UPPER COLUMBIA SCIENCE SUMMIT

"HONORING THE PAST, SHAPING THE FUTURE"

UPPER COLUMBIA SALMON RECOVERY BOARD

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I would like to extend my sincere thanks to our Board of Directors, the members of the Steering Committee, our generous sponsors, and the dedicated Organizing Committee for their vision, expertise, and countless hours of work that made this Upper Columbia Science Summit possible. Your leadership, collaboration, and commitment to advancing science-based solutions for the recovery of salmon and their ecosystems have shaped both the quality of this program and the spirit of partnership it represents. We are deeply grateful for your contributions and for the energy you bring to this important work.

Ryan Niemeyer, Science Summit Chair
Science Program Manager, UCSRB

Upper Columbia Science Summit

"Honoring the Past, Shaping the Future"

Wednesday, January 21

7:00	Registration Open
7:00 – 8:00	Welcome Social: Coffee and Light Breakfast Items Available
8:00 – 8:10	UCSRB Welcome: Shon Smith, UCSRB Board & Amanda Ward, Executive Director
8:10 – 8:20	Honoring the Past, Shaping the Future - Ryan Niemeyer, UCSRB Science Summit Chair
8:20 – 9:00	Keynote Speaker: Davis "Yellowash" Washines, Government Relations Liaison, Yakama Nation DNR Fisheries
9:00 – 10:15	Morning Session: Status of the Species Plenary Talk: Katie Barnas, NOAA Northwest Fisheries Science Center
10:15 – 10:45	Break
10:45 – 12:30	Morning Session: Species Survival and Life History Plenary Talk: Scott Hinch, University of British Columbia Plenary Talk: Brian Burke, NOAA Fisheries, Northwest Fisheries Science Center
12:30 – 1:45	Lunch - on your own
1:45 – 2:45	Afternoon Session: Predation Plenary Talk: Allen Evans, Real Time Research, Inc.
2:45 – 3:15	Break
3:15 – 4:30	Afternoon Session: Collaborative Decision Making for Recovery Plenary Talk: Rene Henry, Trout Unlimited
4:30 – 6:30	Poster Session and Social Hour

Upper Columbia Science Summit

"Honoring the Past, Shaping the Future"

Thursday, January 22

7:00	Registration Open
7:00 – 8:00	Registration and Morning Social - Light Breakfast Items
8:00 – 8:40	Keynote Speaker: John Sirois, Confederated Tribes of the Colville Reservation
8:40 – 10:10	Morning Session: Watersheds and Restoration Plenary Talk: Chris Fisher, Confederated Tribes of the Colville Reservation
10:10 – 10:40	Break
10:40 – 12:40	Morning Session: Habitat and Restoration Part 1 Plenary Talk: Richard Carmichael, Independent Scientific Review Panel Plenary Talk: Phil Roni, Cramer Fish Sciences
12:40 – 2:00	Lunch - on your own
2:00 – 3:00	Afternoon Session: Habitat and Restoration Part 2
3:00 – 3:10	Closing Remarks: Shannon Adams, UCSRB Board Chair

UPPER COLUMBIA SALMON RECOVERY BOARD

WEDNESDAY, JANUARY 21

7:00 – 8:00 Welcome Social and Registration

8:00 – 8:10 **UCSRB Welcome: Shon Smith, UCSRB Board Member & Amanda Ward, Executive Director**

8:10 – 8:20 **Ryan Niemeyer UCSRB Conference Chair**

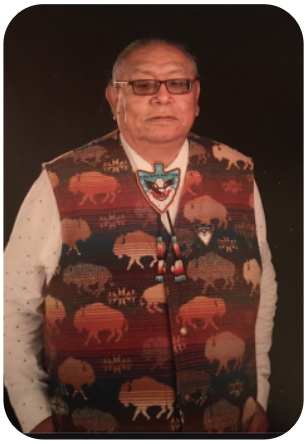
8:20 – 9:00 **Keynote Speaker: Davis "Yellowash" Washines, Government Relations Liaison, Yakama Nation DNR Fisheries**

The Collective Collaboration Continuum In Salmon Recovery Efforts Utilizing Modern Science and the Traditional Yakama Values of Wykanush-Mii-Wahkishwit (Spirit of the Salmon) to Achieve Success in the UCR Basin

Yellowash (D.Washines) will provide Indigenous perspectives based on oral traditional teachings of the spiritual, cultural and historical connection to salmon that will give salmon recovery science professionals increased opportunities through on-going collaboration for efforts to support salmon recovery utilizing the Science Summit theme of " Honoring the Past, Shaping the Future". In utilizing the holistic "gravel-to-gravel" salmon management approach for recovery of ESA-listed salmonid stocks, modern science based implemen-tation projects along with time tested Indigenous Traditional Knowledge values make a major difference in the survival, recovery and propagation of salmon.

About Yellowash Washines

Davis Washines/Yellowash, member of the Yakama Nation, retired from law enforcement in 2014 after 30+ years of service, including three terms as Chief of Police for the Yakama Nation and the Columbia River Inter-Tribal Fish Commission. He has served on the Executive Board of the Yakama Tribal Council and on Yakama General Council as Executive Chairman.



As a youth educator, he directed the Yakama Nation Youth Summer Camp for several years and was a paraprofessional and middle school guidance counselor for the Wapato School District, as well as a Yakama language instructor at the high school. He is on the Board of Trustees for Pacific Northwest University of Health Sciences and on the Native American Advisory Board as Vice-Chairman for the Burke Museum at the University of WA.

STATUS OF THE SPECIES

9:00 – 9:30 **Plenary Talk: Katie Barnas, NOAA Northwest Fisheries Science Center**

Status of ESA listed Upper Columbia River spring Chinook salmon and steelhead

I will provide an update on the current status of the ESA-listed spring Chinook salmon and steelhead Evolutionarily Significant Units (ESUs) in the Upper Columbia River region. I will give a brief overview of how NMFS evaluates status in the context of the Endangered Species Act and the recovery criteria as defined by the Technical Recovery Team process. The last comprehensive Viability Report for ESA listed salmonids was in 2022. At present, for most populations, data is available through 2024, which may provide some additional information. Over the past 26+ years since ESA listing, there have been some improvements in abundance and diversity metrics, but natural origin spawner productivity remains low. In general, the outlook remains the same, the both ESUs are below their recovery goals for multiple recovery criteria. Habitat and hydro improvements along with changes to hatchery programs have likely somewhat lowered the risk of extinction. Out of basin mainstem migration corridor and ocean conditions will continue to play a role in determining the viability of these ESUs.

9:30 – 9:45 **Tracy Bowerman, Mid-Columbia Fish and Wildlife Conservation Office, U.S. Fish and Wildlife Service**[1], Jose Vazquez[1], John Crandall (Methow Salmon Recovery Foundation)

Recent trends in Upper Columbia Bull Trout populations

Bull Trout are listed as Threatened under the Endangered Species Act and face many of the same threats as federally listed salmon and steelhead. However, Bull Trout behavior and life history characteristics present some unique challenges for monitoring and conservation compared with most anadromous species. Bull trout are repeat spawners, exhibit variable migration patterns, and spawn and rear in remote, complex headwater habitats that are inherently difficult to survey. These challenges have resulted in inconsistent monitoring and critical data gaps. We compiled available data for Bull Trout populations throughout the Upper Columbia Region to evaluate trends in local populations and across core areas. Recent data indicate that numerous local bull trout populations in the Wenatchee, Entiat, and Methow subbasins have experienced severe declines, and several are on the brink of extirpation. Factors contributing to population declines likely include a combination of habitat degradation in spawning areas and throughout migration corridors, increasing water temperatures, and fishing mortality. We present considerations for future conservation actions to protect & enhance existing Bull Trout populations in the region

9:45 – 10:00 **John Crandall, Methow Salmon Recovery Foundation**

Status of Pacific Lamprey In the Upper Columbia

This presentation will focus on the current status of Pacific Lamprey in the Upper Columbia. It will describe the results of 17 years of population monitoring in the Methow Subbasin as well as the population response to on-going adult translocation efforts in the Wenatchee, Methow, and Okanogan Subbasins. Key threats to Pacific Lamprey will also be discussed with links to how salmonid-focused restoration can assist with recovery of Pacific Lamprey.

10:00 – 10:15 Panel Q & A

10:15 – 10:45 Break

SPECIES SURVIVAL AND LIFE HISTORY

10:45 – 11:15 **Plenary Talk: Scott Hinch, University of British Columbia**

Exceptionally high mortality of migrating adult female salmon: a large-scale pattern and a conservation concern

In recent decades, the relative proportion of female sockeye salmon (Oncorhynchus nerka) on spawning grounds of several British Columbia populations has declined. Coincident with the decline has been large changes to oceanic, estuarine and river migration environments. Over the past 30 years, numerous telemetry tracking and laboratory studies have examined mortality of adult Fraser River sockeye salmon during ocean and freshwater migrations. We reviewed 19 studies that provided 40 situations where male and female mortality could be directly compared. Female mortality averaged 2.1 times greater than males, and up to 8-fold higher. High female mortality was also evident in migrating coho salmon (O. kisutch) and Chinook salmon (O. tshawytscha), and for sockeye salmon in other systems. Female mortality was highest when migration conditions were challenging (e.g. high / turbulent flows, high temperatures, confinement, or handling), and towards end of river migration. Likely mechanisms for differential mortality include energy exhaustion, cardiac performance, physiological stress, and immune factors. Female-specific mortality will become even more pronounced in coming years as ocean and riverine conditions continue to change.

11:15 – 11:45 **Plenary: Brian Burke, NOAA Fisheries, Northwest Fisheries Science Center**[1], Brian Beckman (Oregon State University, Cooperative Institute for Marine Ecosystem and Resources Studies[2]), Anna Bolm[2], Elizabeth Daly[2], Jennifer Fisher[2], David Huff[1], Mary Hunsicker[1], Kym Jacobson[1], Jessica Miller (Oregon State University), Cheryl Morgan[2], Catherine Nickels[1], Joe Smith[1], Kelcee Smith (Oregon Dept of Fish & Wildlife), Laurie Weitkamp[1], Amy Wallace[2], Brian Wells[1], Jen Zamon[1], Sam Zeman[2]

Reading the Signals: Ocean Ecosystem Indicators, Recent Trends, and Why They Matter

The marine phase is often the most variable and least understood chapter of the salmon life cycle. In this presentation, we will explore how our team monitors this complex environment to bridge the gap between oceanography and biology. We will define the key ecosystem indicators used to assess habitat quality—from physical drivers like temperature to biological metrics like prey availability—and provide a synthesis of recent ocean conditions. Crucially, we try to move beyond the raw data to discuss practical relevance, connecting large-scale environmental shifts to the specific challenges we face in research, forecasting, and resource management.

11:45 – 12:00 **Kevin See, Washington Department of Fish and Wildlife**[1], Andrew Murdoch[1], Michael Hughes[1]

Correcting Bias in Spring Chinook Carcass Surveys - Impacts on Monitoring Metrics

Counting redds is a standard and wide-spread method for monitoring abundance of Spring Chinook, and it is usually accompanied by the collection of Spring Chinook carcasses which are used to estimate the proportions of hatchery- and natural-origin spawners, possibly generate a fish/redd expansion factor and potentially estimate the age structure of the spawning population. This relies on the assumption that recovered carcasses are a representative sample of the overall spawner population, but several studies have shown that various factors may affect the chances of recovering a carcass (Zhou (2002), Murdoch (2010)). Here we will present the results of a model developed to predict the probability of recovering an individual carcass based on factors such as sex, size, habitat and flow conditions. We will show how this model can be used to adjust various metrics based on carcass samples, including fish/redd, pHOS and spawner abundance by origin, and present results of applying this to data from the Chiwawa River in the Wenatchee subbasin. Finally, we will discuss data quality thresholds for carcass surveys and potential alternative data sources when those thresholds are not met.

12:00 – 12:15 **Jeff Caisman, Yakama Nation**[1], Cory Kamphaus[1], Rebekah Horn (Columbia River Inter-Tribal Fish Commission[2]), Shawn Narum[2]

Can't beat em'? Make em'!: Genomic investigation reveals basis for trait selection of reintroduced Coho Salmon in the Wenatchee River Basin

By the end of the 20th century, native populations of Coho salmon (Oncorhynchus kisutch) were largely extirpated from the Mid and Upper-Columbia Basins. In 1999, Yakama Nation began smolt releases of Coho salmon, an historically important species, to the Wenatchee River, using Lower-Columbia River stock. The objective of the program is to create a locally-adapted, naturally-spawning population, by selectively collecting in-basin broodstock. While yearly adult escapements have met or exceeded goals, the proportion of naturally-produced returning adults collected in the broodstock has been low (<1%). It is suspected that one cause of low natural recruitment is a velocity barrier below Tumwater Dam in the Wenatchee River that prevents returning adults from accessing a large area of suitable upstream spawning habitat. In an attempt to create natural spawning above this barrier, broodstock collection in recent years has focused on collecting early-run individuals that arrive before the velocity barrier forms in the early fall, as well as individuals collected at Tumwater Dam, above the velocity barrier. In order to assess the potential for genetic inheritance of return timing and location of Wenatchee Basin Coho, low-coverage whole-genome resequencing of the nuclear genome and whole mitochondrial genome data were used to screen for genomic regions under selection. Results indicated a weak polygenic signal in female Coho Salmon was found to be associated with return timing/location. These results validate current selective broodstock collection practices for Coho in the Wenatchee Basin and have larger implications for selection of traits in reintroduced salmonid populations.

12:15 – 12:30 Panel Q & A

12:30 – 1:45 Lunch - On Your Own

PREDATION

1:45 – 2:15 **Plenary Talk: Allen Evans, Real Time Research, Inc.**

Avian Predation on Upper Columbia River Salmon and Steelhead: A Review of Research, Monitoring, and Evaluation Studies

Since the late 1990's, researchers from Real Time Research, Oregon State University, and the U.S. Geological Survey have investigated to what degree piscivorous colonial waterbird predation limits the survival of salmon and steelhead in the Columbia River basin (CRB). As part of this work, over 70 technical reports and 50 peer-reviewed scientific publications that cover a wide range of topics regarding avian predation have been produced (see www.birdresearchnw.org). The studies have largely focused on identifying nesting locations, colony sizes (number of breeding adults), nesting success (number of fledglings produced), foraging ecology, and inter-colony movement and dispersal patterns. Studies of the impacts of avian predation have mostly focused on diet composition (proportion of different prey types consumed) and the number and percentage of available prey consumed (predation rates) by piscivorous waterbirds nesting at various colonies. This long-term research, monitoring, and evaluation (RM&E) program has identified predation by some breeding colonies as a factor that limits the survival of some ESA-listed salmonid populations, particularly steelhead populations from the Upper Columbia and Snake rivers. Consequently, addressing concerns over avian predation has become a component of management plans, such as lowering predation by reducing the size of select colonies. This presentation will summarize several key findings from this long term RM&E project, with a focus on predation of ESA-listed Upper Columbia River salmon and steelhead, the efficacy of management actions aimed at reducing predation, emerging or new predation concerns, and critical uncertainties.

2:15 – 2:30 **Ross Renick, Chelan Public Utility District No. 1**

Sustaining No-Net Impact for Upper Columbia Salmon and Steelhead: Northern Pikeminnow Control at Chelan PUD Hydroelectric Projects

Chelan Public Utility District (PUD) operates Rocky Reach and Rock Island hydroelectric projects on the Columbia River. Both projects are operated under 50-year Habitat Conservation Plans (HCPs) signed in 2004, which use a collaborative, adaptive management approach to achieve no-net impact (NNI) for HCP Plan species which includes steelhead, spring Chinook, summer Chinook, Coho, and Sockeye Salmon. The NNI strategy is based on meeting a 91% combined juvenile and adult survival standard, with remaining impacts offset through hatchery production and tributary habitat investments.

A key tool in achieving survival standards is Chelan PUD's long-standing Northern Pikeminnow Predation Control Program, which was initiated in 1994. Since the inception of the HCP, the Predation Control Program has removed over 1.5 million Northern Pikeminnow from the Rocky Reach and Rock Island project areas. Continued predator management, monitoring, and regional collaboration remain central to sustaining NNI outcomes and contributing to improved survival for juvenile HCP Plan Species in the Upper Columbia Basin.

2:30 – 2:45 Panel Q & A

2:45 – 3:15 Break

COLLABORATIVE DECISION MAKING FOR RECOVERY

3:15 – 3:45 **Plenary Talk: Rene Henery, Trout Unlimited[1] and University of Nevada Reno[1]**, Alison Collins (California Department of Water Resources), Natalie Stauffer-Olsen[1], Erin Cain (FlowWest[2]), Brian Crawford (Compass Resource Management), Rafael Silberblatt (Kearns and West), Mark Tompkins[2], Darcy Austin (State Water Contractors), Gary Bobker (Friends of the River)

Reorienting to Recovery: A Case Study in Values Informed, Landscape Scale, Collaborative Decision Making Towards an Equitable Outcome

Despite significant investments throughout California's Central Valley (CV) over the years, CV salmonid populations (historically among the most abundant in the lower 48) are at all-time lows. Recovering CV salmon populations in the context of the large and diverse landscapes they occupy, multiple stressors, the complex regulatory context, disparate management, and human communities with differing water-related values necessitates a novel approach for landscape scale, cooperative science and integrated planning. In response, informed by previous efforts within and outside the region (including the Columbia Basin Partnership), Reorienting to Recovery (R2R) brought together State and Federal Agencies, Tribes, conservation NGOs, water managers, commercial fishing, agriculture, and others to: 1) develop a shared, scientific definition of salmon recovery, 2) identify the diverse range of other related participant values, and 3) apply structured decision making (SDM) to identify preferred suites of actions that recover Central Valley Chinook salmon while equitably balancing benefits and impacts across the range of participant values.

Additionally, R2R improved efficiency in the collaborative development of integrated, landscape-scale management approaches for complex ecosystem challenges by a) offering a decision space outside of regulatory process, b) creating transparency around related values and how they influence preferred management choices, c) reducing the influence of political dynamics on collaboration, and 4) fostering diverse participation. Through developing and leveraging salmon lifecycle models capable of integrating hydrology, habitat, hatchery, and harvest (the 4Hs) related actions, tracking the effects of those actions on other participant values, centering consensus, and holding the total body of values as shared as opposed to partisan, the R2R SDM process generated an unprecedented salmon recovery scenario with the broadest possible benefit. Now, transitioning from planning towards implementation, the R2R process is positioned to serve as a model for other regions seeking a new approach to integrated ecosystem planning.

3:45 – 4:00 **Nick Legg, Lichen Land and Water**[1], Dominique Shore[1]

Barriers and Actions to Improve Regional Recovery Efforts – Findings from the Adaptive Management Process

What is this process? In the past year, UCSRB has been leading an adaptive management process to learn and refine regional efforts to recover salmon. This decadal review and synthesis process was originally set forth in the regional Recovery Plan (2008). Phase I of this process, which is nearly complete, emphasized review and discussion to identify critical issues, barriers, and potential actions to improve the efficacy of salmon recovery efforts. Phase II will involve decision making on a refined set of actions that support recovery objectives.

How can we review, synthesize, and collectively improve recovery actions in a community of over 20 organizations and hundreds of scientists and practitioners? To tackle this complex problem (on a short timeline), we took an action-oriented, conversational, multi-faceted approach to identifying issues and potential actions. Our approach involved interviews, a large workshop (June 17), a series of meetings with the Advisory Committee, and strategic literature reviews to support findings with updated science. A forthcoming synthesis report will document findings.

What did we find? We can work together better as a region. Specifically, the conversations revealed a series of institutional barriers to regional progress. These barriers emphasize issues with governance, coordination/collaboration, and programs/policies. We identified a menu of potential actions to alleviate these barriers and improve efficacy.

The barriers and actions addressed “all-H integration” and habitat restoration actions, separately. The Implementation Team, or similar body, will address specific topic of “all-H integration” in the future, based on a deeper need for coordination. We will summarize the habitat-specific findings in this presentation.

4:00 – 4:15 **David Duvall, Grant Public Utility District**, Catherine Willard (Chelan Public Utility District)

Okanagan Sockeye Reintroduction: No Net Impact In Action

The Okanagan Sockeye Salmon program is a powerful example of how Chelan, Grant, and Douglas PUDs are successfully meeting its No Net Impact (NNI) commitment under their respective agreements for operation of their hydroelectric projects. Through close collaboration with partners in the United States and Canada, the three PUDs are delivering measurable results for the Okanagan Sockeye Salmon population.

The reintroduction program demonstrates all three components of NNI in action: achieving survival standards, operating a state-of-the-art hatchery in partnership with the Okanagan Nation Alliance, and funding critical habitat restoration projects that improve fish passage and spawning success. These combined efforts have helped rebuild the Okanagan Sockeye Salmon population while supporting tribal and recreational fisheries in the upper Columbia Basin.

This presentation will highlight the science, partnerships, and adaptive management strategies behind this success story, showcasing how innovative, collaborative approaches are advancing long-term fish recovery and sustainable hydropower operations.

4:15 – 4:30 Panel Q & A

4:30 – 6:30 Poster Session and Social Hour

THURSDAY, JANUARY 22

7:00 – 8:00 Registration and Morning Social

8:00 – 8:40 **Keynote Speaker: John Sirois, Traditional Territories Advisor, Confederated Tribes of the Colville Reservation**

Honoring the Past, Shaping the Future

Salmon have lived in this region since time immemorial. Their records of existence can be traced in the layers of earth. Conditions at this place we call sc̓əm̓áẃš (narrow in the middle) promulgated a significant and healthy salmon run that fed the people for thousands of years. The šnṕəšqʷáẃšəxʷ people take care of this area and its Salmon Chief monitors the taking of salmon. As one of the Four Chiefs, salmon offered up its body to the people to help feed and teach us. As long as we followed their instructions, the salmon would always return. As p'squosa peoples we uphold the responsibility to care for salmon so that they always return. Today, we engage in projects collaborating with any agency to improve the salmon habitat for survivability. In all cases, these projects seem to be held up against a test of what might happen to the "needs" of human society. Our policy makers and corporate interests require project proponents to prove that their efforts will not interrupt or discomfort human economic systems or power needs. We ask ourselves, how much will the rate payers tolerate in funding this salmon habitat project. This thinking is backward. Without keystone species like salmon, human existence will not continue. Instead, we must ask different questions. As we go forward in our modern day world, we need to ask ourselves, what do salmon need? What am I doing to ensure they will always be here?

About John Sirois

Mr. Sirious is a citizen of the Confederated Tribes of the Colville Reservation and is of the respective Okanagan, Methow and Wenatchi Tribes. say'ay', he was born and raised on the Colville Indian Reservation in Omak, WA. Mr. Sirois carries cultural education from his grandmother and extended family that ties him to the lands and waters. He completed degrees at Dartmouth College (History, and Native American Studies) and Masters of Public Administration at the University of Washington.

He served over 20 years in the Colville Tribes' government as an elected representative and in departments that focused on tribal lands, cultural preservation and revitalization, economic development, renewable energy project development, policy development, governance. Mr. Sirois currently serves as the Traditional Territories Advisor for the Confederated Tribes of the Colville Reservation.

WATERSHEDS AND RESTORATION

8:40 – 9:10 **Plenary: Chris Fisher, Confederated Tribes of the Colville Reservation**, Michael Ward (Trout Unlimited)

Enloe Dam Removal: Case study in Connectivity

Enloe Dam is a concrete gravity arch dam located (RM 8.8) on the Similkameen River in north central Washington. Enloe Dam, constructed in 1923 without fish passage, disrupts the flow of bed load, nutrients, and aquatic organisms in the Similkameen River. In the 1950's, Bonneville Power Administration's high-voltage lines extended into the Okanogan Valley and began delivering less expensive power to Enloe Dam customers. Power generation at Enloe Dam was no longer profitable and ceased operation in 1958. In 2023, through the Bipartisan Infrastructure Law, funding was awarded from NOAA's Restoring Fish Passage Through Barrier Removal program to investigate the feasibility of removing Enloe Dam and managing the estimated 560,000 yds3 of sediment behind the dam. In January 2025, action alternatives were evaluated using criteria within the following four categories: technical feasibility, permit-ability, risk/liability, affordability. The study concluded dam removal was feasible with minimal, if any, sediment removal. Funding secured through the USFWS – National Fish Passage Program will advance designs from 30% to 60% to remove Enloe Dam. Once Enloe Dam is removed connectivity will be reestablished to the Similkameen River Basin and allow access by steelhead and spring Chinook salmon, both federally-listed species, to 1,520 miles of spawning and rearing habitat.

9:10 – 9:25 **Morgan Bond, NOAA Northwest Fisheries Science Center**[1]**,** Jeff Jorgensen[1], Britta Timpane-Padgham[1], Michaela Lowe (Washington Dept. of Fish and Wildlife), Frannie Nelson (Astor Environmental LLC)

Building Habitat Assessment and Restoration Planning (HARP) Models for the Wenatchee, Entiat, and Methow River Basins: An update on progress to date and future developments

The Habitat Assessment and Restoration Planning (HARP) model is a landscape scale process-based habitat assessment and salmonid life cycle model. Our aim is to employ HARP to evaluate salmonid responses to freshwater restoration actions under various climate and management scenarios across the range of expressed life histories. NOAA's Northwest Fisheries Science Center team, in collaboration with partners, is developing the Upper Columbia HARP project by building on previous models, data, and prioritization efforts to produce flexible and spatially explicit life cycle models for Chinook salmon and steelhead populations in the Wenatchee, Entiat, and Methow river basins.

These models take an "all H" approach, evaluating possible responses to changes in salmon habitat, harvest, hatchery operations, passage through the hydropower system, and ocean conditions. Our model development process began by defining anadromous extents and completing detailed historical and contemporary habitat assessments using remotely sensed techniques, empirical models, and previously collected field data. These steps are now moving toward completion and next steps will include converting habitat information into the fish productivities and capacities needed to develop and implement the life cycle model portion of HARP. We are also coordinating with scientists at the NWFSC and elsewhere who are refining models of mainstem Columbia River and ocean survivals for incorporation into the Upper Columbia HARP modeling. Through this comprehensive approach, we are building a tool to evaluate the benefits of a suites of restoration actions while also addressing the potential impacts of a changing ecosystem across tributary, mainstem, and estuary/ocean domains.

9:25– 9:40 **Gabriel Temple, Grant County Public Utility District**

Potential Effects of Climate Change on Small Central Washington Streams

Climate experts forecast changing annual precipitation patterns, changing hydrologic conditions, and generally warmer temperatures in inland freshwater systems in northern latitudes over the coming years. These predicted conditions have potential to significantly alter freshwater fish distribution, survival, and demographics. This is concerning because several of the salmon and steelhead populations in our region, many of which are afforded protection under the Endangered Species Act, persist only at chronically low abundance levels. If future stream conditions become decreasingly suitable for our cold-water fishes in many streams, fish monitoring data will be increasingly valuable in order to alert managers of decreased abundance, productivity, spatial structure, or diversity for these protected populations. Unfortunately, current sampling methodologies may also become decreasingly suitable for generating critical monitoring data if the future climate scenarios materialize. In this talk, I highlight a few examples of the trends observed between past and present streamflow and temperature conditions in several small central Washington streams and use the observed trends to predict future conditions likely to manifest if the current climate change trajectory continues unabated.

9:40 – 9:55 **Greg Fraser, Mid-Columbia Fish and Wildlife Conservation Office, U.S. Fish and Wildlife Service**[1], Bill Gale[1], Matt Cooper[1]

Fishery Mitigation Efforts for Grand Coulee Dam, 1939-Present

Grand Coulee Dam was a monumental project to bring power, irrigation and stable flows to an entire region. When the concept building the world's largest concrete structure on the Columbia River was being discussed the impacts to fish were known. To offset some of the impacts of the dam the Grand Coulee Fish Maintenance Project was initiated. The project included trap and haul operations, restoration of four highly degraded tributaries and the creation of three federal hatcheries.

9:55 – 10:10 Panel Q & A

10:10 – 10:40 Break

HABITAT AND RESTORATION PART 1

10:40 – 11:25 **Plenary talk: Richard Carmichael, Independent Scientific Review Panel**

Review and Synthesis of Progress and Challenges in Columbia River Basin Fish and Wildlife Program Habitat Protection and Restoration Projects

The Independent Scientific Review Panel (ISRP) has been reviewing projects under the Northwest Power and Conservation Council's Columbia River Basin Fish and Wildlife Program for almost three decades. Efforts that were once mostly limited to passage for adults and juveniles through the mainstem dams and hatcheries have now expanded significantly and shifted emphasis to include river, lake, and estuary habitat restoration throughout the Columbia River Basin. To take advantage of lessons learned and restoration advancements over these three decades of review, the ISRP completed a retrospective review of habitat protection and restoration projects in the Program to assess progress and identify both successes and challenges. The review looks at major project components, including planning and prioritization, implementation methods, research, monitoring and evaluation, and confounding factors with a focus on evidence for success including exemplary projects. Overall, the ISRP found significant improvements in all the major components and commended the Program's restoration efforts for evolving and expanding over time in a manner consistent with the science.

Planning, and implementation have improved significantly with increased emphasis on restoring natural processes, greater use of landscape frameworks and strategic guidance, and expanded collaboration with structured decision making. There are greater complexity and integration of actions that focus on restoring functional floodplains, riparian conditions, and habitat complexity at watershed scales. However, challenges remain, particularly for understanding watershed scale restoration responses and assessment of effectiveness. Specifically, the ISRP continues to recommend improvements to the research, monitoring, and evaluation component to better understand how much restoration is needed to produce biologically meaningful results and under what conditions and timeframes efforts achieve the greatest benefits. Long term studies, like IMWs, are required to assess meaningful watershed scale habitat and fish responses due to the decadal timeframes for implementation and response. The presentation will highlight the report's major findings and recommendations to improve project effectiveness with specific relevance to the Upper Columbia River restoration programs.

11:25 – 11:55 **Plenary Talk: Phil Roni, Cramer Fish Sciences**, Ryan Bellmore (U.S. Forest Service PNW Research Station), Jennifer Bountry (Bureau of Reclamation), Joe Ebersole (US Environmental Protection Agency), Tracy Hillman (BioAnalysts[1]), Timmie Mandish[1], George Pess (NOAA Northwest Fisheries Science Center-*retired*), and Colin Thorne (University of Nottingham)

Integrating Riverscapes: Guidance for Restoring and Reconnecting Floodplains in the Columbia River Basin

Riverscapes include some of the most ecologically important, diverse, and productive aquatic, riparian, and floodplain habitats. Floodplains, which comprise the valley bottom adjacent to river channels, are periodically inundated by floodwaters, and a key component of a riverscape, but are also some of the most anthropogenically degraded areas. Floodplains provide critical habitat for the recovery of listed salmon and trout in the Pacific Northwest and Columbia River Basin (CRB), and are a priority for habitat restoration within the Federal Columbia River Power System Biological Opinion (BiOp and Bonneville Power Administration's (BPA) Tributary Habitat Program. The rapid genesis and uptake of new science on riverscapes and restoring floodplains in particular, as well as the increasing size, scope, complexity, and abundance of floodplain restoration projects being implemented across the CRB has generated the need for guidance and best practices for restoration practitioners to maximize success.

To help meet this need, we reviewed and synthesized the latest science and outline approaches, methods, and best practices for floodplain restoration including:

1. assessing conditions and identifying restoration opportunities,
2. planning and prioritizing restoration actions,
3. designing floodplain restoration projects,
4. evaluating restoration projects, and
5. adaptive management.

Successful floodplain restoration requires integrating these five areas across multiple spatial and temporal scales. In this presentation, we provide an overview of suggestions we developed for floodplain restoration under BPA's Tributary Habitat Program at project, reach, watershed, and program level.

11:55 -12:10 **Stine Griep, Hinchinbrook, Inc.**[1], Carlos Polivka (U.S. Forest Service PNW Research Station), Keith van den Broek[1]

Using Multiple Approaches to Evaluate Floodplain Restoration Across Scales

We conducted a study of both the effectiveness of floodplain restoration projects in three subbasins of the Upper Columbia River, USA, and the extent to which sampling and analytical methods affect the ability to make inferences at different spatial scales. Physical habitat features such as depth and current velocity were strong correlates of juvenile Chinook Salmon density. Certain discrete habitat types (presence of wood structures, aquatic vegetation, etc.) were found to interact with those predictors. We found similar predictors of fish density with linear and non-linear models. Separately, we used these models in combination with a data simulation method to show that non-randomized sampling gave similar estimates of reach scale density as randomized methods. Targeted sampling of habitats improved our ability to then conduct a mark-recapture study in order to estimate population sizes for each reach. Through studies of food availability and consumption in these habitats, we found that the density of the primary prey of Chinook salmon fry and foraging rates tracked the habitat selection patterns described above. Through simulations with linear and non-linear models applied to non-randomized sampling data, we predicted density for the discrete habitat types mentioned above. Those density estimates were used to weight a common diversity index that is normally used to describe the diversity of those habitat types in each reach, resulting in a metric that estimated overall habitat quality. Our mark-recapture data showed that this metric was a correlate of total abundance across the reaches. Restored reaches tended to have equal or higher habitat diversity and higher abundance compared to reference reaches. Because the reaches for which this was observed spanned the three sub-basins, this suggests that restoration has had an effect at the ESU scale.

12:10-12:25 **Carlos Polivka, U.S. Forest Service PNW Research Station**[1], Stine Griep (Hinchinbrook, Inc.[2]), Keith van den Broek[2]

The Aquatic Food Web and Foraging Ecology of Juvenile Chinook Salmon on Restored Floodplains

We examined the structure of the aquatic macroinvertebrate food web as it is linked to the foraging and growth of juvenile Chinook Salmon on floodplains in two major watersheds of the Upper Columbia River Basin. We first described the macroinvertebrate communities of each watershed using descriptive multivariate ordinations. These indicated some associations among various taxonomic groups. We further analyzed foraging by fish by evaluating samples taken from the guts of X individuals distributed across five major habitat types within each floodplain. Samples showed that a primary food item (measured by average number of items in the guts) was chironomid larvae. Although the "standing crop" of drifting chironomids did not vary greatly among habitat types, consumption was highest in pools formed by naturally occurring log jams. Other studies showed that this habitat type tended to have the highest density of fish, suggesting that fish may partially track food availability across a floodplain. This was further supported by a preliminary application of foraging theory which suggested that a drift rate of ~ 1.0-1.5 individuals/L was a threshold below which the number of foragers is reduced. This tended to occur in riffles and open areas, whereas the number of foragers was higher in pools created by both natural and engineered log jams, and in habitats with aquatic vegetation. Energetic intake estimated by bioenergetics analysis suggested that perennial floodplains that support high habitat diversity would augment the early life history of Chinook Salmon.

12:25 – 12:40 Panel Q & A

12:40 – 2:00 Lunch - On Your Own

HABITAT AND RESTORATION PART 2

2:00 – 2:15 **Reid Camp, Snake River Salmon Recovery Board**

Reconstructing Lost Rivers: Revealing the Hidden Geomorphology Beneath Modern Landscapes

Rivers, wetlands, and floodplains have been buried and obscured by centuries of human impacts across much of the world. As a result, river restoration practitioners often struggle to identify reliable reference or target conditions to guide designs. Modern remote sensing tools, particularly LiDAR, offer a way to peel back the layers of human disturbance and visualize historic riverine systems that once shaped today's landscapes.

When real reference conditions are no longer available, identifying the correct geomorphic context becomes essential for developing effective, process-based restoration strategies. This presentation will outline the geomorphic theory of channel evolution that underpins interpretation of LiDAR-derived surfaces for reconstructing floodplains and historic channel networks.

The Touchet River in southeast Washington will serve as a case study. Like many rivers in the Pacific Northwest, the Touchet experienced severe incision following a suite of human activities (channelization, timber harvest, grazing, agricultural conversion, and urban development) that accelerated natural degradation processes. LiDAR and GIS-based analyses reveal the geomorphic scars left behind, offering a blueprint for understanding the river's pre-disturbance condition and floodplain dynamics. This blueprint also acts as the basis for conceptual designs that can be refined by contemporary boundary conditions and constraints.

By integrating geomorphic principles with modern spatial data, practitioners can move beyond the search for intact reference reaches and instead reconstruct realistic, historically grounded targets. This approach helps ensure that restoration goals are rooted in the river's natural evolutionary trajectory.

2:15 – 2:30 **Jarred Johnson, Yakama Nation**, Christoph Suhr (Interfluve Inc.)

Quantifying Reach Scale Geomorphic Change with Structure from Motion

The Mystery Reach and War Creek Reach Habitat Restoration Projects were implemented in July 2022 by the Yakama Nation. The primary objective was to improve instream habitat complexity throughout three miles of the Twisp River. To accomplish this, we used a helicopter to construct 55 large wood structures, using 900 logs with roots and slash material from a nearby forest health treatment. Pre-project conditions featured only 16 and 35 pieces of large wood per mile (>12" in diameter and >35' long), underscoring the scale of habitat enhancement.

Following implementation, qualitative observations suggested substantial geomorphic responses during the 2023 freshet (>Q5). To better understand and quantify these changes—and to inform adaptive management planning—the Yakama Nation partnered with Interfluve to evaluate the use of Structure-from-Motion (SfM) photogrammetry for developing updated surface models. Using geospatial analysis tools in ArcGIS Pro, we compared SfM-derived surfaces to 2022 topobathymetric LiDAR datasets to measure the magnitude and distribution of channel change. This technique provides a rapid and relatively cost-effective approach for quantifying changes in streambed elevation, width-to-depth ratios, pools, lateral channel migration, and recruitment of floodplain sediments and riparian trees.

These analyses demonstrate increased habitat complexity throughout the project reaches. More broadly, this work shows how remote-sensing technologies can effectively quantify project performance, support adaptive management decisions, and advance large wood restoration strategies.

2:30– 2:45 **Jose Vazquez, Mid-Columbia Fish and Wildlife Conservation Office, U.S. Fish and Wildlife Service**[1]**,** Tracy Bowerman[1]

Expansion of Brook Trout Spawning Activity in Side Channels within Bull Trout Spawning and Rearing Habitat

Eastern Brook Trout pose a substantial ecological threat to native salmonid populations across the Upper Columbia Basin, particularly to Bull Trout within overlapping spawning and rearing habitat. Brook Trout can outcompete and hybridize with Bull Trout, and these impacts may be exacerbated by environmental changes such as increases in stream temperature, altered flow regimes, and human or natural modifications to local physical habitat. To better understand the extent of Brook Trout colonization within Bull Trout spawning areas, the U.S. Fish and Wildlife Service has monitored Brook Trout spawning activity during annual Bull Trout redd surveys in the upper Entiat River, which began in 2005. Over this 20-year monitoring period, observed Brook Trout redds within known Bull Trout spawning and rearing habitat increased from marginal levels (0–8 redds in most years) to between 286 and 1,481 redds annually from 2023 to 2025. Most Brook Trout redds were located within side channels that reconnected to the main channel naturally or as a result of habitat restoration activities. This expansion of Brook Trout spawning activity coincides with notable declines in Bull Trout redd counts and juvenile densities in the same reaches, indicating potential population-level impacts. These findings underscore a broader regional concern: Brook Trout utilization of warming, newly available, or restored habitat may undermine native salmonid recovery efforts throughout the Columbia Basin.

Effective future conservation strategies will require restoration approaches that benefit native species over Brook Trout coupled with monitoring and management actions to limit Brook Trout expansion where it is a concern.

2:45 – 3:00 Panel Q & A

3:00– 3:10 **Closing Remarks: Shannon Adams, UCSRB Board of Directors Chair**

POSTER SESSION

Posters will be set up on the south side (opposite windows) of the Festhalle and authors will be on-hand during the social hour on Wednesday, January 21st at 4:30 to answer questions.

Poster 1: John Phillips, Parametrix[1], Tom Smrdel[1]

Climate Change Projections for the Upper Columbia River Basin: Assessing Hydrologic Change, Uncertainty, and Infrastructure Implications

Climate change represents one of the most pressing and multifaceted challenges confronting humanity. Climate change is leading to increased global average temperatures and alterations in weather patterns, precipitation, sea level rise, and ecosystem dynamics. The Pacific Northwest is already experiencing these impacts, which are expected to intensify throughout this century. This presentation will provide data-driven analyses and actionable recommendations to guide engineering decisions and assess environmental implications. Our team has systematically evaluated the effects of climate change on the Columbia River and its surrounding environment. Drawing upon data from the U.S. Army Corps of Engineers, U.S. Geological Survey, and the University of Washington Climate Impacts Group, we analyzed factors such as sea-level change and projected shifts in river flows resulting from future hydrological changes along the Columbia River. Incorporating uncertainty into our risk assessments was essential in securing stakeholder engagement with the study's findings. This presentation summarizes the primary exposures and potential impacts of climate change on the Columbia River, referencing the latest scientific research from the University of Washington Climate Impacts Group, U.S. Army Corps of Engineers, U.S. Geological Survey, and other authoritative organizations. For various studies and prospective projects, we examined critical variables such as river elevation, precipitation, sea-level changes, and river flow, utilizing these data sources to develop methodologies that synthesize findings and inform strategic planning for future work. Moreover, considerable uncertainties remain regarding the trajectory of climate change and the frequency and severity of extreme weather events. Multiple agencies have established frameworks to assess how evolving climate conditions may affect the Columbia River and the associated resources and infrastructure in Oregon and Washington. By integrating this interdisciplinary data, our evaluation places particular emphasis on the effects of sea-level change, precipitation, and river stage on the Columbia River system and addresses the associated risks and uncertainties.

Poster 2: Tad Schwager, Parametrix[1], Steve Sevill[1], Jessemine Fung[1], Matt Wilberding[1], Dennis Daw (Upper Snake River Tribes Foundation[2]), Scott Hauser[2]

Mapping Historic Salmon Habitat in the Upper Snake River Basin

The Snake River Basin above Hells Canyon once supported habitat for millions of anadromous fish including spring, summer, and fall Chinook, sockeye, and steelhead. But, over a century of landscape changes, that included but were not limited to the construction of hundreds of dams and diversions, resulted in significant population declines. The final "nail in the coffin," Hells Canyon Dam, was built in 1967 without fish passage provisions and has been a complete blockage to returning anadromous fish ever since. To characterize the distribution and magnitude of these losses, we reconstructed historic anadromous fish habitat in the Upper Snake River Basin above the Hells Canyon Complex using an intrinsic potential model. The model is based on a 1:24,000-scale digital elevation model (DEM) and stream network with additional attributes developed by the Northwest Fisheries Science Center's Columbia Basin Historical Ecology Project (https://www.fisheries.noaa.gov/resource/data/ columbia-basin-historical-ecology-project-data). Areas of the stream network not historically accessible to anadromous salmonids (e.g., above 20 percent gradient or known natural barriers) were removed. Stream width, gradient, and valley confinement were used to estimate the value of accessible habitat and assign a unit-less score reflecting both habitat quantity and quality. Reach-based scores were then aggregated at the stream, watershed, and "dam-shed" levels and the historic total run sizes were distributed to these areas in proportion to the habitat value. The results help to better understand the temporal and spatial losses across the traditional territories of the four Upper Snake River Tribes that once relied on salmon and steelhead for subsistence at the upper limits of anadromy.

Poster 3: Dennis Daw, Upper Snake River Tribes Foundation[1], Scott Hauser[1]

A History of the Blockage in the upper Snake River Basin

Prior to European colonization of the northwestern United States, salmon and steelhead had access to much of the Columbia River Basin from Nevada to Canada with an estimated 10-16 million anadromous fish returning annually to the Columbia River Basin. Due to anthropogenic changes, such as overfishing and dam building, the anadromous fish runs are a fraction of what they were historically. Further, due to the construction of dams, many areas within the Columbia River Basin have been blocked by dams. The Snake River above Hells Canyon Dam is one of those blocked areas, and prior to being blocked had an estimated annual return of 1.7 million anadromous fish. We looked at each tributary of the Upper Snake River Basin and the mainstream Snake River to determine the first high head dam that was a complete, or nearly complete, blockage to anadromous fish migration. We created a storymap depicting the history of the blockage in the Upper Snake River Basin. The first dam built in a tributary occurred on the Bruneau River in 1892, this was followed by the first dam built on the mainstem Snake, Swan Falls Dam built in 1901. Both dams were built with fish passage. Unfortunately, the fish passage was ineffective.

Over the next four decades the Bureau of Reclamation constructed dams in all but one of the tributaries of the Snake River, drastically reducing the anadromous fish populations. In the 1960's Idaho Power Started construction of the Hells Canyon Complex, a three-dam complex on the Snake River in Hells Canyon. The construction of these three dams put the nail in the coffin for anadromous fish in the Upper Snake River Basin.

Poster 4: Lydia Kleve, Yakama Nation Mid-Columbia Coho Reintroduction Project[1], Sean Riley[1], Danielle Grundy[1], Katie Weber[1], Rick Alford[1]

Outplanting Adult Coho Salmon to the Upper Methow Basin to Encourage Establishment of Natural Origin Broodlines in Previously Unused Habitat

The Yakama Nation's Mid-Columbia Coho Reintroduction Project (MCCRP) is intended to "re-establish naturally spawning coho populations in mid-Columbia tributaries to biologically sustainable levels which provide significant harvest in most years." In the Methow Basin, coho are reared at Winthrop National Fish Hatchery (WNFH), Willard National Fish Hatchery, and Cascade Salmon Hatchery, then released from WNFH Hatchery Outfall and multiple acclimation ponds throughout the Upper Methow Basin. Due to limited acclimation pond carrying capacity and constraints on pond locations, the MCCRP is outplanting returning adults from WNFH Hatchery Outfall to the upper Methow, Twisp, and Chewuch rivers where spawning and rearing habitat are favorable and where coho have not yet been established. Outplanting ripe adults is part of MCCRP's natural production phase and supports the previously established coho broodlines that successfully migrate to the lower Methow Basin by expanding spawning to upper river reaches without increasing hatchery origin broodstock production. This will help MCCRP reach its goal of creating a locally adapted, naturally spawning coho population capable of supporting harvest. This poster provides preliminary outplanting data from the fall seasons of 2024 and 2025.

Poster 5: Yoel Gebrai, Oregon State University[1], Steven Wondzell (U.S. Forest Service PNW Research Station[2]), Adam Price[2], Adam Ward[1]

Hydrologic Outcomes of Stage-0 Restoration Designs for Meadow Creek, OR

In Stage-0 restoration, valley floors are graded to an inferred pre-disturbance geomorphic grade line, increasing channel-floodplain connectivity and inundated area, and elevating groundwater levels. Expected benefits include increased channel complexity, improved fish habitat quality, and the restoration of riparian vegetation. However, the influence of Stage-0 restoration on the stream's water budget remains contentious, especially regarding groundwater storage and late-summer baseflow augmentation. Some studies suggest that restoration will augment late-summer low flows by storing water in the floodplains during peak flows and gradually releasing it as baseflow when stream flows are low. Other studies contend that late-summer flows will likely decrease due to increased evapotranspiration and lower cross-valley head gradients. We used a water budget framework to examine the hydrologic outcomes of Stage-0 restoration at the reach scale. We used site-specific topobathymetry, stream gage measurements, and practitioner-derived restoration designs to construct a reach-scale 3D, transient groundwater flow model of Meadow Creek.

The water budgets of two pre-restoration and four post-restoration scenarios were compared, offering insight into a spectrum of hydrologic responses and their potential ecological implications. Pre-restoration scenarios had greater seasonal changes in storage, driven by greater channel recharge during high flows and drainage during low flows. Post-restoration scenarios reduced the depth to water and increased evapotranspiration as plants had more readily accessible water, leading to greater losses in stream flow throughout the growing season. Restoration did increase total hyporheic exchange flow. In our study, restoration marginally decreased late-summer stream flows over the simulated 300-m-long stream reach. This result also suggests that post-restoration stream flow loss could be notable for large-scale projects. Still, ecological benefits from greater hyporheic exchange are likely to have water-quality and temperature implications that create conditions conducive to rehabilitating aquatic habitats.

Poster 6: Charles Frady, U.S. Fish and Wildlife Service[1], C.J. Smith[1]

Does tank geometry matter? Evaluating juvenile rearing of summer steelhead at Winthrop National Fish Hatchery

In the Methow Subbasin, Winthrop National Fish Hatchery (WNFH) produces summer steelhead trout (Oncorhynchus mykiss) with dual objectives of mitigating for the loss of habitat upstream of Grand Coulee Dam and assisting recovery of this ESA-threatened population. Low water temperatures and late spawn timing of Methow Subbasin steelhead preclude traditional age-1 smolt (S1) rearing at WNFH and instead raise age-2 smolts (S2). Collaborations with NOAA Fisheries found that S2 steelhead had larger body size, faster outmigration and higher survival through the hydrosystem as well as an increased proportion of outmigrants than their S1 counterparts. Early investigations at NOAA Manchester found only slightly higher rates of early maturation in S2 vs S1 rearing in circular tanks. WNFH found that rearing S2 fish in production-level raceways resulted in higher rates of early maturation. Ongoing collaborations with NOAA have focused on reducing early male maturation and the impacts of precocial parentage on the spawning grounds. WNFH is replacing a large section of raceway infrastructure with circular tanks within the next several years. NOAA and USFWS are investigating how rearing vessel geometry may influence growth, fitness and rates of early maturation of WNFH summer steelhead.

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