Northwest **Power** and **Conservation** Council

July 5, 2023

MEMORANDUM

TO: **Council Members**

FROM: **Erik Merrill, Independent Science Manager; Maureen Hess, Fish and Wildlife Program Analyst; and Mark Fritsch, Project Review and Implementation Manager**

SUBJECT: **ISRP Review of the Lower Snake River Compensation Plan Spring/Summer Chinook Program**

BACKGROUND:

Presenters: Stan Gregory, ISRP Chair, and Richard Carmichael, ISRP Vice Chair

Summary: This presentation will share the Independent Scientific Review Panel's (ISRP) key findings and recommendations from its review of the Lower Snake River Compensation Plan (LSRCP) Spring/Summer Chinook Program (ISRP 2023-1).

Prior to the presentation from the ISRP, Council staff will present a brief overview and history of the LSRCP, including operations and maintenance funding and the review process.

The LSRCP goal for spring/summer Chinook is to return 58,700 adults to and through the LSRCP project area. LSRCP produced adult returns have declined in recent years and have ranged from more than 50,000 spring/summer Chinook salmon in the early years of the program to less than 10,000 in 2017. Low returns have continued in recent years. The ISRP's presentation will describe the challenges, areas of high and low performance, and recommendations to improve performance, recognizing

that many of the challenges limiting program success cannot be addressed by LSRCP Program actions alone.

Relevance: The 2014 Fish and Wildlife Program calls for ISRP reviews of projects funded through Bonneville's reimbursable program, including the programs of the LSRCP, as recommended in the 1998 U.S. Congress' Senate-House conference report on the Fiscal Year 1999 Energy and Water Development Appropriations bill.

Workplan: Fish and Wildlife Division work plan 2023; Program planning and coordination, Program implementation.

Background:

The Council, in cooperation with the U.S. Fish and Wildlife Service (USFWS) and its partners, asked the ISRP to conduct a follow-up review of the Spring/Summer Chinook Salmon Hatchery Programs of the LSRCP. The LSRCP is a federal program designed to mitigate the impacts of construction and operation of the four lower Snake River federal dams (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite) on Chinook salmon and steelhead populations in the Snake River basin. LSRCP hatcheries were constructed between 1982 and 1992, approximately 15 to 30 years after the dams were constructed. The LSRCP goal for spring/summer Chinook is to return 58,700 adults to and through the LSRCP project area to compensate for the estimated annual loss of 48% of the return relative to the base period of the late 1940s and early 1950s. It was assumed that 52% (64,000) naturally produced adults from the base period would continue to return annually. The mitigation goal does not include harvest contribution of adults below the project area, but the total adult production goals were calculated using harvest rates that were occurring in areas below the project areas during the 1970s and assuming that level of harvest would continue. Thus, the total adult production goal accounting for harvest below the project area was assumed to be 293,500 Spring/Summer Chinook. To pursue this goal, the LSRCP is currently implementing eleven separate hatchery production programs in Washington, Oregon, and Idaho spread throughout all the major subbasins in the lower Snake River, including the Tucannon, Clearwater, Grande Ronde, Imnaha, and Salmon subbasins. Another program is operated in the Touchet River, Washington. The USFWS owns most of the facilities that culture spring/summer Chinook salmon for the LSRCP program and administers the program through a direct funding agreement with Bonneville Power Administration (BPA). State, federal, and tribal fish and wildlife agencies in the region operate the LSRCP facilities.

The LSRCP faces major challenges in their efforts to mitigate the impacts of construction and operation of the four lower Snake River dams on salmon and steelhead populations in the Snake River basin. Salmon and steelhead must migrate a long distance to the upper portion of the Columbia River Basin and must pass through six or more hydropower dams and reservoirs to reach their spawning grounds. In addition, climate change and habitat degradation over the last 50 years have reduced freshwater and ocean productivity and caused major declines in salmon and steelhead populations throughout the Pacific Northwest. LSRCP produced adult returns have

declined (similar to their natural-origin counterparts) in recent years and have ranged from more than 50,000 spring/summer Chinook salmon in the early years of the Program to less than 10,000 in 2017.

The LSRCP tracks adult return, in-hatchery and smolt-to-adult return rate performance, ecological interactions, and harvest contributions. Overall in the past decade, the hatchery programs in the LSRCP achieved approximately 60 to 80 percent of their goals for adult returns on average, although some achieved only 20 to 30 percent and one program achieved their goal. With low adult returns, the hatchery programs often have difficulty meeting their broodstock goals for the next generation of hatchery fish. One of the many strengths of the LSRCP Program is the high level of in-hatchery performance. Specifically, egg-to-smolt survival is excellent, exceeding 80 percent in all hatcheries in most years; prespawning mortality of broodstock is very low; and in general, the majority of hatchery programs met approximately 85 to 95 percent of their smolt production goals. While in-hatchery performance is a positive achievement of the program, it illustrates that alternatives for the LSRCP to address overall survival challenges through hatchery management changes are somewhat limited. After release from hatcheries, the smolt-to-adult return rates (SAR) are highly variable, ranging from 0.18 to 0.86 percent, which represents 20 to 132 percent of the SAR goals.

Multiple factors have limited the achievement of the LSRCP goals and management objectives during the past decade including:

1. The SARs are very low because of high mortality rates at multiple life stages across the life cycle. Returns are highly influenced by poor and changing conditions experienced by smolts migrating to sea, as sub-adults feeding at sea, and as adults migrating upriver.
2. The low abundance of natural- and hatchery-origin adult returns in multiple years has influenced the achievement of broodstock and smolt production objectives. The number of natural-origin returns to the Snake River has never been close to the 64,000 adults that were assumed would continue to return annually after dam construction. Natural escapement targets above weirs have rarely been met in recent years.
3. The early age-at-maturity and very high proportions of Chinook jacks have significant influence on the ability to meet broodstock objectives and also limit the availability of age-four and older adults for fisheries.
4. There is limited hatchery rearing capacity to reduce rearing densities or increase smolt production in those cases where it might be appropriate.
5. The marking capacity limitations and logistics dictate the minimum fish size-at-marking, which limits the ability of hatcheries to pursue alternative growth profiles and release smolts at smaller sizes.
6. There has been limited response in increasing natural-origin abundance in populations that are supplemented with hatchery adults. Density dependence in juvenile production areas that are supplemented has limited the effectiveness of supplementation.
7. The overshoot of Tucannon River adults to areas above Lower Granite Dam reduces returns to the Tucannon River.

8. Straying of fish produced at Lookingglass Hatchery into the Wenaha and Minam rivers, which are managed as wild fish sanctuaries, results in hatchery proportions that greatly exceed the 5% criteria.
9. The limited distribution of adults in traditional tribal fishing areas has affected the ability of tribes to fish in traditional areas with traditional methods.
10. The high-risk status and low abundance of ESA-listed populations limits the ability to harvest hatchery fish in mixed stock fisheries.
11. Climate change will influence the smolt-to-adult survival and hatchery operations and performance (e.g., high mortality at the South Fork Salmon River adult holding facility).
12. Flat or reduced funding availability limits many aspects of hatchery operations, hatchery maintenance, monitoring and evaluation, and adaptive management actions.

The LSRCP Program has demonstrated adaptability and capacity to address factors such as these and to implement adaptive changes throughout the history of the program. The LSRCP's most prevalent management change is to increase smolt production. This production effort is coupled with extensive monitoring, evaluation, and research to provide information for adaptive management decision processes and ultimately to improve program performance. The LSRCP is forward thinking in initiating an extensive assessment of climate change impacts and associated needs for facilities modifications for all the LSRCP facilities.

The ISRP identifies 12 major key findings and programmatic issues that affect program performance and makes recommendations for future actions for the LSRCP Program and its state and tribal cooperators that include:

1. Consider adaptive changes to meet adult return goals and smolt survival objectives.
2. Enhance the monitoring and evaluation of benefits and risks of supplementation and increase emphasis on ESA considerations.
3. Reduce straying of Grande Ronde hatchery fish into the Minam and Wenaha rivers.
4. Consider density dependence in supplementation and for future production increases.
5. Modify programs to address early age-at-maturity and decreased representation of age-five adults across the LSRCP program.
6. Conduct a program-wide assessment to identify factors influencing in-river smolt survival, SARs, and early age-at-maturity.
7. Implement actions to better achieve tribal harvest share (50%) and incorporate Indigenous Knowledges.
8. Complete the proposed climate change assessments for existing and new facilities on an expedited schedule and consider impacts on post-release survival.
9. Expand structured decision making and adaptive management.
10. Improve centralized access to methods, indicators, and metadata for performance assessments.

11. Use consistent methods for all metrics and for inclusion of jacks in SARs, adult returns, recruits-per-spawner, and LSRCP mitigation goals assessments.
12. Incorporate additional metrics into the comprehensive LSRCP objectives and performance metric assessment table.

The ISRP appreciates the USFWS and the LSRCP partners' constructive approach to review, evaluation, and adaptation, and the ISRP hopes its recommendations can help the program address its many daunting challenges and move the program closer to meeting its goals. That stated, the ISRP understands that many of the challenges that limit success cannot be addressed by LSRCP Program actions alone, and thus the lack of consistent achievement of objectives is mostly despite, not because of, the extensive efforts of the program.