

The Columbia Basin Collaborative

Revised Recommendation 1-24-24

Introduction

The Columbia Basin Collaborative (CBC) charter aims to achieve the quantitative and qualitative goals for salmon and steelhead documented in the Columbia Basin Partnership Task Force (CBPTF) Phase 1 and 2 Reports, as adopted by the Marine Fisheries Advisory Committee (MAFAC). The CBPTF “explored the various limiting factors that impact salmon and steelhead across their life cycles. The results of the analyses show that no single strategy (e.g., reducing predation, increasing habitat, reducing harvest) will achieve the Goals on its own. Instead, improvements in multiple factors will be needed to increase abundance to desired levels for most stocks. Together, these improvements create synergies that compound benefits greater than those achievable through single actions.”

The CBPTF also identified that, “reliable and predictable funding is essential. Funding must be targeted to achieve the Partnership’s Quantitative and Qualitative Goals. New funding sources should be identified. Funding must come from multiple sources, consider the burden across communities, and account for past, present, and potential impacts.”

The CBC agrees with these MAFAC-adopted objectives and hence the recommendations below are aimed to help achieve those CBPTF Goals. No one recommendation can meet these goals alone.

The parties of the CBC have come to consensus that this recommendation is valid for implementer consideration. As stated in the Charter “sovereigns with management decision-making authority will review recommendations and make independent decisions to implement or support actions. The CBC itself is not a management decision-making body, but will strive to support its recommendations through to implementation.”

Recommendation: Develop and initiate testing of a comprehensive piscine predator monitoring and evaluation program (PPMEP) for the Columbia River Basin

Problem Statement:

Currently, there is no coordinated, large-scale program to investigate and quantify the overall predatory impact of piscine predators (e.g., Northern Pikeminnow, Smallmouth Bass, Walleye) to juvenile salmonid stocks, in the lower and mid-Columbia River Basin. Without more complete estimates of piscine predation rates to salmonid stocks and data to track potential predator compensatory responses, it is difficult to recommend meaningful predator management actions and virtually impossible to measure the effect of any implemented management actions. Furthermore, sustained piscine predation information is needed to track long-term changes to the ecological system and to better inform management decisions involving natural and anthropogenic processes (e.g., climate change). This action item recommends the Region support the process needed to design an improved PPMEP that can be used to provide actionable information for future piscine predation management. The scope of this action item and associated budget are limited to the PPMEP project design process and does not include any PPMEP implementation. It is intended that this action item be the first in a series of action items eventually culminating in a functional PPMEP used to guide management decisions to improve the status of salmonid stocks.

Numerous studies have already been implemented to estimate piscine predation to juvenile salmonids (e.g., Beamesderfer et al. 1996, Tiffan et al. 2020, Northern Pikeminnow Management Program 2021, WDFW in prep.) and while they have improved our understanding of the predator/prey dynamics in the lower and mid-Columbia River Basin, the findings are difficult to compare to each other as the methods employed were often different. Furthermore, none of the previous studies have received the support needed to be expanded into a lower and mid-Columbia Basin PPMEP. Previous studies have estimated the effects of piscine predation to salmonids but there remain several key data gaps:

- Unbiased estimates of predator abundance
- Identification of salmonid prey including stock and hatchery- versus natural-origin
- Spatial and temporal trends of salmonid predation
- A general lack of understanding about the seasonal and interannual variability in native and non-native predator/prey population dynamics

In order to implement and measure the impact of future piscine predator management actions, a scientifically robust and spatiotemporally broad monitoring program is needed in the lower and mid-Columbia River Basin that would address these data gaps. The PPMEP stemming from this action item would be spatially modular incorporating slight study modifications due to the physical and biological differences in the various sub-areas of the lower and mid-Columbia River Basin. However, the focus would be to collect biological metrics that would be comparable over space and time, relative to the predator and prey species present in each sub-area. This action item is

designed to leverage the numerous pre-existing study designs with the technical knowledge of staff at various agencies, tribes, and NGO's to design an improved PPMEP with monitoring and analytical tools to address the listed data gaps. This action item establishes the framework for that design process (action item 'a' in Section 3) and recommends pilot projects needed to inform the design of a lower and mid-Columbia River Basin PPMEP (action sub-items '1 – 4' in Section 3).

The product from this action item would be a study design to provide a lower and mid-Columbia River Basin data stream that address critical questions regarding the effects of piscine predation on the viability (e.g., life stage specific survival rates) of salmonid stocks. The design process for this action item is structured to incorporate the collaborative approach of the CBC by including technical expertise from an array of state, federal, tribal, NGO, and academic entities. This approach will culminate in a study design for monitoring and evaluation of piscine predation that will be relevant to the unique conditions of the lower and mid-Columbia River Basin.

Summary of Action:

The following components action items are required to inform the design of a lower and mid-Columbia River Basin PPMEP:

1. Design a modular PPMEP study to generate unbiased estimates of predator abundance and the consumption rates of juvenile salmonids. These metrics can be used to inform adaptive management of the lower and mid-Columbia River Basin (**PPMEP Study Design**). The design of this study will be coordinated closely with managers to ensure that the data being collected will be directly applicable to management decisions and actions for both new and existing programs.
 - 1.1. Assess the effectiveness and bias of sampling gear types for selected piscine predators (**Gear Effectiveness**).
 - 1.2. Develop GIS layers classifying river habitat (e.g., bank, near shore, off-shore) at the required spatial scales to inform predator abundance models (**GIS Habitat**).
 - 1.3. Evaluate methods to improve prey information from predator digestive tract contents beyond species (e.g., stock, origin, ESU or population) (**Diet Analyses**).
 - 1.4. Assess information about new or expanding non-native piscine predator species
Adaptively manage the PPMEP study design to incorporate information to achieve unbiased predator abundance estimates (**Additional Non-native Predators**)
 - 1.5. Work with relevant agencies to include monitoring and enforcement of regulations.
 - 1.6. Consider expanding the PPMEP study design to other areas of the basin.

Existing or New Program:

The **PPMEP Study Design** action item will incorporate technical staff identified by the Columbia Basin Collaborative Piscine Predation Work Group who will utilize pre-existing studies to design a PPMEP for the lower and mid-Columbia River Basin, including field and analytical components (e.g., Beamesderfer et al. 1996, Friesen and Ward 1999, Counihan 2011, Tiffan et al. 2020, Murdoch pers. comm.). The four action sub-items (**Gear Effectiveness, GIS Habitat, Diet Analyses, Additional Non-native Predators**) could be integrated into existing programs or study designs (e.g.,

Northern Pikeminnow Management Program, WDFW GRTS study). There are a number of state, federal, regional, tribal, and academic groups that are currently conducting work related to these action items. These existing efforts could collaborate and partner with the proposed action sub-items for effective and efficient PPMEP implementation, in a future action item.

Benefit Provided by Action:

PPMEP Study Design:

Designing a scientifically robust, lower and mid-Columbia River Basin PPMEP is the missing tool to effectively assess the benefit of future management actions and prioritize impacts among all sources of piscine predation mortality. Developing a modular study design to generate unbiased piscine predator abundance estimates and analytical tools to compare estimates across space and time will reduce the inherent uncertainty in the responses of predator populations to management actions and climate change. Without a PPMEP, there will be significant data gaps and uncertainty related to any future management action, further complicating the utility of actionable information to resource managers. The occurrence of piscine predation on juvenile salmonids is certain, but inaccurate estimates of predation lead to questions about the efficacy or necessity of piscine predation control measures among resource managers and stakeholders. Long-term monitoring studies conducted under the recommended adaptive management framework should provide actionable management information while maintaining the flexibility to incorporate additional monitoring approaches to account for the expected (but unknown) dynamics of the Columbia River Basin.

Gear Effectiveness, GIS Habitat, Diet Analyses, Additional Non-native Predators:

The four additional action sub-items could be addressed concurrently with and to help inform the PPMEP design process. These action sub items are Gear Effectiveness, GIS Habitat, Diet Analyses, and Additional Non-native Predators. Addressing each of these four areas would provide critical information needed to ensure the PPMEP is utilizing effective and efficient sampling gear, has appropriate habitat data to inform statistical models, provides taxonomically resolved predator diet composition data, and can integrate sampling for additional non-native piscine predators.

Stocks Benefited by the Action:

Presumably, the survival of individuals from all stocks is negatively impacted by piscine predation (i.e., another data gap). However, because information about piscine predator impacts to out-migrating juvenile salmonids are data limited, the size at migration may serve as a relative measure. Hence, subyearling Chinook may benefit the greatest and steelhead the least, while Spring Chinook, Coho and Sockeye are intermediate.

Data Supporting Benefits:

Studies assessing piscine predator/prey dynamics have been conducted in the Columbia River Basin for over 40 years. Below is a list of relevant studies that will be used to help inform a lower and mid-Columbia River Basin PPMEP though this list is not exhaustive:

Beamesderfer, R.C., Ward, D.L. and Nigro, A.A., 1996. Evaluation of the biological basis for a predator control program on northern squawfish (*Ptychocheilus oregonensis*) in the Columbia and Snake rivers. *Canadian Journal of Fisheries and aquatic sciences*, 53(12), pp.2898-2908.

Counihan, T.D., Hardiman, J.M., Burgess, D.S. and Simmons, K.E., Assessing Native and Introduced Fish Predation on Migrating Juvenile Salmon in Priest Rapids and Wanapum Reservoirs, Columbia River, Washington, 2009–11.

Friesen, T.A. and Ward, D.L., 1999. Management of northern pikeminnow and implications for juvenile salmonid survival in the lower Columbia and Snake rivers. *North American Journal of Fisheries Management*, 19(2), pp.406-420.

McLellan, H. J., S. Wolvert, A. O. Silver, K. T. Thurman, C.D. Lee, and T. Parsons. 2019. Lake Roosevelt Northern Pike Suppression and Monitoring, 2018 Annual Report. Bonneville Power Administration Project # 1994-043-00 and 2017-004-00.

NPMP 2022

Poe, T.P. and Rieman, B.E. eds., 1988. Predation by resident fish on juvenile salmonids in John Day reservoir, 1983-1986. US Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife.

Tiffan, K.F., Erhardt, J.M., Hemingway, R.J., Bickford, B.K. and Rhodes, T.N., 2020. Impact of smallmouth bass predation on subyearling fall Chinook salmon over a broad river continuum. *Environmental biology of fishes*, 103, pp.1231-1246.

Waltz, G. T., K. J. Rybacki, C. M. Barr, A. L. Carpenter, K. R. Anderson, E. B. Lamb, and P. E. Chambliss. 2022. Report C–System-wide predator control program: fisheries and biological evaluation. Oregon Department of Fish and Wildlife, Project Number 1990-077-00. 2021 Annual Report to the Bonneville Power Administration, Portland, Oregon.

Willis, C.F., Ward, D.L. and Nigro, A.A., 1993. Development of a Systemwide Program: Stepwise Implementation of a Predation Index, Predator Control Fisheries, and Evaluation Plan in the Columbia River Basin. 1992 Annual Report. BPA Project, (90-077).

Implementing Entities:

Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), the Yakima Nation (YN), and the Confederated Tribes of the Colville Reservation (CTCR). Other fisheries resource agencies may also choose to participate.

Time Needed to Implement:

PPMEP design efforts could be initiated within a couple of months after funding. CBC Piscine Predation Work Group members have the professional contacts needed to staff a PPMEP design panel as well as the technical capacity to lead the design of a lower and mid-Columbia River Basin PPMEP (resumes available on request). Action sub-items 1.1 – 1.4, could be integrated with

ongoing projects affiliated with ODFW (NPMP), WDFW, YN, and CTCR. While much work is conducted during the juvenile salmonid outmigration (April – July), other components could be implemented at any time of the year (e.g., Gear Effectiveness).

PPMEP could be designed in 1-2 years. Some of the action sub-items would be conducted concurrently with the PPMEP design process because the PPMEP design process can be initiated while the sub-action items are being completed. These sub-action items would also take 1-2 years to complete.

Time Needed to Benefit Fish Populations:

Unlike other sources of predation (avian and pinniped), piscine predation has not been adequately quantified. Relative to other sources of predation, the magnitude of predation by species is unknown. This critical data gap precludes prioritization of management actions due to uncertainty in the effectiveness of any action.

Estimated Cost:

Existing programs could serve as a cost share (e.g., WDFW ~ \$282k; NPMP ~\$4.2M), but funding to design a PPMEP, including all sub-action items, is likely to require an additional \$500,000-\$1,100,000 which does not include implementing PPMEP in the lower and mid-Columbia River Basin.

Uncertainties:

Many of the uncertainties as related to the PPMEP can be addressed through adaptive management of the monitoring program that results from the design process. Given the lack of previous work in the Columbia River Basin for many of the components, the precision of estimates is unknown at this time. As the PPMEP is fully implemented and our understanding of the predator-prey interactions increases, the type and effectiveness of management actions is also uncertain. Compensatory response to Northern Pikeminnow (NPM) reductions may have been occurring over the last 30 years. The responses of Northern Pikeminnow or other piscine predators to further management actions will require better information than we have gathered to date.

Associated Regulatory Processes or Policies:

Permits to collect NPM, Smallmouth Bass, Walleye, and potentially incidental take of other species (e.g., salmonids) including ESA coverage for all salmonid populations.

Potential Challenges:

Engagement with the recreational angler and guide community will be important and challenging. Providing unbiased scientific information as related to the predator risk will be critical for resource managers to take any recommended control measures.

Effective PPMEP study design will need to be scalable, potentially incorporating pilot studies in sub-areas of the lower and mid-Columbia River Basin, as well as modular such that the core study

design is relevant across this large spatial scale. There will likely be many challenges to develop a relevant and effective PPMEP study design for all sub-areas of the lower and mid-Columbia River Basin. Some of these challenges are expected from previous research while there are potentially numerous others that will be identified through the design process. However, the modular and scalable nature of the PPMEP will be a strength as it progresses from the design to testing and eventually implementation phases (which would be conducted in subsequent action items) as the inherent challenges can be addressed at each stage of the process.

Adaptive Management:

Initially, adaptive management will occur as data gaps are filled. As additional information is collected on piscine predation, monitoring (spatial or temporal) and analyses to evaluate the performance of management actions can be adjusted. The response of predator populations to future management actions and climate change is also of great importance. Reducing overall mortality related to the community of piscine predators, not simply a single species, is the primary objective. Hence, the PPMEP can respond with management actions consistent with responses observed by predator populations.

Stock Benefits Report Card:

Benefit depends on the geographic range that is chosen for implementation.