susan Corum**	**George Kautsky**
1:20 – 1:40	The Past, Present, and Future of the Williamson River Delta: Big Changes in the Upper Basin	Modeling Hydrodynamics, Temperature, and Water Quality in Klamath River, from Link River Dam to Keno Dam, Oregon	Genetic Analysis of the Population Turnover in the 2007 Copco Reservoir Microcystis Bloom that Resulted in Predominantly Non-toxigenic Variants Late in the Season	Klamath Basin Lampreys: Critical Uncertainties for Restoration and Management.
	Mark Stern	Annett Sullivan	Connie Bozarth	Damon Goodman
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 1	Environmental Influences on Endangered Sucker Ecology 1	Riparian Dependent Species 1	Environmental Assessment and Monitoring 1
Moderator	**Jim Simondet**	**Lyman Thorsteinson**	**John Alexander**	**Linda Pendergast**
1:20 – 1:40	Ceratomyxosis and *Parvicapula minibicornis* Infection of Klamath River Juvenile Salmon	Ecological Strategies Utilized by Cyanobacteria	A Spatial Model for Predicting Unknown Populations of Oregon Spotted Frogs in the Klamath Basin	Long-term Ecological Effects of Debris Flows and Debris Floods on Tributary Streams in the Klamath Mountains
	Scott Foott	Barry Rosen	Luke Groff	Matthew Cover
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
	Trinity River	Physical Hydrology and Climate	Ecohydrology	
Moderator	**Rod Wittler**	**Jonathan LaMarche**	**Ken Fecho**	
1:20 – 1:40	Using Integrated Hatchery Practices to Improve Genetic Fitness of Naturally - and Hatchery Produced Coho Salmon in the Trinity River, California	Use of a Simulation-optimization Model to Evaluate Alternative Groundwater Management Strategies for the Upper Klamath Basin, Oregon and California	Potential Impacts of Climate Change on Aquatic Fauna: Finding a New Paradigm for Wetland and Riparian Systems in the Upper Klamath Basin, Oregon	
	Seth Naman	Brian Wagner	Craig Bienz	

Session 1 – Talk 3 (1:40 – 2:00 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 1	Water Quality Monitoring and Modeling	Toxic Algae in the Klamath Basin 1	Anadromous & Resident Fish 1
Moderator	**Walt Duffy**	**Dan Turner**	**Susan Corum**	**George Kautsky**
1:40 – 2:00	Monitoring Fishery Effects of Salmonid Habitat Restoration	Multi-year Nutrient Budget Dynamics for Iron Gate and Copco Reservoirs, California	Nutrient Limitation of Phytoplankton and Microcystis Blooms in Copco and Iron Gate Reservoirs	Population Genetics of Klamath Basin *Oncorhynchus mykiss*
	Cindy Thomson	Eli Asarian	Pia Moisander	Devon Pearse
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 1	Environmental Influences on Endangered Sucker Ecology 1	Riparian Dependent Species 1	Environmental Assessment and Monitoring 1
Moderator	**Jim Simondet**	**Lyman Thorsteinson**	**John Alexander**	**Linda Pendergast**
1:40 – 2:00	Effects of *Ceratomyxa shasta* Infections on Klamath River Salmon: What do we Know and Where do we go Next?	Seasonal and Spatial Dynamics of Cyanobacteria and Associated Water Quality Variables in Upper Klamath Lake, Oregon	Comparative Ecology of the Western Pond Turtle (*Actinemys marmorata*) on Two Forks of the Trinity River, Trinity County, California	Applications of Environmental Monitoring in the Scott Valley
	Jerri Bartholowmew	Sara Eldridge	Don Ashton	Erich Yokel
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
	Trinity River	Physical Hydrology and Climate	Ecohydrology	
Moderator	**Rod Wittler**	**Jonathan LaMarche**	**Ken Fecho**	
1:40 – 2:00	Legacy Effects of Trinity River Gold Mining	Streamflow Response to Climate in the Klamath Basin Region	Application of Hydrological and Ecological Models to Access Effects of Changing Climate and Adaptation Strategies on Pastures and Water Resources in the Wood River Basin	
	Andreas Krause	Tim Mayer	Yutaka Hagimoto	

Session 1 – Talk 4 (2:00 – 2:20 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 1	Water Quality Monitoring and Modeling	Toxic Algae in the Klamath Basin 1	Anadromous & Resident Fish 1
Moderator	**Walt Duffy**	**Dan Turner**	**Susan Corum**	**George Kautsky**
2:00 – 2:20	Restoration Prior to Dam Removal: The Key to a Low-impact Dam Removal Strategy?	Scott River Water Balance Model (Understanding Water Quality and Quantity)	Microcystin Analyses in the Klamath River by ELISA	Status of Coho Salmon in the Scott and Shasta River Watersheds
	Eric Ginney	Danielle Yokel	Andrew Lincoff	Morgan Knechtle
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 1	Environmental Influences on Endangered Sucker Ecology 1	Riparian Dependent Species 1	Environmental Assessment and Monitoring 1
Moderator	**Jim Simondet**	**Lyman Thorsteinson**	**John Alexander**	**Linda Pendergast**
2:00 – 2:20	*Ceratomyxa shasta* Infection in Sentinel Fish Exposed in the Klamath River, 2007-2009	Cyanobacterial Toxins Found in Upper Klamath Lake, Oregon: Implications for Endangered Fish	Freshwater Mussel Abundance, Distribution, and Habitat Preference in Two Northern California Rivers Within Karuk Ancestral Territory	Feasibility Assessment of Constructed Treatment Wetlands in the Vicinity of the Klamath Hydroelectric Project
	Richard Holt	Kathy Echols	Aaron David	Ken Carlson
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
	Trinity River	Physical Hydrology and Climate	Ecohydrology	
Moderator	**Rod Wittler**	**Jonathan LaMarche**	**Ken Fecho**	
2:00 – 2:20	A New Model for Introducing Environmental Challenges into the Public School Curriculum: Learning and Applying Core Science to Save Salmon	Watershed Scale Response to Climate Change: Sprague River Basin, Oregon	Protecting Groundwater-dependent Ecosystems in the Klamath Basin	
	Judith Jensen	John Risley	Leslie Bach	

Session 1 – Talk 5 (2:20 – 2:40 PM)				
	Red Lion			
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 1	Water Quality Monitoring and Modeling	Toxic Algae in the Klamath Basin 1	Anadromous & Resident Fish 1
Moderator	**Walt Duffy**	**Dan Turner**	**Susan Corum**	**George Kautsky**
2:20 – 2:40	Adaptive Management: Lessons from the Everglades, Coastal Louisiana and Missouri River Programs	Method Development to Modeling the Shading Provided to the Klamath River and its Tributaries by Vegetation and Geomorphology	Evaluation and Comparison of Five Commercial Microcystin Enzyme-Linked Immunosorbent Assays to Liquid Chromatography Tandem Mass Spectrometry	The Potential for Integrating Fish Tagging Studies Throughout the Klamath River Basin
	Chuck Padera	William Forney	Keith Loftin	Eric Janney
	Red Lion		Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 1	Environmental Influences on Endangered Sucker Ecology 1	Riparian Dependent Species 1	Environmental Assessment and Monitoring 1
Moderator	**Jim Simondet**	**Lyman Thorsteinson**	**John Alexander**	**Linda Pendergast**
2:20 – 2:40	Evaluation of *Certaomyxa shasta* and *Parviscapula minibicornis* in Adult Returning Chinook Salmon Throughout the Klamath River Basin	Algal Toxins in Upper Klamath Lake, Oregon: Histopathology of Age-0 Lost River and Shortnose Suckers in 2007 and 2008	Thermoregulatory Behavior and Growth Characteristics of Western Pond Turtles (*Actinemys marmorata*) on Regulated and Unregulated Forks of the Trinity River	Using Spatial Techniques to Aid Ecological Inventory and Monitoring at Regional Scales
	Ryan Slezak	Christopher Ottinger	Jamie Bettaso	Lorin Groshong
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Physical Hydrology and Climate	Ecohydrology	
Moderator		**Jonathan LaMarche**	**Ken Fecho**	
2:20 – 2:40		Bathymetric Mapping with Airborne LiDAR in the Klamath-Trinity Basin	How Much Water does a Wetland Need? Developing Environmental Water Requirements for Groundwater-dependent Ecosystems in the Upper Klamath Basin	
		David Gaeuman	Allison Aldous	

2:40 – 3:10 BREAK (Snack and Beverage)

Session 2 – Talk 1 (3:10 – 3:30 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 2	Integrated Modeling	Toxic Algae in the Klamath Basin 2	Anadromous & Resident Fish 2
Moderator	**Robert Franklin** **Tracy Fuentes**	**John Hamilton**	**Susan Corum**	**Nick Hetrick**
3:10 – 3:30	A 45-Year Retrospective on Restoration Construction Projects on the Trinity River, California	Overview of SALMOD, a Fish Production Model, in the Secretarial Decision	Cyanotoxins in Waters of the Klamath Basin: Historical Perspective and Current Risks	Chinook and Coho Salmon Outmigrant Trapping in the Mainstem Klamath River
	Andreas Krause	Sharon Campbell	Wayne Carmichael	Steve Gough
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 2	Environmental Influences on Endangered Sucker Ecology 2	Riparian Dependent Species 2	
Moderator	**Jim Winton**	**William McFarland**	**Heather Ray**	
3:10 – 3:30	Modeling the *Ceratomyxa shasta* Cycle in the Klamath River System	Skin Bacterial Flora of Age-0 Lost River and Shortnose Suckers in 2008: Nature Conservancy Delta Restoration Project and Upper Klamath Lake	Ecology and Conservation of Western Pond Turtles in the Klamath Basin: What are the Challenges Ahead?	
	Adam Ray	Christopher Ottinger	Bruce Bury	
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Environmental Assessment and Monitoring 2	Dams, Sediment and Fish	
Moderator		**Kris Fischer**	**Michael Hughes**	
3:10 – 3:30		Where in Upper Klamath Lake are the Largest Concentrations of Phosphorus, Organic Carbon and Metals Found in Bottom Sediment?	Effects of Dams on the Klamath: Historical Changes, Distinct Sediment Impacts by Reach, and Implications for Restoring Native Fish	
		Nancy Simon	Matt Kondoff	

Session 2 – Talk 2 (3:30 – 3:50 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 2	Integrated Modeling	Toxic Algae in the Klamath Basin 2	Anadromous & Resident Fish 2
Moderator	**Robert Franklin** **Tracy Fuentes**	**John Hamilton**	**Susan Corum**	**Nick Hetrick**
3:30 – 3:50	Restoration Implications of the Holocene History of the Sycan River, Upper Klamath Basin, Oregon	Conceptual Design and Approach for Modeling Fall-run Chinook Production Post Dam Removal	Preliminary Assessment of Cyanotoxins in the United States	Juvenile Coho Salmon Use of Off-Channel Habitats in the Lower Klamath River
	Pollyanna Lind	Noble Hendrix	Keith Loftin	Dave Hillemeier
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 2	Environmental Influences on Endangered Sucker Ecology 2	Riparian Dependent Species 2	
Moderator	**Jim Winton**	**William McFarland**	**Heather Ray**	
3:30 – 3:50	*Ceratomyxa shasta* In The Williamson River: Implications For Salmonid Reintroduction and Management in the Upper Klamath Basin	Direct and Indirect Consumption of Cyanobacteria by Juvenile Suckers in Klamath Lake, Oregon	Breeding Distribution and Phenology of the Foothill Yellow-legged Frog (*Rana boylii*) in Regulated and Unregulated Tributaries of the Trinity River Basin	
	Charlene Hurst	Barry Rosen	Jamie Bettaso	
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Environmental Assessment and Monitoring 2	Dams, Sediment and Fish	
Moderator		**Kris Fischer**	**Michael Hughes**	
3:30 – 3:50		Building a Foundation for Coordinated Water Quality Monitoring in the Klamath River Basin	Sediment Transport Dynamics in Dam-influenced Reaches of the Klamath River: Lessons from 10 Years of Study	
		Chantell Royer	Mark Tompkins	

Session 2 – Talk 3 (3:50 – 4:10 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 2	Integrated Modeling	Toxic Algae in the Klamath Basin 2	Anadromous & Resident Fish 2
Moderator	**Robert Franklin** **Tracy Fuentes**	**John Hamilton**	**Susan Corum**	**Nick Hetrick**
3:50 – 4:10	Valley and Stream Habitat Restoration in the Lower Klamath Sub-basin	Economic Analysis in Support of the Secretarial Decision	Multi-year Trends in *Microcystis aeruginosa* and Associated Microcystin Toxin in the Klamath River System: Implications for Public Health Guidelines	Juvenile Coho Life History Tactics Utilizing the Mid-Klamath River Corridor with Linkages Between Inland and Coastal Riverine Habitats
	Rocco Fiori	Cindy Thomson	Jacob Kann	Toz Soto
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 2	Environmental Influences on Endangered Sucker Ecology 2	Riparian Dependent Species 2	
Moderator	**Jim Winton**	**William McFarland**	**Heather Ray**	
3:50 – 4:10	Effects of Elevated Water Temperature on Early Life Stage Development and Survival of Spring-run Chinook Salmon in the Klamath-Trinity Basin	Within-year and Among-year Distributions of Benthic Invertebrates in Upper Klamath Lake and the Newly Restored Delta Wetlands	What are the Challenges for Amphibians and Reptiles in the Klamath River Watershed: Biogeographic Barriers, Endemism, and Conservation Status	
	Keith Marine	James Carter	Bruce Bury	
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Environmental Assessment and Monitoring 2	Dams, Sediment and Fish	
Moderator		**Kris Fischer**	**Michael Hughes**	
3:50 – 4:10		Benthic Sources of Dissolved Nutrients and Trace Metals in Upper Klamath Lake and Associated Wetlands after Designed Levy Breaches	Effects of Sediment Release Following Dam Removal on the Aquatic Biota of the Klamath River: Application of Results from a Fine Sediment Transport Model	
		James Kuwabara	Ethan Bell	

Session 2 – Talk 4 (4:10 – 4:30 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 2	Integrated Modeling	Toxic Algae in the Klamath Basin 2	Anadromous & Resident Fish 2
Moderator	**Robert Franklin** **Tracy Fuentes**	**John Hamilton**	**Susan Corum**	**Nick Hetrick**
4:10 – 4:30	Building on the Baseline Assessment: First Year Restoration Discoveries on Big Springs Creek	Effects of Flow Augmentation and Meteorological Conditions on Coho Salmon Production in the Klamath River Basin	Monitoring of Harmful Algal Blooms and Potential Impacts to Fish Health	Movement and Survival of Juvenile Salmon in the Lower Klamath River
	Ann Willis	Ian Courter	Swee Teh	John Beeman
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
	Fish Health and Disease 2	Environmental Influences on Endangered Sucker Ecology 2		
Moderator	**Jim Winton**	**William McFarland**		
4:10 – 4:30	Monitoring the Salmon Parasite *Ceratomyxa shasta* in the Klamath River Through Water Sample Analysis	Larval Lost River Sucker *Deltistes luxatus* and Shortnose Sucker *Chasmistes brevirostris* Response to Wetland Restoration at the Williamson River Delta, Upper Klamath Lake, Oregon		
	Jerri Bartholomew	Heather Hendrixson		
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Environmental Assessment and Monitoring 2	Dams, Sediment and Fish	
Moderator		**Kris Fischer**	**Michael Hughes**	
4:10 – 4:30		Well Designed Performance Measures are Essential for Planning, Operation and Validation of Landscape Scale Restoration Programs	DREAM-1 and Its Application to Klamath River Dam Removal Sediment Transport Simulation	
		Jed Redwine	Yantao Cui	

Session 2 – Talk 5 (4:30 – 4:50 PM)				
Red Lion				
Room	Cascade	Jackson	Douglas Fir	Crater Lake
	Restoration: Principles, Practices, and Case Studies 2	Integrated Modeling	Toxic Algae in the Klamath Basin 2	Anadromous & Resident Fish 2
Moderator	**Robert Franklin** **Tracy Fuentes**	**John Hamilton**	**Susan Corum**	**Nick Hetrick**
4:30 – 4:50	Update and Design Approach on Urban Stream Restoration Projects Along Yreka and Greenhorn Creeks in the Shasta River Watershed of the Klamath Basin	Bioenergetics of Juvenile Chinook and Coho Salmon at Klamath River Tributary Mouths	Microcystin Bioaccumulation in Klamath River Fish and Freshwater Mussel Tissue: Implications for Public Health	Monitoring Adult Spawning Populations of Lost River and Shortnose Suckers to Support Recovery Planning
	Tom Hesseldenz	Walt Duffy	Jacob Kann	David Hewitt
Red Lion			Rogue Community College/Southern Oregon University Higher Education Center (HEC)	
Room	Rogue River	Siskiyou	Rm 127	Rm 129
Moderator				
4:30 – 4:50				
	Rogue Community College/Southern Oregon University Higher Education Center (HEC)			
Room	Rm 311	Rm 321	Presentation Hall	
		Environmental Assessment and Monitoring 2	Dams, Sediment and Fish	
Moderator		**Kris Fischer**	**Michael Hughes**	
4:30 – 4:50		Seasonal Water Quality Patterns Downstream of a Hypereutrophic Lake: Summary of 2007 - 2009 Multi-probe Monitoring in the Lake Ewauna Reach of the Klamath River	Migrational Movements and Distribution of Spawning Klamath Largescale, Lost River, and Shortnose Suckers in the Sprague River Before and After the Removal of Chiloquin Dam	
		Jessica Asbill	Craig Ellsworth	

Notes

Friday February 5	Plenary Session
Room	**Hotel Lobby**
7:00	Registration
Room	**Pre-Function Area**
7:00—8:00	Continental Breakfast
Room	**Grand Ballroom** **Climate Change Plenary Session**
	Convener/Moderator – William Woodson, U.S. Geological Survey
8:00	Western Climate Change: Observations and Predictions - Kathie Dello
8:25	Hydrologic Implications of Climate Change for the Klamath River Basin - Lori Flint
8:50	Potential Impacts of Climate Change on Klamath Region Ecosystems and Water Resources - Ron Neilson
9:15	Potential Impacts of Climate Change on Infectious Diseases of Fish - Jim Winton
9:40	(Question and Answers)
10:00	BREAK (Snack and Beverage)
10:15	**Findings from the Breakout Sessions**
	Convener/Moderator – Debra Curry, U.S. Geological Survey
	Watershed Processes - Michael Hughes
	Freshwater and Marine Habitats and Communities - Pete Adams
11:15	**Senior Science Managers Panel**
	Convener/Moderator – Lyman Thorsteinson, U.S. Geological Survey
	Perspectives on Klamath Basin Science Priorities
	Frank Shipley, U.S. Geological Survey
	Usha Varanasi, NOAA Fisheries
	Hao Tran, U.S. Forest Service
	William Pearcy, Oregon State University
	(Questions and Answers)
12:15	**Closing Remarks: Where do we go from Here?**
	Convener/Moderator – Debra Curry, U.S. Geological Survey
	Leslie Dierauf, U.S. Geological Survey
12:30	**CONFERENCE ADJOURNS**

Notes

Abstract No.	Presenter	Title
1	Eli Asarian	KLAMATH RIVER NUTRIENT LOADING AND RETENTION DYNAMICS IN FREE-FLOWING REACHES, 2005-2008
2	Michael Rotar	SEVENMILE CREEK FISH PASSAGE
3	John Duff	PHOSPHORUS AND NITROGEN LEGACY IN A RESTORATION WETLAND, UPPER KLAMATH LAKE, OREGON
4	Kerrie Pipal	USE OF DUAL FREQUENCY IDENTIFICATION SONAR (DIDSON) TO ESTIMATE LOW ABUNDANCE SALMONID ESCAPEMENT IN CALIFORNIA WATERSHEDS
5	Randall Peterman	THE SALMON MONITORING ADVISOR: A HIERARCHICAL WEB SITE TO HELP DESIGN AND IMPLEMENT SALMON MONITORING PROGRAMS
6	Siana Wong	POST-RESTORATION WATER QUALITY MONITORING AT THE WILLIAMSON RIVER DELTA, UPPER KLAMATH LAKE, OR
7	Heather Hendrixson	MODELING LARVAL SUCKER TRANSPORT THROUGH THE WILLIAMSON RIVER DELTA, UPPER KLAMATH LAKE, OREGON
8	Jim O'Connor	SPRAGUE RIVER BASIN GEOMORPHOLOGY DATASETS
9	Kimberly Brewitt	KLAMATH RIVER THERMAL REFUGIA AS CRITICAL HABITAT FOR THREATENED JUVENILE SALMONIDS.
10	Kent Russell	AN ASSESSMENT OF USING WILD-CAUGHT LARVAL AND JUVENILE LOST RIVER AND SHORTNOSE SUCKERS FOR SUPPLEMENTATION PURPOSES
11	Tana Haluska	POTENTIAL AREAS OF INUNDATION AND STAGE-VOLUME AND STAGE-AREA RELATIONS FOR DIKED AND DRAINED WETLANDS ADJACENT TO UPPER KLAMATH AND AGENCY LAKES IN THE LOWER WOOD RIVER VALLEY, OREGON
12	Michael Cummings	HYDROGEOLOGIC RELATIONS IN THE WILLIAMSON RIVER SUB-BASIN OF THE UPPER KLAMATH BASIN, OREGON
13	David Banks	SPAWNING ECOLOGY AND LARVAL DRIFT OF KLAMATH LARGESCALE, LOST RIVER, AND SHORTNOSE SUCKERS IN THE WILLIAMSON AND SPRAGUE RIVERS, OREGON.
14	Annett Sullivan	DATA COLLECTION TO BETTER UNDERSTAND INSTREAM PROCESSES IN THE KLAMATH RIVER FROM LINK RIVER TO KENO DAM, OREGON: NUTRIENTS, ALGAE, BACTERIA, ZOOPLANKTON, OXYGEN DEMAND, STABLE ISOTOPES, AND ACOUSTIC DOPPLER MEASUREMENTS
15	Steven Sobieszczyk	BATHYMETRY AND A MODEL GRID FOR THE UPPER KLAMATH RIVER, FROM LINK RIVER DAM TO KENO DAM, OREGON
16	Mike Deas	KLAMATH BASIN CONCEPTUAL MODEL - WATER QUALITY AND AQUATIC SYSTEM MANAGEMENT
17	Jared Bottcher	AGE-1 SUCKER HABITAT USE, DISTRIBUTION, AND APPARENT MOVEMENT IN UPPER KLAMATH LAKE, OREGON
18	Daniel Brown	EFFECTS OF A POOR WATER QUALITY EVENT ON THE DISTRIBUTION OF JUVENILE SUCKERS WITHIN THE WILLIAMSON RIVER DELTA, UPPER KLAMATH LAKE, OREGON
19	Jon LaMarche	HYDROLOGIC MONITORING AND TRENDS IN THE UPPER KLAMATH BASIN OVER THE LAST DECADE
20	Kathryn Kuivila	CURRENT-USE PESTICIDES IN THE KLAMATH RIVER BASIN
21	Danial Polette	MONITORING GROUNDWATER FLUCTUATIONS IN THE UPPER KLAMATH LAKE BASIN
22	Nicole Athearn	STRATEGIC HABITAT CONSERVATION: AN INTEGRATED, LANDSCAPE-LEVEL APPROACH TO CONSERVATION SCIENCE IN THE KLAMATH BASIN
23	Marc Stewart	CANAL FLOW MONITORING AND ASSESSMENT AT SELECTED SITES IN THE UPPER KLAMATH BASIN
24	Brian Barr	PREPARING FOR CHANGING CLIMATE CONDITIONS IN THE KLAMATH BASIN - LINKING COMMUNITY PLANNING AND NATURAL RESOURCE MANAGEMENT
25	Barry McCovey	YUROK TRIBAL FISHERIES PROGRAM GREEN STURGEON STUDIES
26	Barry McCovey	YUROK TRIBAL FISHERIES PROGRAM PACIFIC LAMPREY STUDIES
27	Lyra Cressey	SALMON RIVER TMDL IMPLEMENTATION
28	Norman Buccola	MODELING WIND ON UPPER KLAMATH LAKE, OREGON
29	Alex Corum	USING REMOTE PIT TAG READERS TO UNDERSTAND MOVEMENTS AND HABITAT USE BY COHO SALMON *ONCORHYNCHUS KISUTCH* IN THE KLAMATH RIVER CORRIDOR
30	Will Harling	ASSESSMENT OF FIRE IMPACTED KLAMATH TRIBUTARIES (2007-2008 FIRES): OBSERVATIONS AND MANAGEMENT RECOMMENDATIONS
31	Will Harling	A REVIEW OF ASSESSMENT/MANUAL IMPROVEMENT OF SALMONID FISH PASSAGE ON KLAMATH RIVER TRIBUTARIES (2006-2008)

Poster Session

Abstract No.	Presenter	Title
32	Melissa Braham	ENDANGERED LOST RIVER AND SHORTNOSE SUCKERS IN LAKE EWAUNA AND USE OF THE LINK RIVER DAM FISH LADDER, OREGON
33	Thomas Hotaling	SALMON RIVER SPRING CHINOOK STATUS (MODELING FOR RECOVERY)
34	Jerry Grondin	WATER SUPPLY AND QUALITY ISSUES RELATED TO GROUNDWATER-SURFACE WATER INTERACTION IN THE UPPER LOST RIVER SUB-BASIN, KLAMATH COUNTY, OREGON
35	Kristofor Kannarr	VARIABILITY OF WATER QUALITY DYNAMICS AND CYANOTOXINS IN UPPER KLAMATH LAKE, OREGON
36	Jamie Bettaso	AGING WESTERN POND TURTLES (*ACTINEMYS MARMORATA*) USING ANNULI COUNTS: CONSIDERING GROWTH DURING THE ACTIVE SEASON TO ACCURATELY REFLECT INDIVIDUAL AGES
37	Jennifer Silveira	RESTORING HABITAT PRODUCTIVITY IN THE MIDDLE KLAMATH BASIN: AN OVERVIEW
38	Mark Cookson	SUCCESSFULLY IMPLEMENTING HABITAT RESTORATION PROJECTS IN THE MIDDLE KLAMATH BASIN
39	Mark Schuster	SUMMARY OF USGS COLLECTED TURBIDITY AND TEMPERATURE DATA AND SEDIMENT SAMPLING ON THE WILLIAMSON AND SPRAGUE RIVERS, NEAR CHILOQUIN, OREGON AND ON THE SPRAGUE RIVER NEAR BEATTY, OREGON
40	Emily Mulford	MODELING THE EXTENT RESTORATION WETLANDS AROUND UPPER KLAMATH LAKE RELEASE AND SEQUESTER PHOSPHORUS
41	Bill Patterson	KLAMATH RIVER ESTUARY WETLANDS RESTORATION PRIORITIZATION
42	Tim Mayer	TRENDS IN TEMPERATURE, PRECIPITATION, AND SNOWPACK IN THE KLAMATH BASIN REGION
43	Scott Sinnot	PERIPHYTON ASSESSMENT OF THE LOWER KLAMATH RIVER ON THE YUROK INDIAN RESERVATION
44	Micah Gibson	HYDROLOGIC ASSESSMENT OF LOWER KLAMATH RIVER TRIBUTARIES
45	Chris Adams	JUVENILE COHO SURVIVAL SHASTA RIVER
46	Mike Deas	KLAMATH HYDRO SETTLEMENT AGREEMENT: 2010 WATER QUALITY MONITORING
47	Sascha Hallett	MONITORING THE SALMON PARASITE *CERATOMYXA SHASTA* IN THE KLAMATH RIVER THROUGH WATER SAMPLE ANALYSIS
48	Walt Duffy	BIOENERGETICS OF JUVENILE CHINOOK AND COHO SALMON AT KLAMATH RIVER TRIBUTARY MOUTHS
49	John Beeman	FACTORS AFFECTING COHO SMOLT SURVIVAL IN THE LOWER KLAMATH RIVER
50	Robert Franklin	ADEQUACY OF KLAMATH RIVER FISHERY FLOWS UNDER TERMS OF KLAMATH SETTLEMENT
51	Ron Larson	A SURVEY OF VERNAL POOL PLANT COMMUNITIES IN SOUTH-CENTRAL, OREGON WITH EMPHASIS ON SEARCHING FOR TWO IMPERILED GRASSES, SLENDER ORCUTT GRASS (*ORCUTTIA TENUIS*) AND GREEN'S TUCTORIA (*TUCTORIA GREENEI*)
52	Ron Larson	UPPER KLAMATH BASIN WETLANDS—AN ASSESSMENT
53	Ron Larson	FAIRY AND TADPOLE SHRIMP OF THE UPPER KLAMATH BASIN: HIDDEN DIVERSITY OF VERNAL POOLS
54	Anna Shannon	HARVEST AND QUALITY CONTROL OF *APHANIZOMENON FLOS-AQUAE* (CYANOBACTERIA) BY SIMPLEXITY HEALTH FOR HUMAN DIETARY USE
55	Petey Brucker	SALMON RIVER COMMUNITY RESTORATION PROGRAM 1992-2010
56	Sari Sommarstrom	SCOTT RIVER WATER TRUST: A COOPERATIVE WATER SOLUTION
57	Judith Jensen	A NEW MODEL FOR INTRODUCING ENVIRONMENTAL CHALLENGES INTO THE PUBLIC SCHOOL CURRICULUM: LEARNING AND APPLYING CORE SCIENCE TO SAVE SALMON

Notes

Notes

Program Planning Team*

Susan Corum	Department of Natural Resources, Karuk Tribe, Orleans, CA
Debra Curry	U.S. Geological Survey, California Water Science Center, Sacramento, CA
Tracy Fuentes	U.S. Geological Survey, Northwest Area Director's Office, Western Region, Seattle, WA
Michael Hughes	The Klamath Tribes Research Station, Chiloquin, OR
Linda Prendergast	PacifiCorp Energy, Portland, OR
Scott VanderKooi	U.S. Geological Survey, Western Fisheries Research Center, Klamath Falls Field Station, Klamath Falls, OR

*Concurrent Sessions and Posters

IT Support

Gretta Blackwood	U.S. Geological Survey, Western Fisheries Research Center, Klamath Falls Field Station, Klamath Falls, OR
Mary Dunning	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA
Robin Salling	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA

Website

Debra Becker	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA

Program Guide

Debra Becker	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA
Debra Curry	U.S. Geological Survey, California Water Science Center, Sacramento, CA
Bill Gibbs	U.S. Geological Survey, Enterprise Publishing Network, Tacoma, WA
Debra Grillo	U.S. Geological Survey, Enterprise Publishing Network, Tacoma, WA
Dan Snyder	U.S. Geological Survey, Oregon Water Science Center, Portland, OR
Sharon Wahlstrom	U.S. Geological Survey, Enterprise Publishing Network, Tacoma, WA

Registration

Debra Becker	U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA