

June 7, 2016

MEMORANDUM

TO: Columbia Basin Partnership Workshop Participants

FROM: Debra Nudelman and Annie Kilburg, Kearns & West

SUBJECT: Columbia Basin Partnership Workshop – June 7, 2016 Draft Summary Memo

Welcome, Opening Remarks, Introductions, Agenda, and Materials

Welcome, Opening Remarks, and Introductions

Barry Thom, *National Oceanic and Atmospheric Administration (NOAA) Fisheries*, welcomed the group and thanked the meeting attendees for their continued interest in collaborating for the Columbia Basin Partnership (the Partnership).

Overview of the Workshop

Barry stated that the workshops provide an opportunity to jointly share information on the status of the Columbia River Basin (the Basin). The intent of these workshops is to provide the context for sovereigns and stakeholders in the Basin to work together and develop long-term goals for salmon and steelhead. He explained that during this workshop several NOAA Fisheries and co-manager experts would address the current status of harvest, hatchery, and hydropower management and the challenges faced in the Basin.

Federal Columbia River Power System Litigation

Barry said that NOAA Fisheries has received a few questions about whether or not they will continue with the Partnership in light of the Court ruling on the Federal Columbia River Power System (FCRPS). He explained that the Partnership will continue as its purpose is to develop goals for all listed and non-listed salmon and steelhead species in the Basin in order to address the Endangered Species Act (ESA), harvest goals, and tribal and treaty trust responsibilities. He stated that the FCRPS is an important piece to the outcomes of this process; however, its significance does not take precedence over the existing goals of the Partnership.

Purpose of the Partnership

Barry explained that the Partnership is about defining long-term success and setting recovery goals. If we want healthy salmon in the future, sovereigns and stakeholders need to work together with the current state of the Basin and determine next steps.

Marine Fisheries Advisory Committee (MAFAC)/Federal Register Notice (FRN) Update

Barry provided an update on the NOAA Fisheries' Federal Advisory Committee Act (FACA) group called the Marine Fisheries Advisory Committee (MAFAC). He reminded participants that MAFAC has agreed to charter a Task Force for the Partnership. NOAA Fisheries can use MAFAC's existing structure to move forward with the Partnership process and they will be distributing a Federal Register Notice (FRN) to re-solicit nominations for the formal Partnership in the next four-to-six weeks. The FRN will provide instructions for where to send the nominations and what to include.

MAFAC will request a statement for each nomination, addressing the criteria NOAA Fisheries included in the Discussion Paper. Selected nominees will:

- Be broadly representative of their interests and constituents affected by salmon and steelhead management in the Basin;
- Have organizational and/or subject matter expertise regarding salmon and steelhead management in the Basin;
- Have the authority to represent and speak on behalf of their interests/constituents;
- Have demonstrated a willingness and ability to work collaboratively and respectfully with other stakeholders to find solutions; and
- Together represent the geographic diversity of the Basin.

Barry said that the deadline for nominations will be 45 days after the FRN publishes. NOAA Fisheries will send the necessary information when the FRN publishes and once the nomination process is open.

Agenda and Materials

Deb Nudelman, *Kearns & West (K&W) Facilitator*, thanked Barry for the welcome and opening remarks. She explained that this workshop is an opportunity for participants to learn more about the potential topics for the Partnership, ask questions, and to engage in dialogue with other sovereigns and stakeholders. She walked participants through the agenda and meeting materials, asked for clarifying questions, and provided an overview of the ground rules for the structure of the workshop dialogue. She asked the group for a round of introductions. The workshop attendees introduced themselves by name and affiliation.

Harvest Information/Presentations

Deb introduced Brent Hall, *Confederated Tribes of the Umatilla Indian Reservation*, Peter Dygert, *NOAA Fisheries*, Stuart Ellis, *Columbia River Inter-Tribal Fish Commission*, and Guy Norman, *Washington Department of Fish and Wildlife*, who began their presentations on salmon and steelhead harvest information.

For details and copies of the PowerPoint presentations from this workshop, please visit the following website:
http://www.westcoast.fisheries.noaa.gov/columbia_river/cbp_June_7_2016_presentations.html

Treaties/Agreements

Brent introduced his topic as a review of off-reservation fishing rights and the origins of *U.S. v. Oregon* case, its proceedings, and the resulting *U.S. v. Oregon* Management Agreements. He explained tribally reserved rights: a treaty is not a grant of rights to Indians but a grant of rights from them, and those rights not specifically granted are reserved to the Indians (citing *United States v. Winans*,

(SCT 1905)). He explained that the treaties take precedence over conflicting state laws by reason of the Supremacy Clause of the U.S. Constitution. Brent provided an overview of how early fishing conflicts between non-Indian and Indian fishers led to several lawsuits against non-Indian individuals who were preventing tribal fishermen from fishing at the usual and accustomed places. Several of these cases reached the U.S. Supreme Court and affirmed that the tribes' reserved treaty rights to fish at all their traditional fishing areas.

Brent stated that the U.S. then filed suit against the State of Oregon to enforce Indian off-reservation fishing rights in the Columbia River Basin (*U.S. v. Oregon*). Judge Belloni upheld the tribes' right to fish at all traditional fishing areas free from unreasonable or unnecessary regulation and to a fair share of the available harvest. He later modified his original decision to apply Judge Boldt's ruling that treaty fishermen in Puget Sound could take up to 50% of the harvestable number of fish available to all fishermen (*U.S. v. Washington*). That is, Judge Belloni determined that Indian treaty fishermen in the Columbia River were entitled to take up to 50% of the spring Chinook run destined to reach their accustomed fishing grounds as their fair share of the available harvest. Brent said that due to challenges to the states' Columbia River Compact (CRC) as not providing the treaty fisherman with a fair share of the available harvest under the conservation necessity principles,¹ the parties to *U.S. v. Oregon* have negotiated and adopted a series of Fishery Management Plans (FMP) that met these needs. The current *U.S. v. Oregon* Management Agreement is a ten-year plan, expiring at the end of 2017.

Harvest Management Forums

Peter greeted the attendees and presented on the key salmon harvest management forums including: (1) *U.S. v. Oregon* and its relationship to the states' CRC; (2) the Pacific Fishery Management Council (PFMC) and its North of Falcon (NOF) agreement; and (3) the Pacific Salmon Treaty/Commission. He walked participants through the major fishery events from 1968 – 2008.

U.S. v. Oregon

Peter explained that the states and tribes share management of fisheries in the tributaries and that the states, federal government, and treaty tribes share management in the mainstem Columbia River. There are 12 parties to *U.S. v. Oregon*, which adopts FMPs aimed at rebuilding weak salmon and steelhead runs while providing tribal and non-tribal fishers with a fair share of the harvest. The *U.S. v. Oregon* Technical Advisory Committee (TAC) reviews harvest data and the monitoring methods used by the *U.S. v. Oregon* parties to set harvest rates. The states' CRC, which was ratified by U.S. Congress in 1918, defined how Oregon and Washington would co-manage fisheries in the areas that they share. The CRC is an active forum and it holds as many as 50 hearings per year through the fishing season.

Pacific Fisheries Management Council (PFMC)

Peter said that the PFMC is one of eight regional management councils in the U.S. It manages the conservation and ocean harvest of fall and spring-run Chinook and coho salmon from the U.S./Canada border south to Mexico. The PFMC's 14 voting members represent broad fishing interests and meet five times a year. The NOF forum is part of the PFMC process; it coordinates freshwater fisheries in the Columbia River and Puget Sound and coastal fisheries in Washington

¹ Conservation Necessity Principles: Is the application of conservation measures to the Indians necessary to preserve the fish? Is it possible to achieve the conservation measures by imposing restrictions on non-treaty activities that impact the treaty resource?

State with the ocean fisheries so that escapement goals, ESA requirements, and harvest sharing objectives are achieved. The NOF forum includes public involvement.

Pacific Salmon Treaty and Commission

Peter stated that the Pacific Salmon Commission resulted from a 1985 salmon treaty between the U.S. and Canada for the management of Pacific salmon. The commission includes four commissioners and four alternates from each country, has four geographic panels, and several technical committees including a Chinook Technical Committee (CTC).

Fisheries Management Tools and Monitoring

Stuart reviewed the technical aspects of managing mainstream fisheries to the harvest rate objectives. He explained that the annual management cycle begins with preseason forecasts to determine the harvestable numbers for each fishery. The management cycle has a feedback loop that uses in-season monitoring data to help keep each fishery within its catch quotas. He presented a database of the Columbia River Up-River Bright (URB) stock fall Chinook returns from 1990 – 2011 to show how sibling relationships based on Bonneville Dam counts are used in preseason forecasting. He said that the goal is to update a run size as accurately and as early as possible using both data and judgment. Runs are “reconstructed” post-season using actual catches, dam counts, hatchery returns, and spawning ground data. Reconstructed run sizes and actual fisheries are used to assess ESA and Management Agreement compliance.

Stuart identified the fall Chinook stock groups and the tools for managing fisheries on a day-to-day basis including: catch quotas, selective fisheries, and on-board monitoring. Catch quotas are fisheries managed for catch guidelines/quotas whereas selective fisheries can use hatchery-origin marks or Time-Area-Gear management strategies. On-board monitoring is conducted during spring Chinook commercial fishing to provide in-season feedback to the TAC. Biological monitoring collects data on the weight, sex, scales, length, marks, scars/bites from predator attacks, and skin color of the fish; tissue samples for DNA analysis and information from electronic tags that can indicate the hatchery or natural spawning origin of each fish; catch and effort estimates for the sport fishery; and landings in the commercial fisheries.

Fisheries Management Surveys and Enforcement

Guy presented on the CRC process and the coordinated efforts of surveys and enforcement throughout the Basin for in-season harvest management in the mainstem Columbia River. The Oregon and Washington Departments of Fish and Wildlife (ODFW/WDFW) use aerial flights and commercial sampling to help manage fisheries to meet quotas based on preseason forecasts. At non-Indian commercial fisheries and Indian fisheries, ODFW/WDFW collect information such as average fish weight, which is used to estimate landings; scale samples for estimating the age composition of the run; and information from coded wire tags for estimating the stock composition of the catch. The monitors report this information to their agencies within 24 hours.

Guy showed the abundance based harvest rate schedule for spring season fisheries that was developed through the negotiations under *U.S. v. Oregon*. He presented a graph that showed that the Indian catch of spring Chinook prior to 2000 was consistently below the minimum for subsistence and ceremonial needs, but has been higher in recent years. Another graph showed a similar increase in catch in the nontreaty sport fishery below Bonneville Dam. The increased catches are due largely to increases in abundance in recent years. The sport fishery has also been able to increase their catch of hatchery-origin fish by implementing mark-selective fisheries. He shared the locations of Select

Area Fisheries (SAFE) in the lower Columbia including Youngs Bay, where a large number of fish pens provide for a good harvest opportunity.

Questions and Answers/Comments

Deb asked participants for clarifying questions on the topics covered. The following are highlights of the questions raised, answers provided, and comments made.

- One participant asked Peter if he could speak to whether the North Pacific Anadromous Fish Commission (NPAFC) fits into the management scheme.
 - Peter said that NPAFC is involved with the high sea fisheries, not the fisheries in the mainstem Columbia River.
 - With respect to the high seas fisheries, Guy said NOAA Fisheries' focus is on enforcement. They coordinate enforcement between the U.S., Japan, Canada, and Russia. This role has evolved into sharing scientific information, as well, especially for steelhead.
- Another participant referenced the abundance-based management table and asked why it only includes the Snake River wild estimate.
 - Guy stated that the abundance-based management table is focused on the Snake River wild population. There is another provision in the agreement specific to the abundance of wild Upper Columbia Chinook salmon: if it reaches a certain level, harvest is then further restricted.
- One participant stated that the management stocks for early fall Chinook (tule) fisheries were not included in the presentation.
 - Peter responded that the fall season fisheries are managed to protect ESA listed tule stocks. The tules include both natural-origin populations and several hatchery produced stocks including, for example, those produced at the Spring Creek hatchery above Bonneville Dam.
- Another participant stated that a lot of the case law discussed by the presenters is pre-ESA. When there is a situation where there is a non-listed stock it is pretty straightforward; however, when managing under ESA, you must consider impacts on the likelihood of survival and recovery. Who carries the conservation burden as it applies to the ESA and how does the ESA impact treaty rights?
 - Brent stated that the allocation is completed by considering the estimated abundance of a given stock in the forecast. The harvest managers then negotiate how that will be split between the tribal and non-tribal fishers. Based on the case law, the tribes say that they should not bear the conservation burden.
 - Guy stated that the *U.S. v. Oregon* management process allocates harvest for each ESA-listed species.
 - Brent stated that there is no definitive case law in terms of the ESA and treaty rights; however, there is a general direction to harmonize harvest obligations and keep everyone on the water as much as possible.
- One participant asked Brent for a point of clarification. They stated that the presentation was limited to focusing on the four member treaty tribes.
 - Brent responded that yes, the focus was on the four treaty tribes as they are the ones with reserved fishing rights. There is a mix of status for other tribes with respect to whether they have reserved fishing rights under treaties. To be concise and efficient, he included the four treaty tribes in his presentation.

- Another participant said that the forecasts are really important to help put wild fish back on the spawning grounds. What kind of progress is being made in improving forecasting models?
 - Stuart stated that in the case of Upper Columbia River spring Chinook, the preseason is less important than the in-season updates. In comparison, the preseason forecasts are very important to the ocean fisheries for summer and fall Chinook. The Technical Advisory Committee (TAC) has tried to incorporate environmental factors (especially oceanographic indices) as these data sets are readily available; however, success has been mixed (i.e., is it better than the age-based or sibling regression method?). It is hard to link environmental variables to the experience of specific groups of fish in the ocean.
- One participant asked about mainstem passage. Do you take their migration conditions into consideration when modeling?
 - Stuart said that the TAC has tried to correlate run size with passage survival indices including those published by CSS (the Comparative Survival Study). To date, they have not proven to be any more reliable.
 - Peter said that the use of sibling forecasts takes downstream passage survival into account. That is one of the advantages of using an age-specific forecasting tool.
- Barry asked whether information on harvest impact rates is publicly available.
 - Guy said that the *U.S. v. Oregon* management agreement that include provisions for managing the fisheries, is available here: https://www.fws.gov/pacific/fisheries/hatcheryreview/Reports/snakeriver/SR--079.revised.2008-17USvOR_Mngmt_Agrmt.pdf
- Another participant asked if local watershed groups are trying to manage habitat for designated populations, is there a table that cross-walks geographic origin with the harvested stock designation?
 - Peter said that crosswalk is difficult to find. He explained that the harvesters are dealing with mixed fish populations from larger areas. It would take specific expertise to look at something like this.
- One participant asked whether terminal fisheries in the Upper Columbia River are part of the lower Columbia River harvest negotiations.
 - Guy stated that they are working on methods to catch more of those Chinook in the lower Columbia; however, they are somewhat restricted by the effects on other stocks, including those that are ESA-listed.
 - Stuart explained that it becomes really challenging to ramp up harvest of hatchery-origin fish in the mainstem and ocean without increasing impacts on the listed fish. Also, there is a challenge with using mark-selective fisheries. You have to be able to manage your fisheries to understand the: (1) release mortality rate, and (2) how many of the wild fish that you encountered and released. Implementing those in mark-selective fisheries is more complicated and expensive than a full retention fishery. When you have to turn fish lose, it increases your uncertainty of the fate of those fish.
 - Guy said that commercial fisheries have tried to reduce the impacts through gear type/mesh size as well as time-in-area. They are looking at alternative ways to harvest hatchery fish. There are challenges; it is a work in process.
- Another participant said that 2015 had high temperatures in the mainstem Columbia River and there was a major die off of sockeye salmon. Is there some contingency plan if a similar situation occurs in the future with *U.S. v. Oregon*?
 - Peter said there is not currently a contingency plan for this situation. Sockeye harvest is limited to 7% so there is some; however, a relatively small potential to increase

survival through reduced harvest. Will you know that it is going to be a hot year with low survival in time to set the fishery quotas or will it be too late to do anything about it?

- Brent said that the *U.S. v. Oregon* policy committee was extremely active in communicating to the U.S. Army Corps of Engineers (USACE) that there is a need for a change in operations in the lower Snake River, especially for sockeye.
- One participant asked whether the federal agencies play a role in determining gear selection in the Lower Columbia, or if it is the states.
 - Guy said that the states develop the models; NOAA Fisheries describes its role in the conservation of the listed species and the scientific basis.
 - Peter said that it is NOAA's job to determine the conservation objectives and then the states and tribes can allocate the harvest that meets those objectives among user groups.
 - Stuart stated that from a biological perspective, what matters is how many fish are killed. The gear types depend on the social concerns and how people want to fish.
- A participant noted that [NOAA Fisheries' analysis of] the last *U.S. v. Oregon* agreement was "married to" the FCRPS biological opinion and asked if all these regulatory pieces are tied together.
 - Barry responded that yes, they were underpinned by the same biological analysis, but we don't know if that will continue.
- One participant asked if mortality due to catch and release fisheries is estimated conservatively.
 - Stuart said no, they assign mortality rates to different fisheries, areas, gear types, etc., and try to be accurate; however, there is uncertainty. Given this uncertainty, they expect the policy decisions (e.g., quotas) to be conservative.

Hatcheries Information/Presentations

Deb introduced Becky Johnson, *Nez Perce Tribe*, Paul Kline, *Idaho Department of Fish and Game*, and Rob Jones, *NOAA Fisheries*, to begin their presentations on hatcheries information.

Production Numbers/Types of Programs

Becky began by displaying graphs to show that 143 million salmon and steelhead juveniles are produced and released annually from hatcheries in the Basin (Columbia River mouth to headwaters), of which 90 million are released above Bonneville Dam. She shared another graph to show that of 12 million juvenile spring/summer Chinook released from hatcheries in the Snake River Basin, only about five million survive to Bonneville Dam. She explained that most of the hatchery programs in the Columbia River Basin are producing fish to mitigate for the development and operation of the hydrosystem and that as long as the dams are in place, there is a legal obligation to provide fish.

Becky said that the fishery/harvest augmentation program is used to supplement natural spawning populations (i.e., to mitigate for losses of wild fish lost due to the effects of the hydrosystem) while also producing fish for sustenance purposes. In contrast, a captive broodstock/conservation program is used to reduce the risk of extinction for populations in dire situations. This approach takes returning adults from the wild and holds them in the hatchery until they are ready to spawn, and then rears their progeny to adulthood (the F₁ generation). The F₁ adults are spawned at the hatchery and then their progeny (the F₂ generation) are released as juveniles to complete their anadromous life cycle in the wild.

Becky explained that 91% of the 51 million salmon and steelhead produced in hatcheries below Bonneville Dam are intended for harvest, 8% are for fishery/supplementation, and only 1% are for conservation. This compares to 67% of the 90 million salmon and steelhead produced above Bonneville intended for harvest, 19% for fishery/supplementation, and 10% for supplementation only, 3% for reintroduction to historically occupied areas, and 1% for research purposes.

Many groups that pay for these supplementation programs; however, about half are paid for by Bonneville Power Administration as mitigation for effects of the hydrosystem. Becky stated that as hatcheries evolve, they have to take on new roles and address issues such as increased temperatures and precipitation patterns under changing climate conditions. She showed a picture of a washed out stream in the Salmon River Basin where the Nez Perce Tribe collected the spawners and brought them to a hatchery so that their progeny would not be lost.

Role of Hatcheries/Hatchery Management Tools

Paul discussed the changing roles of hatcheries, the hatchery/wild interaction debate, the development of scientific tools to better manage hatcheries, and “new” tools for hatchery management. He said that the focus of hatchery programs has evolved from strictly harvest augmentation to include mitigation, reintroductions, supplementation, and conservation. He provided an overview of the first supplementation/conservation programs, from the late 1970s – 1992 and explained that as the number of these programs increased, biologists began to document some negative effects on natural spawning populations. These effects were grouped into two types of risk to the wild populations, genetic (reduced fitness from interbreeding with hatchery fish) and ecological (competition with hatchery fish for food and space).

Paul walked the group through the research on and reviews of the effects of supplementation programs since the 1980s that led to recommendations for hatchery reform principles: manage hatchery broodstocks to achieve proper genetic integration with, or segregation from, natural populations; promote the local adaptation of natural and hatchery populations; and minimize adverse ecological interactions between hatchery-and natural-origin fish. He described goals for integrated versus segregated hatchery stocks for the “Proportionate Natural Influence” (PNI) in integrated programs, which estimates the degree to which the dominant effect on natural selection comes from the hatchery versus natural component of the population. A PNI > 0.5 is preferred because it indicates that the selection pressure from the natural environment dominates over the type of influence the hatchery experience exerts on the viability of the natural spawning population.

The tools used in modern hatchery programs have clearly defined goals/objectives, best management practices for fish culture, stringent bio-security protocols, “Natures” (more naturalistic) rearing environments, flexible facility layouts, and the ability to mark fish so that returning adults can be identified as hatchery-produced. Conservation hatcheries use localized broodstocks, mating schemes that avoid inbreeding, and sliding scales for the number of wild fish to incorporate into the broodstock (i.e., depending on the number returning to the spawning grounds). Research, monitoring, and evaluation programs are an integral part of the hatchery programs; it contributes to modernization and effectiveness.

Hatcheries’ Purposes/Compliance/Challenges

Rob explained that as our streams and rivers in the Columbia River Basin have produced fewer salmon and steelhead over the years, there has been an increasing reliance on artificial propagation. The Basin has almost half of the hatchery programs for the entire west coast. The primary purposes of hatchery programs include: (1) trust obligations to Indian tribes; (2) fisheries; (3) conservation;

and (4) climate change. He suggested that coordinating the Basin hatchery programs to achieve these purposes begins with existing laws and agreements including the Lower Snake River Compensation Plan, which mitigates for effects from the construction and continuing operation of the four federal hydropower dams on the lower Snake River; construction and operation of Grand Coulee, John Day and The Dalles dams and the Willamette project dams; and FERC license requirements for hydroelectric projects throughout the Columbia River Basin.

Rob said that managers tailor their facility and operations plans, known as Hatchery and Genetic Management Plans (HGMPs), to serve specific purposes. One program may operate to mimic wild salmon for maximum survival in the wild while another may culture fish for maximum survival in the hatchery and for characteristics and qualities that best serve the interests of fisheries. There are a total of 159 programs in the Basin and it is NOAA Fisheries' job to ensure that HGMPs are in compliance with the ESA and National Environmental Policy Act (NEPA). The overall goal of these programs under the ESA is to ensure that their operations allow us to restore self-sustaining natural salmon production to streams and rivers of the Columbia Basin. In the meantime, hatcheries will continue to be an important tool at the region's disposal to support its multiple needs and objectives. Rob summarized the challenges of hatcheries including hatchery/wild interactions, over escapement of hatchery fish to the spawning grounds, and climate.

Questions and Answers/Comments

The following are highlights of the questions raised, answers provided, and comments made.

- One participant asked Rob why it is taking so long to complete HGMPs if there are still 82 in process. What do you see as the next steps and how soon will you get through the process?
 - Rob said that the HGMP template was devised by the states and the tribes in collaboration with NOAA Fisheries in 1999/2000 to do a more thorough job in analyzing hatchery effects on ESA-listed fish. Then, additional species of salmon and steelhead were listed in the 2000s, a period when NOAA Fisheries was also drafting recovery plans and we were learning more about what was important through ongoing research and hatchery program reviews. All of this, combined with litigation, created some paralysis and a backlog. We have new people on board to handle these now.
 - Becky said that they have been working with HGMP Columbia River Task Force to determine what is holding up the ability of the hatchery operators to draft their HGMPs and/or NOAA Fisheries' review. Another factor has been the listing of bull trout so that the hatchery operators have had to consult with the U.S. Fish and Wildlife Service at the same time.
- Another participant said that the issue of habitat restoration facilities is missing from HGMPs. They suggested that is something that could be included in the future.
 - Paul responded that that is one area that was not previously considered; however, it has more awareness now.
 - Becky said that the newer hatcheries have begun to address this.

Hydropower Information/Presentations

Deb introduced Ritchie Graves, *NOAA Fisheries*, to begin his presentation on hydropower and dam effects within the Columbia River Basin.

Ritchie presented on the locations/types of dams, their purposes, effects on fish and aquatic habitat, actions to reduce or minimize these effects, monitoring, and challenges. He stated that there are over sixty large dams in the basin with multiple purposes. The effects of dams include: passage barriers/habitat inundation, shifts in water quantity and timing, water quality, sediment transport and turbidity, food and predation, and fish passage. There are two general types of dams: water storage and run-of-river. He stated that the effects on water quantity and timing are seasonal with more water released during winter for electricity generation and to create space for flood control compared to a natural system and more water stored during the spring. These effects on mainstem flow, combined with the larger cross-sectional area of the reservoir compared to free-flowing river can increase travel time for juveniles significantly; however, there is little difference for adults. Effects on water quality include changes in temperature, sediment transport, turbidity, total dissolved gas and oxygen, and the storage of toxic substances in reservoir sediments. With respect to temperature, large storage projects increase winter minimum temperatures, delay spring warming, reduce summer maximum temperatures, and delay fall cooling in the river downstream. Ecological effects include altered food webs and slow moving water that favors some native and non-native fish predators.

Ritchie described measures to reduce or eliminate these effects including dam removal, fish collection and transport, and conventional passage facilities, many types of facility upgrades and operations, and predator hazing and removal. Researchers use a variety of electronic fish tags to monitor the survival of juvenile and adult fish through specific structures and reaches. Some of the challenges from dams include latent mortality, which cannot be measured directly, understanding when juvenile transport is beneficial, effects of juvenile bypass facilities on downstream survival, adult losses, pinniped predation on returning adults, and the effects of changing climate. Ritchie said that the effects on food and from predation can alter the ecosystem, which is difficult to recover from. The changes in climate can alter temperature and precipitation which effects fish migration, passage, energetics, spawning/incubation, life history, and survival.

Questions and Answers/Comments

The following are highlights of the questions raised, answers provided, and comments made.

- One participant asked whether another effect of the hydrosystem is not the loss of marine derived nutrients.
 - Ritchie answered that yes, this is true, especially where fish cannot get past the dam to their historical spawning area.
- A participant asked a question about the climate slide, which shows “land-surface” average temperatures, and whether it would not be better to show the increase in water temperature.
 - Ritchie responded that he was trying to make the point that temperatures are going up, which is shown in the land-surface averages. He agreed with the commenter that his slide shows that these went up almost 1 degree C between 1970 and 2000.
- Another participant mentioned that the water quality in Bonneville pool is pretty bad; we are seeing the growth of warm water grasses like milfoil and also losing cold water refuges so the salmon cannot get cooled down.

- Ritchie said that one of NOAA Fisheries’ big issues in its review of Oregon’s water quality standards for temperature was the availability of these thermal refuges. The Environmental Protection Agency, the states, the tribes, and the other federal agencies are all looking for opportunities to find and then protect and enhance these habitats.
- One participant asked Ritchie to define thermal stratification.
 - Ritchie responded by referencing limnology. Cold water is denser than warm water so if you fill a tub with cold water and then add warm water, the warm water will rise to the top. If it sits there long enough (e.g., not mixed by storms), a “thermocline” develops; those set up in natural lakes when the sun warms the surface layer and then erode over the course of the fall and winter. Once the air temperatures start cooling down, the surface water cools. As it cools, the surface water becomes denser and it eventually plunges and remixes the whole pool.
- Michael Tehan asked a question about passage technologies. We used to think that fish that went through turbine units would die; however, turbine unit technology is evolving. He asked Ritchie to talk about the evolving technology and why these units are no longer fatal.
 - Ritchie noted that most fish survive passing through Kaplan turbine units. As an example, researchers saw 80% survival rates for juvenile salmon even through the Francis turbines (which are generally worse for fish) at Brownlee Dam. Ritchie stated that the newer Kaplan turbine units at the mainstem projects have minimum gap runners. The idea is that physical injuries were caused from the small recesses between the inner edge of the blade and the hub of the unit and the outer edge of the blade and the outside wall. The minimum gap ensures that fish are unlikely to get pinched in those areas. The next generation of turbine unit technology is being prepared for Ice Harbor Dam. This is the first effort to design turbines specifically for fish passage. We hope to see that the design that provides the highest fish survival also provides the most efficient power production (per unit of water passing through).
- Another participant noted that the water in deep reservoirs can become anoxic. When you take water from the bottom of Dworshak Reservoir to cool the river downstream, does it become anoxic?
 - Ritchie said that part of the interaction is determined by the nutrient load in the reservoir. Nutrients boost plankton production and when those plankton die they sink to the bottom and decompose, a process that uses oxygen. Dworshak is full of cold, clear water so we do not think the water taken from depth is low in oxygen.
- One participant mentioned the management of fish spill (water released over a dam’s spillway instead of run through the turbines) and other mechanisms. How do you determine when those should occur?
 - Ritchie responded by saying that NOAA Fisheries has many years of data that tell us when the fish are in the river so we can provide a lot of spill during the fish passage season. At the Public Utility District dams in the mid-Columbia reach, they used to put fyke nets in the turbine intakes and used that data to decide when to start spill for fish passage.
- Another participant asked if we should be trying to optimize the system for the benefit of species other than salmon and steelhead such as lamprey and sturgeon, which are also part of the ecosystem?
 - Ritchie answered that by putting dams in the river, you have special effects on anadromous species because you prevent them from going from place to place. We do not know as much about lamprey as salmonids; they may be more impacted by hydropower projects because they are small and not strong swimmers and they may

look like food to non-native bass. The tribes and others are working on projects to improve passage at Bonneville Dam and other mainstem projects.

Next Steps and Summary

Deb thanked the presenters for their time and effort and attendees for their insightful and thoughtful questions and comments. She asked meeting attendees to fill out the templates they received and to provide their feedback to K&W before they leave the workshop. If participants have specific questions on a presented topic, feel free to contact the presenter directly by email. The high level meeting notes will be distributed via email and the presentations from this workshop will be posted to NOAA Fisheries' website.

Barry thanked everyone for their attendance and attention. He stated that he hoped that participants had an opportunity to learn new information and to engage on the questions and answers they were seeking. The Partnership will determine how to integrate the topics discussed during the Partnership workshops with the development of salmon and steelhead recovery goals. He thanked the group for their constructive energy and interaction, and stated that the workshops encouraged looking at diverse perspectives and honest and robust conversation. If attendees have any comments on the format, structure, and content of the workshop, they should feel free to contact K&W.

He reminded attendees to submit their stakeholder nominations and that NOAA Fisheries will continue working to keep participants engaged in the coming months and prior to the first Partnership meeting in the fall of 2016.

Deb thanked NOAA staff, the presenters, and those that attended for their attention and willingness to participate. The meeting was adjourned at 3:40 pm.

Upcoming Meeting Dates	Who	Location
TBD in the Fall of 2016	Columbia Basin Partnership	TBD in Portland, Oregon
Meeting Documents		
<ul style="list-style-type: none"> • Proposed Agenda – 06-07-16 • Biographies for Presenters – 06-07-16 <p><i>The above documents were provided to participants at the June 7, 2016 workshop.</i></p> <ul style="list-style-type: none"> • Hatcheries 1 PowerPoint – 06-07-16 • Hatcheries 2 PowerPoint – 06-07-16 • Hatcheries 3 PowerPoint – 06-07-16 • Harvest PowerPoint – 06-07-16 • Hydropower PowerPoint – 06-07-16 <p><i>The above documents can be found on the NOAA Fisheries' website here:</i> http://www.westcoast.fisheries.noaa.gov/columbia_river/index.html</p>		



Columbia Basin Partnership Workshop #2 – June 7, 2016

Please provide any clarifying questions/input to the June 7 Workshop topics:

Please share any comments, suggestions, or feedback for the June 7 Workshop:

Perhaps I missed it, but is there a reason why we are only focusing on the current anadromous range of salmonids?
The Columbia Basin is much larger than where there is a impassable dam. Let's not forget these other regions.



Columbia Basin Partnership Workshop #2 – June 7, 2016

Please provide any clarifying questions/input to the June 7 Workshop topics:

[Empty box for clarifying questions/input]

Please share any comments, suggestions, or feedback for the June 7 Workshop:

I really appreciate the congenial atmosphere that NMFS staff & facilitation staff creates for these mtgs. I also appreciate the organization & thoughtfulness expended to make these informative & productive sessions.

The best information on hatcheries I've ever heard. Hydro also very good.



Columbia Basin Partnership Workshop #2 – June 7, 2016

Please provide any clarifying questions/input to the June 7 Workshop topics:

Please share any comments, suggestions, or feedback for the June 7 Workshop:

The audio was difficult and the screen was ~~shaking~~ shaking - both were distracting. Consider a different venue. Also get a pointer that is easier to use - this was hard for everyone that presented.

~~Grass~~ ~~impact~~

moderate structure (reduced habitat impact)

missing from discussion



Columbia Basin Partnership Workshop #2 – June 7, 2016

Please provide any clarifying questions/input to the June 7 Workshop topics:

[Empty box for clarifying questions/input]

Please share any comments, suggestions, or feedback for the June 7 Workshop:

[Empty box for comments, suggestions, or feedback]

*adults/Idaho Power
mitigatm*