



## Priest Rapids Coordinating Committee Meeting

### FINAL APPROVED MEETING MINUTES

Wednesday, April 24, 2019

10am

Wanapum Dam HOB, Room107

#### **PRCC Representatives**

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Scott Carlon, Justin Yeager (Alt), NMFS  
Keely Murdoch, Bob Rose (Alt), YN  
Chad Jackson, P. Verhey (Alt) WDFW  
Curt Dotson, Peter Graf (Alt), GCPUD  
Denny Rohr, D. Rohr & Assoc, Facilitator

Jim Craig, USFWS  
Kirk Truscott, Casey Baldwin (alt), CCT  
Tom Skiles, CTUIR  
Erin Harris, Admin Ass't, GPUD

#### **PRCC Meeting Attendees**

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Curt Dotson, GPUD  
Keely Murdoch, YN  
Scott Carlon, NMFS  
Kirk Truscott, CCT  
Chad Jackson, WDFW  
Patrick Verhey, WDFW (Via Phone)

Jim Craig, USFWS -Absent  
Tom Skiles, CTUIR  
Peter Graf, GPUD  
Denny Rohr, D. Rohr & Assoc, Facilitator  
Erin Harris, GPUD

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#### **Decision made during April 24, 2019 meeting**

1. NNI Funding Proposal – “Testing the feasibility of collecting adult spring-run Chinook salmon using a pound net within the lower Columbia River Estuary” – Dr. Michelle Rub, NMFS, final decision to not approve.
2. Request for a time extension to July 31, 2019 for the “Final Report of Evaluation of Caspian Tern Management to Reduce Predation on ESA-listed Salmonids in the Columbia Plateau Region” was affirmed as approved.

## Meeting Minutes

- I. **Safety Briefing** –Conducted by Curt Dotson.
- II. **Welcome and Introductions** –Rohr welcomed everyone
- III. **Agenda Review (D. Rohr)** – No additions were requested
- IV. **Meeting Minutes (D. Rohr)**
  - A. February 27, 2019 Conference Call -Approved
  - B. March 27, 2019 Conference Call -Approved
- V. **Actions Items from the March 27, 2019 Meeting (D. Rohr)**
  1. NNI Funding Proposal – “Testing the feasibility of collecting adult spring-run Chinook salmon using a pound net within the lower Columbia River Estuary” – Michelle Rub, NMFS – move presentation to April 24th meeting. **Agenda item**
  2. Consultation with PRCC Regarding the Priest Rapids Right Bank Embankment Project presentation by Tom Dresser, 30-day review period, April 29th deadline, comments are to be sent to Dresser. **Rohr reminded everyone of deadline and to send comments to Tom Dresser.**
  3. Update of the White River Spring Chinook Mitigation 2026 Decision Framework, Rohr will follow up, add to April agenda, and notify Hillman of ongoing activities and PRCC discussion. **Completed**
  4. Continued Support for UC Fish Screen Monitoring Program, D. Didricksen report will be added to April 24th meeting agenda. **Rohr informed committee that Danny Didricksen unable to attend today’s meeting but will plan for May or June meeting to provide an update report.**
  5. Evaluation of Caspian Tern Management to reduce predation on ESA-listed Salmonids in the Columbia Plateau Region, request for additional time for final report, Rohr will contact Truscott to notify of committee approval and request his vote. **Completed**
  6. Dotson reminded committee members of April 1, 2019 P&I Report comment deadline to meet April 15, 2019 deadline to file with FERC. **Completed**
- VI. **(Decision Item) (10:30 am Presentation) NNI Funding Proposal – “Testing the feasibility of collecting adult spring-run Chinook salmon using a pound net within the lower Columbia River Estuary” – Dr. Michelle Rub, NMFS (C. Dotson) –**

Dr. Michelle Rub attended the meeting and provided a PowerPoint presentation to describe the proposal. The NNI Funding request was for \$199,750 for implementation of Phase I, and Rub explained they will continue to seek additional sources of funding to cover the operations phase (i.e. Phase II) of this project. See Attachment A for a copy of the NNI Funding request and description of the work to be performed.

Committee members viewed the presentation and asked questions of Rub throughout. Committee members continued their review and discussion of the request after Rub had ended her presentation and exited the meeting. The

final decision was a split vote with some members approving the request and others commenting that there were some unresolved issues that need to be addressed. Additionally, some questioned if this was a proper use of NNI Funds. Accordingly, after discussion the final decision was to not approve the NNI Funding request. Dotson will notify Rub of the final decision.

**VII. Affirmation of Truscott and Skiles Agreement for a Time Extension for Final Report of “Evaluation of Caspian Tern Management to Reduce Predation on ESA-listed Salmonids in the Columbia Plateau Region” (D. Rohr)** – Truscott and Skiles were not present for the March 27, 2019 PRCC Meeting Conference Call when a vote was taken for this time extension. Rohr commented that he contacted Truscott and Skiles after the meeting and received approval votes from them both. Accordingly, the request for a time extension for the final report is approved.

**VIII. Fish Spill Update (C. Dotson)** – Dotson reported that fish-spill began at Wanapum Dam on Monday, April 22<sup>nd</sup> and at Priest Rapids Dam on Tuesday, April 23<sup>rd</sup>. Skiles questioned the status of Wanapum Dam sluiceway wall that had become disconnected. Dotson commented that an internal Grant PUD meeting has been scheduled to discuss repair options, and that design issues caused the problem.

**IX. Potpourri (D. Rohr)**

- A. **Discussion of May Meeting Hydro Tour** – Rohr asked if there was interest in a hydro tour of the PRP facilities during the May meeting. Committee members requested staying with the regular meeting scheduled and no touring to be included.

#### **GENERAL UPDATES**

**A. Avian Predation Activities (C. Dotson)** – IAPMP reports are being received. Curt shared weekly reports being received regarding Goose Island activities and photos. The newly installed irrigation system on Goose Island is up and operating and operations will take place through October 2019.

**B. FCRPS BiOp – Corps/BOR Avian Predation Management in Columbia Plateau Region (C. Dotson)** – Curt D. spoke of how “shocked” he was that there is NOTHING in this interim FCRPS BiOp regarding management actions associated with avian predation (on salmonid smolts) on the Columbia Plateau region (i.e. the mid-Columbia river). His concern was “what kind of message” does this BiOp send to the federal actions agencies who had quite a bit of avian predation management requirements in their 2014-2018 BiOp. That with the late issuance of this interim BiOp, the federal action agencies (mainly the Corp and BOR) budgeted no monies for 2019 activities, based on not having a BiOp telling them what would be required of them in 2019 (and now the PRCC is funding those avian management actions via NNI finding) and now they (action agencies) do have a BiOp, which says nothing is required of them, so most likely they will budget \$0.00 for avian predation management for 2020. Curt D. questioned how that is even possible considering all of the data/studies that have been conducted in the past 6 years showing the

impact of avian predation on salmonid smolts in the mid-Columbia region. Kirk T. also voiced his concern for lack of requirements, regarding avian predation in the Columbia Plateau in the new FCRPS BiOp.

**C. Update and Review of the White River Spring Chinook Mitigation 2026 Decision Framework (D. Rohr)** – Rohr provided a background

review of this subject beginning with SOA 2013-01 (Priest Rapids Coordinating Committee – Policy Committee Statement of Agreement White River Spring Chinook Mitigation) up to and including the March 26, 2019 memorandum from the PRCC Hatchery Subcommittee requesting specific direction from the PRCC regarding a review of possible updates to the White River Spring Chinook Mitigation 2026 Framework. PRCC members next discussed details of life cycle modelling with a specific focus on the Lake Wenatchee area. Additional comment was made that details of life cycle modelling were discussed extensively by a PRCC subcommittee with no consensus on how to proceed. Accordingly, after additional discussion, committee members agreed to invite Jeff Jorgenson, NOAA, to an upcoming meeting to discuss life cycle modelling. Carlon will contact Jorgenson regarding his availability and report back.

**D. Review of Outstanding NNI Funded Projects**

1. Continued Support for UC Fish Screen Monitoring Program (C. Jackson) – Danny Didricksen unable to attend today’s meeting and may be able to attend in May or June to provide an update report. Rohr will keep committee advised.
2. Lower Wenatchee Instream Flow Enhancement Project Phase II (C. Jackson, D. Rohr) – Internal water rights review has been completed and this project is moving forward. Rohr will keep committee advised of ongoing progress.
3. Evaluation of Caspian Tern Management to Reduce Predation on ESA-listed Salmonids in the Columbia Plateau Region – time extension of final report to July 31, 2019 (C. Dotson) – Committee agreed.
4. “Non-Native Predator Recruitment Reduction – Phase I” (K. Murdoch) – Keely received a report from McMichael dated April 20, 2019 and copies were distributed to committee members. If any questions, please contact Keely.
5. “Northern Pike Removal in Lake Roosevelt” (K. Truscott) – Nothing new to report.

**X. Committee Reports (D. Rohr)** – Rohr distributed to committee members.

**XI. NNI and Habitat Funds Report (D. Rohr)** – Rohr distributed copy of Q1, 2019 report to committee members.

**XII. Next Meeting (D. Rohr) – Wednesday, May 29, 2019, 10:00 am, Wanapum Dam,  
HOB, Room 107**

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**ATTACHMENT A (to be attached to final minutes that are posted on GCPUD  
website)**

**Project Title: “Testing the feasibility of collecting adult spring-run Chinook salmon  
using a pound net within the lower Columbia River estuary”**

**Project Title:** Testing the feasibility of collecting adult spring-run Chinook salmon using a pound net within the lower Columbia River estuary

**Principle Investigators:** A. Michelle Wargo Rub, Ben Sandford, and Don Van Doornik (Northwest Fisheries Science Center), and Adrian Tuohy (The Wild Fish Conservancy NW)

### **Background and Justification**

Since 2010, NOAA Fisheries has been collaborating with Columbia River (CR) commercial fishermen to collect and tag adult spring-run Chinook salmon (*Oncorhynchus tshawytscha*) originating from the Upper and Middle Columbia and Snake Rivers upon their return as adults to the CR estuary. Based on detections of these fish at Bonneville Dam, from 2010-2015 Wargo Rub et al. (2019) estimated 51,751- 224,705 adults died annually within the 234 km study reach from sources other than harvest. The study also indicated that adult mortality through the estuary and lower CR varied spatially and temporally (Fig. 1d), increased through time, and was correlated with an increase in the abundance of CR pinnipeds (Fig. 1c). Specifically, adult spring-run Chinook salmon arriving early (e.g., March) appeared to experience significantly higher mortality rates than those sampled later (e.g., May). These observations may explain why some CR salmon continue to struggle despite extensive restoration efforts.

UCR spring-run Chinook salmon have been classified as *endangered* under the U. S. Endangered Species Act (ESA) since 1999 and the prospect for their recovery remains dire. For example, hatchery programs have released approximately 460,000 spring Chinook annually into UCR tributaries of the Wenatchee, Methow, and Okanogan River Basins. However, since 2006, less than 0.01% of the salmon released have returned to the Wenatchee's White River basin (Hillman et al. 2016). Given that each female carries 4,200 to 5,900 eggs, it is imperative that we understand the sources of mortality impacting Chinook salmon returning to UCR spawning grounds. Parental based genetic information has recently become available for hatchery origin spring-run Chinook salmon of the UCR. This information has allowed us to begin to study fish behavior and survival at the population level. Our results to date indicate that UCR populations are among those that return early to CR and thus have high potential for loss through predation and harvest. However, success of our current sampling method (i.e. tangle net) is dependent on environmental and biological factors such as river height, flow, water clarity, and run size. Subsequently, sample sizes for upriver fish have varied from year to year ranging from 205-381. The number of fish identified as having originated from the UCR, although increasing, has not exceeded ten fish annually. Small sample sizes make it challenging to estimate survival and run timing at the subpopulation level with any certainty. Therefore, we propose to explore an additional sampling method that would serve both to augment the current NOAA tagging effort as well as to validate tangle net sampling and handling methodologies used in the past.

Based on a recent study conducted by our co-PI in the Cathlamet channel (and historical success for this gear type), we propose installation of a pound net within the CR estuary (Fig. 2). Tuohy (2018) demonstrated the effectiveness of a modified pound net for the capture and release of Chinook salmon in the lower CR, with relative CPUE exceeding that of the average gillnetter and cumulative survival over a 400 km distance estimated at  $0.995$  (CI ( $0.924 \leq \tau_{cumulative} \leq 1.000$ ) = 0.95). Use of a pound net should improve sampling efficiency, allowing NOAA to study fish behavior, estuarine run timing, pinniped predation, and survival at the population

level. Furthermore, release survival and stock-composition may be compared to tangle nets and other pound nets to inform the implementation effort for alternative commercial fishing gears.

### **Methodology**

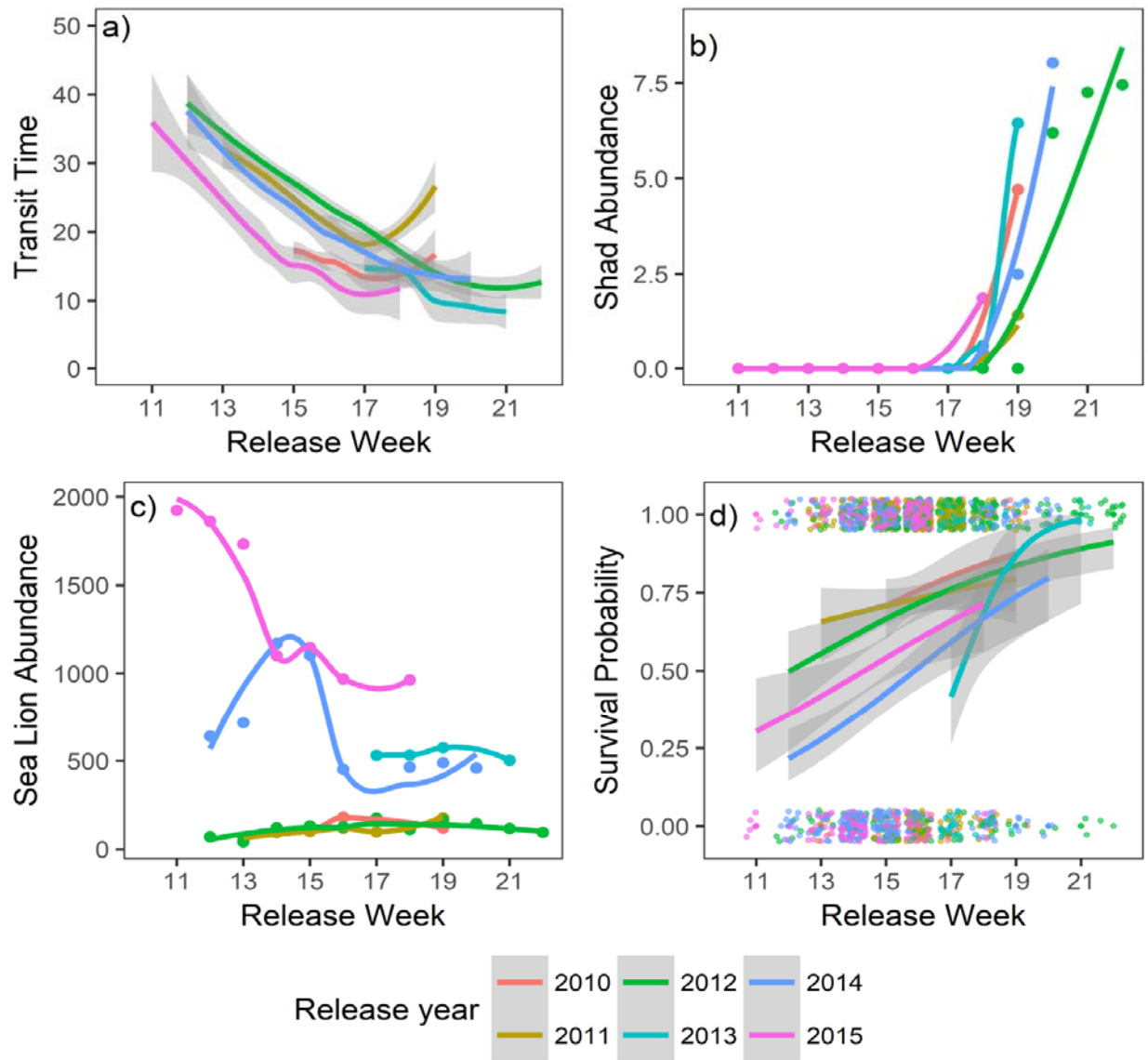
We will first obtain the requisite permits for installation of a trap near CRM 28. Upon obtaining these permits, NOAA Fisheries will work with Wild Fish Conservancy and CR commercial fishermen to install a pound net with a lead of ~80 m. This trap will be constructed in a manner that allows for the traditional net lead to be lifted out of the water to make room for intermittently testing a bubble curtain lead. The bubble curtain will be created by forcing compressed air into a weighted aeration hose deployed on the bottom of the river. The advantage of a bubble curtain over a traditional net lead is that it will not be subject to drag and will thus be easier to deploy, hold in place, and retrieve despite the strong currents typical of the lower CR during spring. The pound net will be actively fished by CR commercial fishers with assistance from the PIs during the first spring following installation (i.e. 2020 or 2021) and commensurate with the spring Chinook salmon return migration (late March- mid-May). The team's goal will be to sample a minimum of 300 adult spring Chinook salmon during 20-25 days of sampling.

Fish collected in the pound net will be identified to stock, measured (FL), and scanned for a PIT tag. If a PIT tag is not present, a 134.2 kHz ISO PIT tag will be injected into the pelvic girdle area. In addition to tagging, a small pelvic fin tissue sample will be taken from each fish for genetic identification to identify fish destined for upriver tributaries. Parental based genetics will be used to identify fish to their subpopulation where possible. All tagged fish will be released back into the river to resume migration. For fish determined by genetic analysis to be returning to tributaries above Bonneville Dam, survival and residence time within the estuary and lower CR will be estimated based on PIT-tag detections within the CR hydrosystem. These survival estimates will be adjusted for harvest effects. Furthermore, post-release survival of PIT-tagged Chinook from the CRM 28 pound net will be compared to the Cathlamet pound net trap (CRM 40) and/or tangle nets operating simultaneously in the river at CRM 28.

### **Linkage to MSRA Section 318 Priority Areas:**

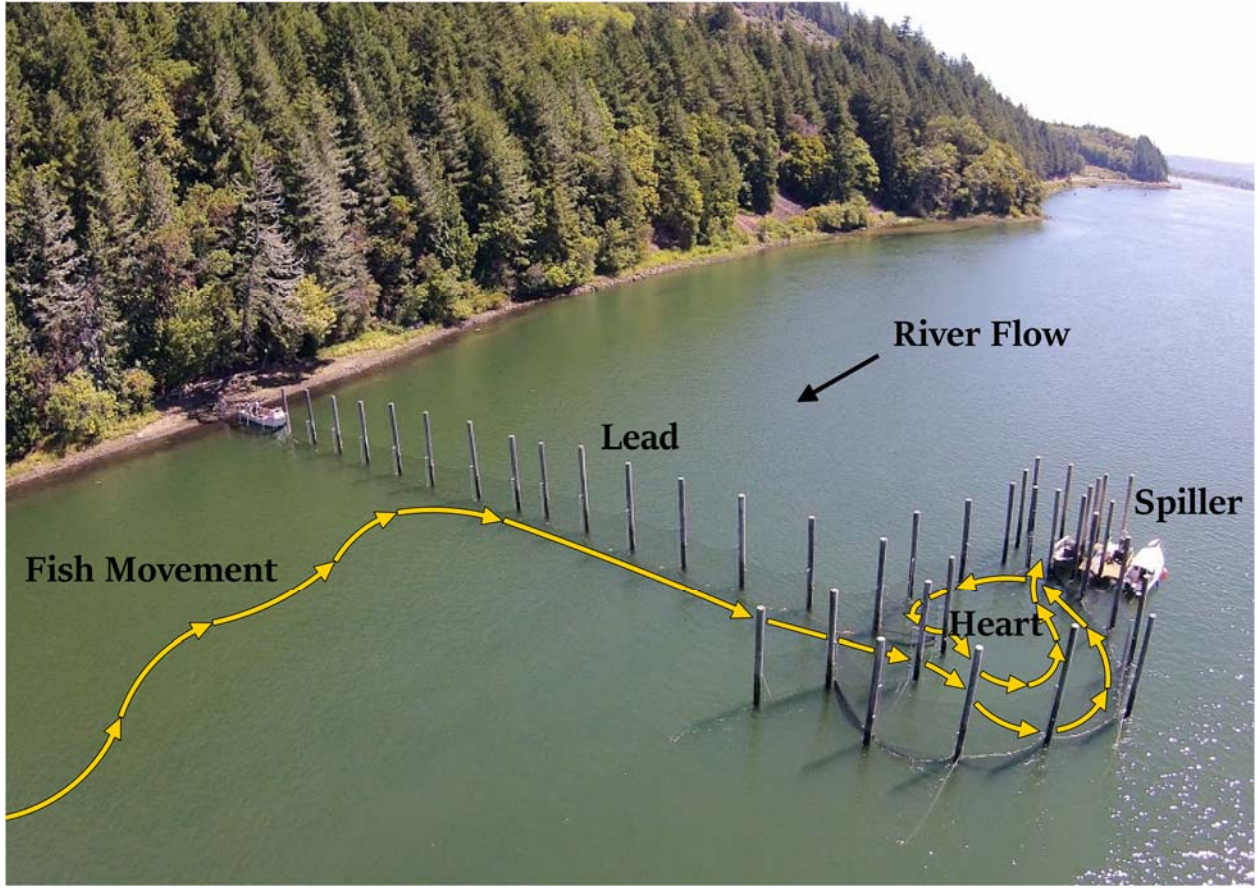
We will work closely with local commercial fishers who will construct and maintain the pound net and conduct our sampling. The data collected by tracking marked fish from the estuary to Bonneville Dam will be used by regional fisheries managers to make in-season adjustments to run size forecasts and to strategically schedule fishing opportunities to minimize impacts to at risk subpopulations (Section 318(c)(i & ii)). Additionally, we plan to document stock-composition and compare post-release survival for study fish obtained from the pound net to that of fish sampled using tangle-net commercial fishing gear (Section 318(c)(ii & iii)). This will improve our understanding of bycatch encounters and bycatch mortality from both pound nets and tangle nets (two alternative gears considered for mark-selective commercial harvest and research purposes throughout the U.S Pacific Northwest and Canada). This study also has the potential to identify habitat areas of concern for returning CR spring Chinook salmon between the estuary and spawning grounds (Section 318(c)(iv)). A focused and effective education and outreach strategy will be employed to disseminate results to management agencies, fisheries scientists, and fishermen. Results will be disseminated through the following means: reports, publication in a peer-reviewed journal, presentations at conferences and events, short videos, live-video streaming, an online blog, and social media platforms.

## Tables and Figures



**Figure 1.** Observed relationship between the release date and (a) transit time of surviving fish from release location to Bonneville, (b) log Shad abundance, (c) California Sea Lion abundance, and (d) Adult salmon survival probability. Lines in a, b, and c were fit with loess smooths, while the line in (d) is the fit of a logistic regression with release week as the only predictor. Grey shading represents 95% confidence intervals.





**Figure 2.** Photograph of proposed fish trap and lead in operation in Cathlamet Channel, Washington.

**Table 1.** Post-release survival point-estimates for adult fall Chinook salmon released from an experimental pound net trap and associated profile likelihood 95% confidence intervals (Tuohy 2018; Tuohy et al. 2019).

<b>River Reach</b>	<b>Survival Point Estimate</b>	<b>Profile Likelihood 95% Confidence Interval</b>
Immediate survival ( $\tau_0$ )	0.9995	0.998 – 1.000
Gear to Bonneville Dam ( $\tau_1$ )	0.970	0.901 – 1.000
Bonneville Dam to The Dalles Dam ( $\tau_2$ )	1.060	0.965 – 1.000
The Dalles Dam to McNary Dam ( $\tau_3$ )	0.968	0.877 – 1.000
Cumulative ( $\tau_0*\tau_1*\tau_2*\tau_3$ )	0.995	0.924 – 1.000

**References:**

- Hillman, T., M. Miller, C. Willard, S. Hopkins, M. Johnson, C. Moran, J. Williams, M. Tonseth, B. Ishida, C. Kamphaus, T. Pearsons, and P. Graf. 2016. Monitoring and evaluation of the Chelan and Grant County PUDs hatchery programs: 2015 Annual Report. Report prepared for the HCP Hatchery Committees, Wenatchee, Washington and the PRCC Hatchery Sub-Committee, Ephrata, Washington.
- Tuohy, A. M. 2018. Post-release survival of Chinook salmon and steelhead trout from an experimental commercial fish trap in the lower Columbia River, WA. Master's Thesis. University of Washington. Seattle, WA.
- Tuohy, A. M., J. R. Skalski, N. J. Gayeski. 2019. Survival of salmonids from an experimental commercial fish trap. Fisheries. Manuscript in review.
- Wargo Rub, A. M., Som, N. A., Henderson, M. J., Sandford, B. P., Van Doornik, D. M., Teel, D. J., Tennis, M., Langness, O. P., van der Leeuw, B. K., and Huff, D. D. 2019. Changes in adult Chinook salmon (*Oncorhynchus tshawytscha*) survival within the lower Columbia River amid increasing pinniped abundance. Canadian Journal of Fisheries and Aquatic Sciences. Manuscript accepted for publication. doi:10.1139/cjfas-2018-0290.

**Budget (2019):** We anticipate it will take up to a year to manufacture and install the fish trap, therefore we have provided a biphasic budget. The first phase (FY2019) primarily includes the costs associated with installing the proposed trap. The second phase (FY2020) primarily includes the costs associated with operating and testing the trap. We realize that funding for phase II cannot be guaranteed at this time through the Cooperative Research Program. Therefore, we are requesting funding in the amount of **\$199,750.00** for implementation of Phase I. We will continue to seek additional sources of funding to cover the operations phase (i.e. Phase II) of this project.

Item:	Amount Requested Phase I	Amount Requested Phase II	Total project cost
Contract Commercial Fishermen (work the trap; \$300/day x 3 people for 25 days plus \$300/d x 1 skiff for 25 days; fabricate and purchase net materials)	\$54,000.00	\$26,000.00	\$80,000.00
Equipment and misc. supplies (PIT-tags, and miscellaneous tagging supplies, air compressor rental, fuel, air hose)	\$5,000.00	\$4,000.00	\$9,000.00
Equipment (pilings, net, misc. materials to construct trap)	\$70,000.00		\$70,000.00
Boat maintenance and fuel	\$1,500.00	\$3,500.00	\$5,000.00
Genetics Analysis (\$50 each for up to 600 fish)		\$30,000.00	\$30,000.00
NMFS Bio. Rub	\$12,000.00	\$12,000.00	\$24,000.00
NMFS Travel to scientific meetings		\$2,500.00	\$2,500.00
Wild Fish Conservancy salary	\$46,500.00	\$16,500.00	\$63,000.00
Wild Fish Conservancy travel for fieldwork	\$10,000.00	\$3,500.00	\$13,500.00
Wild Fish Conservancy travel for meetings	\$750.00	\$750.00	\$1,500.00
<b>Total for study (100% direct charges):</b>	<b>\$199,750</b>	<b>\$98,750</b>	<b>\$298,500</b>

**Leveraged Sources of Funding:** We plan to operate the fish trap in tandem with ongoing tangle net fish sampling and tagging in the vicinity of the trap (proposed at \$125,000 annually) in order to compare survival/catch rate/origin of fish caught between the two methods. We also plan to compare trap operations in the estuary to that in Cathlamet Channel (proposed at \$100,000 annually).

## Qualifications of Investigators

The team is unequivocally qualified to accomplish the objectives of this study and have demonstrated their proficiency through the successful completion of the pilot work that has led to this proposal.

- Principal investigator Dr. Michelle Rub is a research scientist and veterinarian at the NWFSC. She has worked for NOAA Fisheries for 17 years and is an experienced project lead who has conducted complex tagging studies involving both juvenile and adult salmon in the CR.
- Mr. Adrian Tuohy is a biologist and project manager with WFC. He has conducted research and managed various projects with the organization for the last 7 years, including paired mark-recapture studies to estimate post-release survival of salmonids in the CR. He was responsible for engineering, constructing, testing, and evaluating the first commercial pound net in WA State waters in over 80 years.
- Mr. Benjamin Sandford has worked as a data analyst for NOAA Fisheries for 32 years, with a primary focus on assessing juvenile and adult salmonid migration and survival throughout the CR Basin primarily using PIT tags and radio telemetry.
- Mr. Donald Van Doornik is a NOAA Fisheries research fisheries biologist specializing in genetics. He has 30 years of experience studying the population genetics of Pacific Salmon and employing genetics techniques to conduct genetic stock identification and pedigree analyses.

## Curriculum Vitae

Ann Michelle Wargo Rub, Research Fisheries Biologist

### EDUCATION

M.S., Oregon State University, Corvallis, OR (Marine Resource Management, minor: Earth Information Science & Technology), December 2000

D.V.M. Honors, University of Illinois, Urbana-Champaign (Veterinary Medicine), May 1993

B.S. Honors, University of Illinois, Urbana-Champaign (Veterinary Medicine), May 1991

### RECENT PUBLICATIONS

**Wargo Rub, A. M.**, Som, N. A., Henderson, M. J., Sandford, B. P., Van Doornik, D. M., Teel, D. J., Tennis, M., Langness, O. P., van der Leeuw, B. K., and Huff, D. D. 2019. Changes in adult Chinook salmon (*Oncorhynchus tshawytscha*) survival within the lower Columbia River amid increasing pinniped abundance. *Canadian Journal of Fisheries and Aquatic Sciences*. Manuscript accepted for publication. doi:10.1139/cjfas-2018-0290.

**Wargo Rub, A.M.**, Sandford, B. P., Butzerin, J. M., and Cameron, A. S. 2018. A comprehensive approach to evaluation of micro-acoustic transmitter tag effects on surgically implanted juvenile Chinook salmon (*Oncorhynchus tshawytscha*). Manuscript in review.

Sorel, M.H., **Wargo Rub, A. M.**, and Zabel, R. W. June 2018. Effect of population-specific migration timing on salmon survival through an estuary with increasing pinniped abundance. Manuscript submitted for publication.

**Wargo Rub, A. M.**, Jepsen, N., Liedtke, T.L., Moser, M. S., and Weber III, E.P.S. 2014. Surgical tagging and telemetry methods in fisheries research: promoting veterinary and research collaboration, *American Journal of Veterinary Research*; 75(4):402-416.

Cunningham, K. A., Hayes, S. A., **Wargo Rub, A. M.**, and Reichmuth, C. 2014. High-frequency hearing in seals and sea lions with implications for detection of ultrasonic coded transmitters. *Journal of the Acoustical Society of America*; 135(4):1978-1985.

Liedtke, T. L., and **Wargo Rub, A. M.** 2012. Techniques for telemetry transmitter attachment and evaluation of transmitter effects on fish performance. Pages 45-87 *in* *Telemetry Techniques: A User Guide for Fisheries Research*, Noah S. Adams, John W. Beeman, and John H. Eiler, editors, American Fisheries Society, Bethesda, Maryland, September 2012, 518 pp.

**Wargo-Rub, A. M.**, L. G. Gilbreath, R. L. McComas, B. P. Sandford, D. J. Teel, and J. W. Ferguson. 2012. Estimated survival of adult spring/summer Chinook salmon from the mouth of the Columbia River to Bonneville Dam, 2011. Report of the National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, WA, 98112, 24 p.

**Wargo-Rub, A. M.**, L. G. Gilbreath, R. L. McComas, B. P. Sandford, D. J. Teel, and J. W. Ferguson. 2012. Estimated survival of adult spring/summer Chinook salmon from the mouth of the Columbia River to Bonneville Dam, 2010. Report of the National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, WA, 98112, 19 p.

**Benjamin P. Sandford**, Mathematical Statistician

**EDUCATION**

B.S. Mathematics, Central Washington University, Ellensburg, WA, 1986

M.S. Statistics, Oregon State University, Corvallis, OR 1988

**RECENT PUBLICATIONS**

**Sandford, B.P.**, R. W. Zabel, **L. G. Gilbreath** and S G. Smith. 2012. Exploring Latent Mortality of Juvenile Salmonids Related to Migration through the Columbia River Hydropower System. *Transactions of the American Fisheries Society*, 141:2, 343-352

Gosselin, J. L., R. W. Zabel, J. J. Anderson, J. R. Faulkner, A. M. Baptista, and **B. P. Sandford**. 2018. Conservation planning for freshwater-marine carryover effects on Chinook salmon survival. *Ecology and Evolution* 18(1):319-332.

Sebring, S. H., M. C. Carper, R. D. Ledgerwood, **B. P. Sandford**, G. M. Matthews, A. F. Evans. 2013. Relative vulnerability of PIT-tagged subyearling fall Chinook salmon to predation by Caspian terns and double-crested cormorants in the Columbia River estuary. *Transactions of the American Fisheries Society*, 142(5):1321-1334.

Scheuerell, M. D., R. W. Zabel, and **B. P. Sandford**. 2009. Relating juvenile migration timing and survival to adulthood in two species of threatened Pacific salmon (*Oncorhynchus* spp.). *Journal of Applied Ecology*, 46:983-990.

Achord, S., R. W. Zabel, and **B. P. Sandford**. 2007. Migration timing, growth, and estimated parr-to-smolt survival rates of wild Snake River spring/summer Chinook salmon from Idaho to the lower Snake River. *Transactions of the American Fisheries Society*, 136:142-154.

**Sandford, B. P.**, and S. G. Smith. 2002. Estimation of smolt-to-adult return percentages for Snake River Basin anadromous salmonids, 1990-1997. *Journal of Agricultural, Biological, and Environmental Statistics*. 7(2):243-263.

**Donald M. Van Doornik, Research Fisheries Biologist**

**EDUCATION:**

B. S. Biology, Seattle Pacific University, Seattle, WA, 1987

**PROFESSIONAL EXPERIENCE**

**1990-Present Research Fishery Biologist, NOAA Fisheries**

**RECENT PEER-REVIEWED PUBLICATIONS**

**Van Doornik, D. M.**, M. A. Hess, M. A. Johnson, D. J. Teel, T. A. Friesen, and J. M. Myers.

2015. Run timing and artificial propagation efforts influence the genetic population structure of Willamette River steelhead. *Transactions of the American Fisheries Society* 144:150-162.

Teel, D. J., B. J. Burke, D. K. Kuligowski, C. A. Morgan, and **D. M. Van Doornik**. 2015.

Genetic identification of Chinook Salmon: stock-specific distributions of juveniles along the Washington and Oregon coast. *Marine and Coastal Fisheries* 7:274-300.

Weitkamp, L. A., D. J. Teel, M. Liermann, S. A. Hinton, **D. M. Van Doornik**, and P. J. Bentley.

2015. Stock-specific size and timing at ocean entry for Columbia River juvenile salmon and Steelhead: implications for early ocean growth. *Marine and Coastal Fisheries* 7:370-392.

**Van Doornik, D. M.** and B. A. Berejikian. 2014. Landscape factors affect the genetic population structure of *Oncorhynchus mykiss* populations in Hood Canal, Washington. *Environmental Biology of Fishes*. DOI: 10.1007/s10641-014-0301-4.

**Van Doornik, D. M.**, B. A. Berejikian, and L. A. Campbell. 2013. Gene flow between sympatric

life history forms of *Oncorhynchus mykiss* located above and below migratory barriers.

PLOS ONE 8(11): e79931. doi:10.1371/journal.pone.0079931.

**Van Doornik, D. M.**, D. L. Eddy, R. S. Waples, S. J. Boe, T. L. Hoffnagle, E. A. Berntson, and

P. Moran. 2013. Genetic monitoring of threatened Chinook salmon populations: estimating introgression of nonnative hatchery stocks and temporal genetic changes. *North American Journal of Fisheries Management* 33:693-706.

**Van Doornik, D. M.**, R. S. Waples, M. C. Baird, P. Moran, E. A. Berntson. 2011. Genetic

monitoring reveals genetic stability within and among threatened Chinook salmon populations in the Salmon River, Idaho. *North American Journal of Fisheries Management* 31:96-105.

Hanson, M.B., R.W. Baird, J.K.B. Ford, J. Hempelmann-Halos, **D. Van Doornik**, J.R. Candy,

C.K. Emmons, G.S. Schorr, B. Gisborne, K.L. Ayres, S.K. Wasser, K.C. Balcomb, K.

Balcomb-Bartok, J.G. Sneva, and M.J. Ford. 2010. Species and stock identification of prey selected by endangered "southern resident" killer whales in their summer range. *Endangered Species Research* 11:69-82.



**Adrian M. Tuohy**, Biologist and Project Manager

**EDUCATION**

M.S. Aquatic and Fishery Sciences, University of Washington, Seattle, WA 2018

B.S. Aquatic and Fishery Sciences, University of Washington, Seattle, WA 2014

B.A. Natural Resource Economics, Whitman College, Walla Walla, WA, 2011

**RECENT PUBLICATIONS**

Tuohy, A. M., J. R. Skalski, N. J. Gayeski. 2019. Survival of salmonids from an experimental commercial fish trap. Fisheries. Manuscript in review.

Tuohy, A. M., and L. Harlan. 2019. Lower Columbia River fall trap test fishery, 2018. Report to Wild Salmon Center. Wild Fish Conservancy. Duvall, WA. Report in preparation.

Tuohy, A. M., and M. M. Wait. 2019. Hood Canal juvenile chum salmon nearshore habitat use assessment, 2018. Report to the United States Navy. Wild Fish Conservancy. Duvall, WA. Report in preparation.

Tuohy, A. M. 2018. Post-release survival of Chinook salmon and steelhead trout from an experimental commercial fish trap in the lower Columbia River, WA. Master's Thesis. University of Washington. Seattle, WA.

Tuohy, A. M., and N. J. Gayeski. 2018. Evaluation of pound nets as stock-selective fishing tools in the lower Columbia River Sub-basin. Report to the National Oceanic and Atmospheric Administration National Bycatch Reduction Engineering Program. Wild Fish Conservancy. Duvall, WA.

Tuohy, A. M. 2016. Evaluation of pound nets as stock-selective fishing tools. Report to the Washington Coastal Restoration Initiative. Wild Fish Conservancy. Duvall, WA.

Fletcher, J., Buehrens, T., Tuohy, A. M, and M. M. Wait. 2014. Hood Canal nearshore juvenile fish use assessment. Pilot year results. Report to the Hood Canal Coordinating Council Technical Advisory Group. Wild Fish Conservancy. Duvall, WA.

Tuohy, A. M. 2014. King Conservation District report. Cherry Valley water quality and post-restoration monitoring analysis. Report to the King County Conservation District. Wild Fish Conservancy. Duvall, WA.