

Memorandum

To: Wells, Rocky Reach, and Rock Island HCP
Coordinating Committees

Date: August 28, 2019

From: John Ferguson, HCP Coordinating Committees Chairman

cc: Kristi Geris

Re: Final Minutes of the July 23, 2019 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plan (HCP) Coordinating Committees met at the Grant PUD office in Wenatchee, Washington, on Tuesday, July 23, 2019, from 10:00 a.m. to 1:45 p.m. Attendees are listed in Attachment A to these meeting minutes.

Action Item Summary

- HCP Coordinating Committees representatives will prepare technical questions and considerations concerning the feasibility of conducting subyearling Chinook salmon studies with the current information and technology available to date, for discussion with Drs. Rebecca Buchanan and John Skalski (University of Washington [UW], Columbia Basin Research) during the HCP Coordinating Committees meeting on August 27, 2019 (Item I-A).
- Lance Keller will provide updates about the repair of Rocky Reach Dam Turbine Unit C1 and Turbine Unit C3 to the HCP Coordinating Committees as soon as additional information becomes available (Item II-C).
- Douglas PUD will review available passive integrated transponder (PIT)-tag detection data from April 9 to April 30, 2019, covering the span of Wells Dam bypass non-compliance events for Turbine Units 1 to 4 and Bypass Bays 2 and 4, to identify possible impacts to fish passage and survival through the Wells Project (Item II-C).
- Kirk Truscott will submit Colville Confederated Tribes (CCT) comments on the draft *Wells Project Subyearling Chinook Life-History Study 2011-2013 Draft Final Report* to Tom Kahler by Friday, July 26, 2019 (Item V-B).
- The HCP Coordinating Committees meeting on August 27, 2019, will be held **in-person** at the Grant PUD Wenatchee office in Wenatchee, Washington (Item VII-A).

Decision Summary

- There were no HCP Decision Items approved during today's meeting.

Agreements

- There were no HCP Agreements discussed during today's meeting.

Review Items

- The draft *Wells Project Subyearling Chinook Life-History Study 2011-2013 Draft Final Report* was distributed to the HCP Coordinating Committees by Kristi Geris on May 24, 2019; Douglas PUD will request approval of the report during the HCP Coordinating Committees meeting on August 27, 2019 (Item V-B).

Finalized Documents

- There are no documents that have been recently finalized.

I. Joint HCP Coordinating Committees and PRCC

A. *Considerations in the Design and Analysis of Subyearling Chinook Salmon Survival Compliance Studies – 2019* (Rebecca Buchanan)

The presentation titled, *Considerations in the Design and Analysis of Subyearling Chinook Salmon Survival Compliance Studies – 2019* (Attachment B) was distributed to the HCP Coordinating Committees by Kristi Geris on July 20, 2019.

Slides 1 to 2

Dr. Rebecca Buchanan said there have been no significant developments in statistical analyses for estimating reach survival of subyearling Chinook salmon; however, there have been some new developments for estimating at-dam passage survival. Buchanan said this presentation will include a refresher on the requirements and assumptions for a paired release-recapture design, a review of studies, and study recommendations.

Slides 3 to 4

Buchanan said project survival can be estimated using a paired release-recapture design, based on the Cormack-Jolly-Seber (CJS) model, which requires control and treatment releases and a minimum of two downstream detection sites. She said detection arrays need to be placed at the upstream end of one pool and at the downstream end of the next pool. She said arrays in the tailrace of a dam need to be far enough downstream to avoid detecting dead fish in the immediate tailrace (which results in a positive bias) and far enough downstream that fish in both releases have completed expressed short-term handling effects, but not too far that fish in Release 1 (R_1) are exhibiting tagger effects or tag burden effects (negative bias). She said an estimate (S_1) of the probability of survival from R_1 to the first detection site (dashed line labeled P_1 and P_2)¹ and an estimate (S_2) of the

¹ Where P_1 is the probability of tag detection at the first detection site for a fish from R_1 , conditional on the tag being present at the detection site (i.e., "detection probability"); and P_2 is the probability of tag detection at the first detection site for a fish from R_2 , conditional on the tag being present at the detection site.

probability of survival from Release 2 (R_2) to the first detection site are calculated. She said the last reach parameter estimates the joint probability of: 1) surviving from the first detection site to the second detection site; and 2) being detected on the second detection site, conditional on having survived to the first detection site, for fish from R_1 (λ_1) and R_2 (λ_2). She said the ratio of the estimated survival for one release (\hat{S}_1) to the other release (\hat{S}_2) equals the estimated project survival (\hat{S}_{Project}). She said if the detection arrays are placed as described, the short-term handling effects for \hat{S}_1 and \hat{S}_2 should be the same and will cancel out.

John Ferguson asked about additional rules or recommendations for placement of the first and second detection arrays. Buchanan said for each respective tailrace location, one must consider how far dead fish are drifting downstream. She said studies conducted in mainstem rivers place arrays anywhere from 25 to 50 river kilometers (rkm) downstream of the dam. She said, however, the arrays cannot be located too far downstream where fish from R_1 are exhibiting tag burden effects. She said additionally, arrays in the tailrace should be placed far enough downstream where there is complete mixing of fish from the different releases. She said two downstream arrays are the minimum design requirements, but more than two are needed to test the assumptions. She said 8 to 10 arrays are ideal.

Kirk Truscott said it seems placing arrays farther downstream would result in less issues with dead fish and short-term handling effects and tagging more fish might address issues with overall lower survival to downstream detection sites. He said more PIT tags might not be an issue; however, the cost of additional acoustic tags might be an issue. Buchanan agreed tag and receiver costs can be a factor in these studies. She noted that PIT-tag studies do not estimate project survival because those studies examine juvenile bypass system to juvenile bypass system and not tailrace to tailrace. Truscott said PIT-tag studies still examine a ratio. Buchanan agreed but explained that the detection locations for PIT-tag studies (juvenile bypass system) do not exactly align with the project and will always include some survival from the previous project. She said in this presentation, she will always be referring to acoustic tags. *(Note: Buchanan later indicated that upon further consideration, she agrees with Truscott that the ratio from PIT tags can be used to estimate project survival, provided that the model assumptions are met.)*

Slide 5

Buchanan said this is the list of assumptions common to all paired-release model studies. She said one cannot adjust for an assumption at the time of data analysis; therefore, it is important to think about these assumptions when designing a study.

Slides 6 to 7

Buchanan said each assumption includes considerations, as well as actions to take to prevent from violating the assumption or to determine how much in violation one is with the assumption. She reviewed considerations and actions for *Assumption #1: Test fish representative of population of inference*. She noted that good documentation of fish selection is key to defend against criticisms, and she reviewed histograms that compare fish lengths of acoustic-tagged subyearling study fish with run-of-the-river (ROR) fish.

Truscott asked if fish are not the healthiest but are representative of the run, is it really representative to remove injured fish from the study? He asked further, how does one not bias the study results unless the same quality of fish are included in each release group? Lance Keller agreed and said it can also be difficult to design a study to make sure the results are due to project effects and not a function of hatchery effects. Truscott said because the evaluation is based on a ratio, it seems this bias can be removed so long as there is equality between the release groups. Buchanan agreed if poor-quality fish are represented in both release groups this will cancel out. She said if a hatchery population is what one wants to make inference to, these fish need to be included in the sample and project survival will be estimated for this population. *(Note: Buchanan later indicated, upon further consideration, that the effects of using poor-quality fish will cancel out only if those effects are expressed equally between the upstream and downstream release groups. If the effects are expressed more in the upstream release group [e.g., stronger tag burden effects among poor quality fish], then the estimate of project passage survival will be negatively biased [for higher quality fish] even if both releases have the same proportion of poor-quality fish [i.e., representative sampling]. Both releases should have the same distribution of fish condition.)*

Slides 8 to 9

Buchanan reviewed considerations and actions for *Assumption #2: Test conditions representative of conditions of interest*. She said, for example, an unusually high-water year or drought year would not be representative of normal conditions and would not be ideal for a study.

Truscott said the HCPs stipulate conducting a validation study every 10 years, which limits the options to 1 year. Tom Kahler added, however, that validation studies consider a multiyear average, and Keller said a flow duration curve is also applied to each individual study included in a 3-year survival average.

Slide 10

Buchanan reviewed considerations and actions for *Assumption #3: Release sizes known exactly*. She emphasized the importance of scanning tags before release and also scanning recovered shed tags.

She said if fish are assigned to the wrong release group this will negatively impact the survival estimate.

Slide 11

Buchanan reviewed considerations and actions for *Assumption #4: Detection events correctly coded*. She said to differentiate true detections from false positive detections arising from ambient noise or tag collisions, one needs to implement a signal processing program. She said UW has a software program for processing data based upon Juvenile Salmon Acoustic Telemetry System (JSATS) and other tags. She said the program analyzes the number of tag pings and intervals. She said the program is complicated to implement.

Truscott asked how studies differentiate between alive and dead fish. Buchanan said there are filters for data implanted by the researcher; for example, those based on assumed behavioral differences or a statistical process based on movement behavior. Truscott asked if there is a difference in the tag signal. Buchanan said not generally; however, tag manufacturers have developed predation tags that ping differently when the tag comes in contact with stomach acid.

Slide 12

Buchanan reviewed considerations and actions for *Assumption #5: Fate of each fish independent*. She noted that tag collision is fairly uncommon with JSATS tags. She also recommended not positioning a receiver array directly downstream of a release location.

Slide 13

Buchanan reviewed considerations and actions for *Assumption #6: Prior detection history has no effect on subsequent survival and detection*. She said this consideration came out of bird banding studies where one must re-handle a bird to read the band, which might affect subsequent survival. She said the thought was the same with fish although less of an issue for acoustic tags, which do not require re-handling to detect fish. She said one can test for violations of this assumption using tests developed by Burnham et al. (1987)²; however, because acoustic tags have high detection probabilities these tests are not useful in this case. The Burnham tests are necessary for PIT-tag studies. She said to avoid violations of this assumption, researchers should think about the placement of the receivers. She said for example, if two detection sites are located upstream and downstream from each other and do not span the entire migratory channel, fish detected at the upstream site will have a different detection probability compared to the downstream site. She said this type of scenario results in biased detection probability (generally negative bias) and biased

² Burnham, K. P., D. R. Anderson, G. C. White, C. Brownie, and K. H. Pollack (1987). Design and analysis methods for fish survival experiments based on release-recapture. American Fisheries Society Monograph 5.

survival (positive bias). She said nothing can be done to correct this in the statistical analysis so this needs to be considered and addressed when designing the study.

Slides 14 to 15

Buchanan reviewed considerations and actions for *Assumption #7: All fish have same survival and detection probabilities*. She said the CJS model is generally robust to violations of this assumption. The robustness of the model to failures of this assumption can be tested by conducting a simulation study. She said in the example on slide 15, the study used a single release with two detection sites and survival was estimated through one reach (S_1). She said the single release was broken into two groups of equal size (Group 1 and Group 2 each with 10,000 fish), and the study simulated datasets under different scenarios to determine similarities or differences between groups. She said then an estimate of survival (or expected survival) [$E(\hat{S})$] and average of all datasets (or actual survival) (\hat{S}) were calculated. She said in each case, the expected survival and actual survival were really close. She noted the low detection probabilities (p_1) ranging from 0.10 to 0.20, which she said is applicable to PIT-tag studies.

Ferguson asked what the lambda (λ) represents, and Buchanan said this represents the joint probability of: 1) surviving from the first detection site to the second detection site; and 2) being detected on the second detection site, conditional on having survived to the first detection site.

Peter Graf (Grant PUD) asked if there is a short-term receiver outage does this invalidate the data? Buchanan said this depends on how long the outage is relative to the duration of the detection period. She said, for example, a 2-hour outage over a 2-week detection period is not a big deal; however, a 2-hour outage over a 24-hour detection period might be more significant. She said one consideration is the λ parameter cannot be too small or this can lead to bias in the survival estimate.

Slide 16

Buchanan reviewed considerations and actions for *Assumption #8: Releases share same survival processes in reaches in common*. She reviewed the paired release-recapture model for estimating project passage survival. She said the first release (R_1) provides an estimate of the joint probability (S_1) of surviving through the project and through the tailrace to the first detection site and must be adjusted for survival from the tailrace to the detection site in order to give project passage survival. She said the second release (R_2) provides an estimate of the probability of survival from the tailrace to the first detection site (S_2). She said if fish from the two releases have the same probability of survival from the tailrace to the first detection site, then the ratio of the survival probabilities estimated from the two releases (S_1/S_2) is project passage survival. She said if the two releases do not have the same probability of survival between the tailrace and the detection site, then the ratio will be biased for project passage survival. She said one possible reason fish from the two releases might

not have common survival in the common reach is if the fish are experiencing different environmental conditions when the fish are in the reach. She said to avoid this, the release timings should be staggered so that the downstream fish are released during the time when fish from the upstream release are expected to be passing through that reach.

Truscott said, for example, a study is targeting 80% of all migrants and those migrants are experiencing different flow regimes over the migration period, or the majority of fish pass in the first 30% of the migration period. He asked what exactly should the releases mimic? Buchanan said with the ratio this does sometimes make a difference. She suggested calculating a season-wide estimate that pools the releases across the season or take a weighted average of release-specific estimates. She said both should have the same results in expectation. Truscott said it seems if the bulk of fish pass during a specific period this would result in a different estimate compared to taking an average. Keller said the important thing is to align the release and migration timing. He said, for example, sockeye salmon below Wells Dam take 18 hours on average to reach Rocky Reach Dam and so long as the releases in the tailrace are at the same time across the entire study these factors should tease out.

Graf said these survival studies want the final results to be representative of the run at large, and he asked if this means the releases need to be weighted more? Buchanan said this is a good question and she is unsure, but she believes U.S. Army Corps of Engineers (USACE) studies pooled data across releases through time (R_1 and R_2 were pooled across the season). She said for PIT-tag survival studies, data were pooled on a daily basis.

Kahler said Douglas PUD has reported treatment and control releases within each replicate separately as a single release. He said survival was reported for: 1) pooled Okanogan and Methow releases (treatment); and 2) tailrace releases, for each replicate. He said survival for each pooled release treatment was divided by the survival for the control release for each replicate, and then the overall average survival was weighted.

Truscott asked how to calculate an estimate based on high survival when there is a low abundance of ROR fish. Buchanan replied: by taking a representative sample of the run through time, weighted more to the times when most fish are migrating. Keely Murdoch said she recalls having pre-planned releases fixed through time. Kahler agreed and said because it is unknown how the migration will turn out. Truscott asked then, if this would be a valid study? Murdoch also asked if the migration is normally distributed and releases are equal, but at the peak of migration there is higher or lower survival, will this bias the results? Kahler said for every release group there was an average travel time with travel-time distributions that overlapped with the distributions from other release groups, essentially a mass of fish from all releases that combined at one point. He said it would not be possible to implement an in-season tailoring of the releases to match the run, because one cannot

tell where you are in the distribution at any point in time until the run is over. Keller suggested monitoring survival on a weekly basis and said it is not uncommon to see a decrease in survival on the front end and back end of the migration. He said from a predator saturation perspective, a lot of ROR fish are present in the middle of a juvenile outmigration compared to the beginning and the end. Buchanan suggested comparing study dates to run timing (e.g., slide 9). She said this would be a post-hoc analysis, but it would be based on historical averages. She said the curve on slide 9 is fairly well-representative and if the study is conducted too early or too late the sample size would have undue weight.

Slide 17

Buchanan continued discussing *Assumption #8: Releases share same survival processes in reaches in common*. She said when study fish are released in the river channel there is concern about releasing the fish in an area of high or low mortality, which can result in a positive or negative bias to the estimate. She said this can be assessed by comparing survival to a downstream site for each release across the river channel. She said in the example on slide 17, there is no strong evidence of a mortality hotspot.

Slide 18

Buchanan continued discussing *Assumption #8: Releases share same survival processes in reaches in common*. She said these plots examine the distribution of arrival timing. She said the hope here is for the peaks of the curves to align (for the modes to align).

Slide 19

Buchanan reviewed considerations and actions for *Assumption #9: Fish either migrate downriver or die*. She said if a fish does not appear at the end of a reach the model cannot distinguish between whether the fish died or did not migrate. She said if residualization occurs (i.e., migration delay past the end of the study), the estimate of project survival will be biased. She said actions to address this concern include using only active migrants and obtaining residualization-corrected estimates. She said the latter can be done through mobile surveys or an augmented acoustic-tag study design (extra receivers). She noted this cannot be done with PIT-tag studies because mobile tracking cannot be used with residualized PIT-tagged fish. She said even with good detection rates the problem is in interpreting the data.

Slide 20

Buchanan reviewed considerations and actions for *Assumption #10: No tag failure*. She emphasized the importance of testing tag life concurrent with the study. She said some tags lose battery life on the shelf or the tag can accidentally be turned on during shipping. She said in one study, by the time tagging came along, these tags had only 4 days of battery life instead of 24 or more days. She said

the only way to salvage a year of study is to conduct a tag-life study concurrent with the tagging and release of test fish and tell the manufacturer what is wrong so the vendor can fix the problem and send new tags.

Slide 21

Buchanan continued discussing *Assumption #10: No tag failure*. She said on the left graph, the black markers show the time of tag failure, which fit the tag-life curve really well. She said the average tag-life is 24 days. She said on the right, a tag-life curve was compared to tag detection times, particularly to the arrival distribution of tags at detection sites. She said each curve represents the cumulative arrival timing of tags at different detection sites. She said for a study you want the arrival to occur before the tag expires. She said if a lot of tags arrive dead (23 days or more in this case) this cannot be corrected, but a smaller amount can be corrected.

Graf asked how to determine whether a fish arrived past 24 days. Buchanan said if the fish arrives on Day 28, there is little likelihood for detection because the tag is probably dead. She said, however, if a fish arrives on Day 23, there is a 50% chance of detecting the fish based on available tags. She said if a lot of fish are arriving late, this indicates a problem. She said a tag-life adjustment can be applied if fish are arriving at the shoulder. Graf asked if the curve is assuming all tags are detected. Buchanan said the curve assumes the observed tags are representative of travel times.

Graf asked if the tag-life adjustment applies with a unimodal distribution of arrival times or does this only work with a uniform distribution of migration time. Buchanan said the tag-life correction factor is based on the average travel time for fish in a release group. She said if the average time is not a good representation, then the tag-life correction factor is not good either. She said a correction factor can be applied to a bimodal distribution, but it would have a large standard error.

Slide 22

Buchanan continued discussing *Assumption #10: No tag failure*. She reviewed each bullet on slide 22. Ferguson asked about tag lots. Buchanan explained that the tag lot indicates what day or group a tag is made on. She said some vendors do not send this information and then tags are assumed to be from one lot. She said different lots can have different ping rates or settings, which require a different tag-life study. Sample size for the tag-life study should be from 50 to 100 tags per tag lot.

Slide 23

Buchanan reviewed considerations and actions for *Assumption #11: No handling or tag effects that could distort survival studies*. She said tag-burden effects can get worse over time. She said Dr. John Skalski calls this the "backpack effect," where over time, the burden of the tag on the test

fish gets heavier (i.e., the fish gets fatigued by the burden over time). Buchanan said the best solution is to avoid tagger effects altogether by using well-trained surgeons and consistent tagging teams.

Slide 24

Buchanan continued discussing *Assumption #11: No handling or tag effects that could distort survival studies*. She said this graph shows estimates of common survival; specifically, it shows survival from a common starting point and moving downstream. She said in this example, the cumulative survival decreases as fish move downstream and the problem here is one release is decreasing more than the other, which is an indication of tag burden effect or tagger effect. She suggested creating this type of plot for each tagger, and if the upstream release for a tagger shows a steeper decline in cumulative survival than the composite upstream release, then the fish tagged by that tagger should be removed from the study, otherwise it will be bias the study results.

Slide 25

Buchanan continued discussing *Assumption #11: No handling or tag effects that could distort survival studies*. She said in this case, Tagger A always tags 20% of fish, Tagger B always tags 40%, and Tagger C always tags 30%. She noted these amounts are not the same, but they are consistent with the same tagger team (i.e., stable tagger team throughout entire season).

Slide 26

Buchanan continued discussing *Assumption #11: No handling or tag effects that could distort survival studies*. She said this graph demonstrates a tag burden effect where the cumulative survival is plotted for different releases. She noted the difference in the slopes of the curves moving downstream. She said on the right, the cumulative survival for the black line is decreasing more than the others, which indicates tag burden effects, where the black line represents the farthest upstream release. This means that fish from the farthest release upstream should not be used to estimate survival far downstream.

Slides 27 to 30

Buchanan said the next few slides consider estimating residualization in subyearling studies using single release and paired-release models. She said there are three possible fates for fish: 1) migrate and survive; 2) stop migrating and survive; or 3) die. She said the probability of migrating and surviving can be estimated using a single release CJS model [$\phi = \text{Prob}(\text{migrating \& surviving})$]. She said the estimate from the CJS model is a product of the combination of migrating and surviving ($= \Psi \cdot S_{\text{MIG}}$). She said the probability of residualizing and surviving [$\delta = \text{Prob}(\text{residualizing \& surviving})$] is $(1 - \Psi) \cdot S_{\text{RES}}$. She said, however, one cannot separate the

probability of residualizing (Ψ) from the probability of surviving (S_{MIG} for migraters and for S_{RES} residualizers).

Ferguson asked if there have been studies to estimate residualization. Buchanan said there have been studies to estimate delta (δ), but not of actual residualizing. She said UW conducted a study in the Lower Monumental Dam pool and Grant PUD also conducted a study to estimate delta (δ). Graf said the study conducted by Grant PUD used arrays (rather than mobile tracking) and did not work well. Buchanan said the Lower Monumental Dam study also used fixed site detections in the reservoir, but the data structure did not allow separating the probability of residualizing from the probability of surviving. She said the study was able to get an overall estimate of phi (ϕ) and delta (δ) and total survival ($S = \phi + \delta$). She noted that both δ and S are time dependent.

Buchanan said one can attempt to estimate the joint probability of residualizing and surviving (δ) by either conducting at least two mobile surveys or using detections from a dense array of acoustic receivers to obtain an estimate of the abundance of tagged fish (\hat{N}) still in a study reach and alive at the end of the migration period or study. She said the study design would need to have rules to differentiate between alive and dead fish or have nodes.

Slides 31 to 35

Buchanan said a paired-release CJS model isolates estimated project survival in the absence of residualization by calculating the ratio of survival estimates from two groups. She said if there is residualization, the model estimates the joint probability of migrating and surviving through the project ($\Psi_1 S_{\text{MIG},1}$) similar to a single release model, but she also pointed out that only a paired-release model accounts for short-term handling effects and mortality between the tailrace and the detection site. She said if test fish residualize, this results in a negative bias in the project survival estimator. She said this model also assumes both releases have the same probability of migrating through the second reach, which may or may not be the case. She said ultimately, the model assumptions may not be realistic. She said taking the ratio of total survival from the two releases does not help because nothing cancels out in the ratio of total survival estimates resulting in no useful interpretation. One option is to use only active migrants ($\Psi = 1$).

Truscott said, as he has stated before, he does not agree with the HCPs' stipulation to only study active migrants. He said to only study active migrants is not an accurate representation of project-level effects. He asked, for example, if fish are collected at Rocky Reach Dam and randomly assigned to R_1 or R_2 , will the probability of residualizing be different or equal if this is calculated by comparing ratios? Buchanan said the assumption is the probability of residualizing will be the same between two releases and if this is the case, the project survival estimate will still be of the joint probability of migrating and surviving. She said regarding compliance standards, if the standards are not met there

is no way to determine if this is because the fish died or residualized. Truscott said if there is equal probability of residualizing, the assumption is the larger release group will have a higher probability of residualizing. Buchanan said not necessarily. Graf said the probability of residualizing will be the same in the two releases and will cancel out of the ratio. He said this is the same with sick fish. He said there are still the same proportion of sick fish and this does not cancel out the effect of sick fish, but it cancels out the bias. Truscott said if the overall survival is 50% and there is a 5% difference between R_1 and R_2 , the PUD mitigation would be 5%. Graf said it is not the difference, it is a ratio. He said the 50% value includes the fish that residualize. Murdoch said if the study uses ROR fish that residualize this is part of the effect. She said if active migrants residualize the assumption is these fish would have residualized anyway. She said if residualizing is natural to this group of fish this is the proportion the study is trying to represent. Buchanan agreed but said this is not an estimate of pure survival; rather, it is the product of two things, migrating and surviving. She said the paired release is not going to include the survival of fish that residualized and cannot only estimate survival; therefore, if the survival standard is not met, the study cannot determine if this is because the fish died or residualized. She said the issue is how to apply the analyses to the standard.

Keller said fish from R_1 and R_2 have two different distances in order to migrate through the study area based on their release location. He said fish from R_1 have more time to manifest residualization, and he asked if the assumption is saying fish from R_1 and R_2 have equal probability of residualizing? Buchanan clarified the assumption only applies to the common reach (i.e., between the tailrace and the first detection site). Keller said, so residualization before a common reach is a bias. Buchanan said the bias for project survival is relative to survival for active migrants. If the two releases have the same probability of residualizing and surviving in the common reach, then the project passage estimate will be biased for true migrant survival in the project but will be unbiased for the joint probability of migrating and surviving through the project. She said one would need to conduct a mobile survey to get at residualizing and she reminded the HCP Coordinating Committees that there need to be rules during these surveys to differentiate live versus dead fish. Kahler asked how to distinguish between foraging and a predator? Buchanan said if the fish is really just foraging this may be a problem. She suggested considering how long the tag has been in one location. She said if a tag is stationary one can assume the fish is dead. She said even if there is evidence of residualizing, these fish cannot be used to get an adjusted estimate of project survival. She said the analysis methods account for non-detection under the modeling assumptions, but low detection probabilities introduce imprecision in the estimate and can introduce bias if detection probabilities are low enough. Graf agreed and added that if ψ (Ψ) does not equal one this will negatively bias the survival estimate when the study is under the assumption that two groups have the same probability of migrating in a shared region. He said if there are different probabilities of migrating there will be bias in one or another direction depending on the ψ (Ψ) from one group.

Slides 36 to 38

Buchanan said the next few slides review USACE subyearling Chinook salmon studies. She reviewed the survival requirements in the Federal Columbia River Power System (FCRPS), noting that FCRPS survival standards are different from those in the HCPs in that FCRPS standards refer to a different metric (dam passage survival), have different standards for subyearlings compared to yearlings, and have more rigorous precision standards. She said studies in the FCRPS use a virtual/paired-release design (or “viper” [ViPRe]) to estimate survival through a dam. She said fish are released upstream of a dam (R_1) where the fish have a chance to express handling and tagging effects and distribute naturally across the river channel. She said a three-dimensional (3D) array of receivers is used to define when and where a fish arrives at the dam and define a virtual release group (V_1). She said the study can estimate resident time in the forebay, route of passage, and survival based on the last known location of the fish. She said receivers should not be located in the tailrace to avoid detecting dead fish and suggested moving the receivers downstream about 20 to 50 rkm. She said the design calculates an adjusted estimate of survival from V_1 by calculating the probability of survival through the tailrace. She said the design cannot use only one release to compare to V_1 because this compares new fish to old fish. She said instead, a paired-release (R_2 and R_3) provides an estimate of surviving between the dam and the first detection site (marked P_{11} on slide 38). The paired release is used to adjust the estimate of survival from V_1 to get an estimate of dam passage survival.

Slide 39

Buchanan reviewed estimates of dam passage survival of subyearling Chinook salmon for seven FCRPS dams. She said the largest and smallest values are bolded to clearly show the range. She noted that the smallest value is about 91% at Little Goose Dam in 2013 and the largest is about 98% at Lower Monumental Dam in 2012. She said the overall average, about 94%, is noted at the bottom of the table. She said the HCPs stipulate 93% project passage. She said if Grant, Chelan, and Douglas PUDs’ dam passage is similar to these FCRPS dam passage values for subyearlings, meeting 93% project passage for subyearlings might be challenging.

Slide 40

Buchanan reviewed an example of a release–recapture design for studying subyearling Chinook salmon in the mainstem in 2012. She said the goal of the study was to estimate dam passage survival. She said this study was conducted at consecutive dams which means it could be implemented efficiently with only 9 releases instead of 12 releases. She said this study design could also estimate project survival by comparing tailrace releases in consecutive tailraces. She said this design still included probabilities of migrating and surviving, which are potentially negatively biased for survival.

Slide 41

Buchanan reviewed acoustic-tagged, paired-survival estimates from various years of study at FCRPS projects. She noted a low of 67% at John Day Dam in 2014, to a high of 96% at McNary and Bonneville dams in 2012. She also noted the McNary Dam study was a mid-reservoir release. She said the average project survival was only 86% and it is not clear if this was due to mortality in the reservoir or to the possibility of residualizing in the reservoir. She said dam passage estimates are unbiased for residualizing because subyearlings do not residualize during dam passage.

Slides 42 to 44

Buchanan reviewed a 2007 acoustic tag study estimating subyearling Chinook salmon survival through the Lower Monumental Dam reservoir. She said fish were released in the Little Goose Dam tailrace. She said the initial release was defined based on fixed site acoustic receivers in the reservoir (virtual release). She said survival was monitored from the virtual release site through the reservoir. She said this was repeated for seven groups. She said fixed site nodes were used to estimate the abundance of residualizing fish at the end of each 8-week sampling period.

Buchanan said slide 44 shows estimates for the weekly release groups and pooled results for study totals. She said the light gray in the plot shows the probability of migration and survival. She noted there is little variability between release groups. She said the white in the plot shows the probability of delay (residualizing) and surviving, which increased toward the end of the study. She said the black in the plot shows the probability of mortality, which could represent a mortality as a migrant or mortality as a residualizer. She said the results for the probability of residualizing and surviving (white bars) and for mortality (black bars) are time dependent; however, the plot is not showing the level of time-dependency. She said the pie chart shows the combined results over the season for the probability of migrating, surviving, and delay in weighted averages. She said migration and delay combined is about 47%, and she noted there is quite a bit of mortality. She also noted that these data only represent the portion of the reservoir where receivers were located.

Buchanan said Grant PUD conducted a similar study but did not have as much residualization. Graf said there was a bit of loss; however, this could not be attributed to death or residualization. He said regarding dam survival, Grant PUD conducted studies in the same years and had similar numbers.

Truscott said both dam passage and survival studies were conducted with taggable-sized subyearlings, and he asked if there are fry in the Rocky Reach Dam bypass. Keller said there are, and Truscott said this is another issue. Truscott said these designs are not studying survival of a population; rather, they only study taggable-sized fish.

Slides 45 to 47

Buchanan reviewed subyearling PIT-tag survival results from Priest Rapids Fish Hatchery to McNary Dam. She said for joint probability of migration and survival, the estimates ranged from 46% in 2004 to 85% in 2016 and averaged 66%. Graf said the study fish were all fall Chinook salmon and there was no evidence of residualizing. Buchanan noted that these estimates are far from meeting the HCP standard. Graf noted that the study area is a long reach. Truscott recalled work conducted by Geoff McMichael (Mainstem Fish Research) on natural subyearlings. Truscott said survival was also really low for McMichael, about 30%. Graf agreed and said McMichael and Ryan Harnish (Pacific Northwest National Laboratory) acoustically tagged wild fish and identified two mortality hot spots at the mouth of the Yakima River and in the McNary Dam forebay.

Buchanan reviewed subyearling Chinook salmon PIT-tag survival results from Lower Granite Dam to McNary Dam. She noted that these fish came from Lyons Ferry Fish Hatchery and were released upstream of Lower Granite Dam. She said the reach from Lower Granite Dam to McNary Dam is through four projects, so taking the fourth root of the survival to McNary Dam gives a per project survival ($\sqrt[4]{S}$). She said these results were considerably higher ranging from 84% to 98% and averaging 91%. She said, however, this still does not meet the HCP project compliance standard.

Slides 48 to 52

Buchanan said project survival (S_{MIG}) is not separately estimable. She said what is estimable is: 1) joint probability of migration and survival ($\phi = \psi \cdot S_{MIG}$); or 2) total survival ($\phi + \delta$), which is time dependent. She said phi (ϕ) can be estimated using a pair-release design; however, phi (ϕ) can only be estimated under perhaps unrealistic assumptions. She said, therefore, a statistical solution to subyearling Chinook salmon residualization may not exist. She then reviewed subyearling study design recommendations if one did want to attempt to study the estimable parameters and how one might attempt to estimate residualization.

Ferguson asked if a study design follows all of these recommendations, could the results potentially address the survival standard as stipulated in the HCPs? Buchanan clarified that there is still no statistical solution to address the survival standard as stipulated in the HCPs. She said there is still no way to tease out the desired parameters. She said what can be done is calculating an estimate of migration and survival, which can be maximized as far as the migration component can go by using actively migrating fish. She said there may still be a negative bias for actual survival itself if some fish are residualizing. She said if one conducts a study, the recommendation is to use a paired-release design bearing in mind the estimates will not necessarily be an unbiased estimate of survival because even with active migrants some study fish may still residualize. Graf also noted that subyearlings are really small earlier in the season and may be less likely to be active migrants. Buchanan agreed and said this is another issue.

Buchanan said one option is to instead estimate dam passage survival, which is presumably estimable based on USACE studies. She said instead of a paired-release design downstream of the tailrace (ViPRe design), a virtual release/dead fish correction (or ViRDcT) design puts receivers in the tailrace and releases dead fish with tags to estimate the probability of dead fish traveling downstream. She said this design, which releases fish at the dam, was tested at Lower Granite Dam in 2018. She said the results were comparable to the ViPRe design. She said there are advantages to the ViRDcT design; however, the results are not applicable to the HCP criteria.

Slides 53 to 55

Buchanan reviewed ideal study timing and spacing. She said regarding timing, consider an ideal tag-life based on what needs to occur during the tag-life and program the tags to last this long. She said detection of all tags needs to occur before the tag fails and a residualizing survey also needs to be conducted before a tag dies. She said when considering spacing of detection arrays, if the first detection site is too far downstream there may be an increasing expression of "backpack effect," and if the site is not far enough downstream this will result in false positives from detections of dead fish and unequal expression of handling effects. She said the graph on slide 55 shows the survival of two releases through space. She said the cumulative survival declines as fish travel farther. She said to look for a lack of parallelism, which would indicate tag burden effects and is likely to occur more towards the right side; the curves on slide 55 are parallel.

Slides 55 to 57

Buchanan reviewed a summary about the residualization issue. She suggested having nodes in place to conduct a post-study abundance survey. She said one can estimate migrating and surviving (ϕ) and not migrating and surviving (δ). She said using active migrants gets a design closest to 1 as possible ($\Psi_1 \approx 1, \Psi_2 \approx 1$). She noted that ϕ to ϕ ($\frac{\hat{\phi}_1}{\hat{\phi}_2}$) will estimate the joint probability of migrating and surviving through the project ($\Psi_1 S_{MIG,1}$) but assumes the probability of migrating is the same for two groups through a common reach. She said one option is to estimate total survival using the ratio of ϕ estimates and the estimate of residualization and survival from the project reservoir ($\hat{\delta}_{11}$).

Buchanan said alternatively, one can study dam passage survival to avoid the residualization issue. Murdoch asked if instead of just dam passage survival, can a study be set up to study both dam and total survival? She recognized this is still not the same as project survival, but the data could be useful to inform dam and total survival. Buchanan said yes, this is possible and said this is kind of what was being studied in the USACE studies, only those designs did not use in-reservoir nodes so there were no estimates of residualizing populations or total survival in the project. She said rather, these studies used the ViPRe design and consecutive dams to estimate the probability of migrating

and surviving through the projects. She said one question to ask when considering a study design is, can one interpret the complement in a useful way? She asked, what does “1 – whatever is being estimated” mean? Murdoch said if one knows project survival and total survival, this would provide an idea of how big of an issue residuals and mortalities are outside of a project. Buchanan said the experience Grant PUD had makes her hesitant, i.e., they found that fish were not getting past the project and there was no evidence of residualizing. She questioned whether this was because the fish residualized and died before the post-study survey or died before residualizing? Murdoch said this would still provide an estimate of project survival, and Buchanan said but not an unbiased estimate of survival. Murdoch said one would still know dam survival and know how that parameter performed. She said if there is a big difference between total and dam survival this would indicate a problem with residualizing and mortalities. Buchanan said if there is not a big difference, then this raises a question when interpreting project performance because one cannot distinguish between residualization and mortality. Murdoch agreed but said this might provide the best information available.

Murdoch asked how much do projects and reservoirs affect residualization and the mortality of fish displaying different life histories? Kahler said at this point, there is no way to distinguish from what would happen without the project being present.

Discussion

Truscott said considering there are fry (or 40-millimeter fish) at Rocky Reach Dam, which are active migrants that cannot be tagged, this means there is no way to tag an accurate representation of the population. Graf said the issue is not that a study cannot be done; rather, with the current information and technology, there will be someone who is unsatisfied with the study (e.g., the sample is not representative, the study duration is too short, and unknowns about the tags, among other things). Truscott agreed and said there needs to be an understanding that a study cannot be perfect and the reason for studying subyearlings is to have something more tangible.

Buchanan said even if a smaller fish can be tagged and as much as these fish may be less likely to migrate, the interpretation issue will be bigger. She said if the results indicate that survival is high, this is fine; however, if results are low, then why? She questioned if low results are a project effect or tag effect? Truscott also noted that subyearlings are emigrating and rearing at the same time but moving downstream slower compared to yearlings, and he asked how to classify an active versus non-active migrant?

HCP Coordinating Committees and PRCC representatives thanked Buchanan for sharing the presentation.

Ferguson asked, given the information shared during today's meeting, if Chelan PUD plans to request approval of another 3-year Statement of Agreement (SOA) during the next HCP Coordinating Committees meeting on August 27, 2019? Keller said he did not hear anything today to change Chelan PUD's view expressed during recent meetings and he believes an SOA is the next logical step. He said, however, Chelan PUD does not want to draft an SOA if the Rock Island and Rocky Reach HCP Coordinating Committees desire additional discussion. He recalled Chelan PUD's proposal to draft a reboot of the last SOA, including retaining the quarterly check-in language to capture changes or new opportunities at estimating project survival for subyearlings. Truscott asked when the current SOA expires, and Keller said September 29, 2019. Truscott suggested having another discussion on this topic before voting on an SOA. Murdoch agreed and said it seems there may be parameters that can be measured and could be useful. Keller agreed further discussion could be useful.

HCP Coordinating Committees representatives will prepare technical questions and considerations concerning the feasibility of conducting subyearling Chinook salmon studies with the current information and technology available to date, for discussion with Buchanan and Skalski during the HCP Coordinating Committees meeting on August 27, 2019.

II. Welcome

A. Review Agenda (John Ferguson)

John Ferguson excused Peter Graf and Tom Skiles (Columbia River Inter-Tribal Fish Commission) and welcomed the HCP Coordinating Committees and reviewed the agenda. Ferguson asked for any additions or changes to the agenda. No additions or changes were requested.

B. Meeting Minutes Approval (John Ferguson)

The HCP Coordinating Committees reviewed the revised draft June 25, 2019 meeting minutes. Kristi Geris said all comments and revisions received from members of the Committees were incorporated into the revised minutes. HCP Coordinating Committees members present approved the June 25, 2019 meeting minutes, as revised. National Marine Fisheries Service (NMFS) and the CCT abstained, because NMFS and CCT representatives were not present during the June 25, 2019 meeting. *(Note: Chad Jackson provided Washington Department of Fish and Wildlife's [WDFW's] approval of the minutes via email on July 22, 2019.)*

C. Last Meeting Action Items (John Ferguson)

Action items from the HCP Coordinating Committees meeting on June 25, 2019, and follow-up discussions, were as follows. (*Note: Italicized text corresponds to agenda items from the meeting on June 25, 2019*):

- *Lance Keller will review subyearling Chinook salmon sampled at the Rocky Reach Juvenile Sampling Facility (RRJSF) during the summer spill season at Rocky Reach Dam, to determine the following: 1) whether the index samples collected represent overall passage trends based on PIT-tag detections in the bypass across the season, notably during high flow years such as that experienced in 2018; and 2) whether any adjustments are needed while also maintaining continuity with historical data in the Columbia River Data Access in Real Time database (DART; Item I-C).*

Keller provided the review of subyearling sampled at RRJSF by email following the meeting on June 25, 2019, as distributed to the HCP Coordinating Committees by Larissa Rohrbach that same day.

- *Kirk Truscott will contact Lance Keller to further discuss options to increase attraction flow through the cul-de-sac area in the Rocky Reach Dam forebay (near Turbine Units C1, C2, and C3) while Turbine Units C1 and C3 are offline for maintenance (Item I-C).*

Keller said Turbine Unit C3 is back in operation, which closes this action item.

- *Lance Keller will provide updates about the repair of Rocky Reach Dam Turbine Unit C1 and Turbine Unit C3 to the HCP Coordinating Committees as soon as additional information becomes available (Item I-C).*

This action item will be discussed during today's meeting and will also be carried forward.

- *Douglas PUD will review available PIT-tag detection data from April 9 to April 30, 2019, covering the span of Wells Dam bypass non-compliance events for Turbine Units 1 to 4 and Bypass Bays 2 and 4, to identify possible impacts to fish passage and survival through the Wells Project (Item I-C).*

Tom Kahler said the PIT-tag data from the Methow Fish Hatchery and Twisp River releases have only recently been uploaded, and have not yet been analyzed. This action item will be carried forward.

- *The following action items pertain to the Decision Item whether to approve Douglas PUD's request not to tag with coded wire tags (CWTs) the component of brood year (BY) 2018 summer Chinook salmon raised at Wells Hatchery that will be used for the 2020 Survival Verification Study (2020 Survival Study) because they will be tagged with PIT-tags and adipose clipped (Item II-A) (Note: This Decision Item will be brought forward to the July 23, 2019 meeting agenda):*
 - *Tom Kahler will inform the HCP Coordinating Committees of the planned dates in July when CWT tagging will occur. (Note: Kahler stated via email on June 26, 2019, that CWT tagging will occur in August, as distributed by Larissa Rohrbach the following day.)*

- *Tom Kahler will respond to Keely Murdoch's initial questions about the effects of a decision not to tag with CWTs the 2020 Survival Study fish on the following:*
 - *Monitoring and evaluation studies*
 - *Estimates of smolt-to-adult ratios (SARs)*
 - *The collection of harvest information*
- *Chad Jackson will determine whether there are concerns associated with not coded wire tagging the study fish from an ocean harvest standpoint.*
- *Larissa Rohrbach will distribute draft meeting minutes from this agenda item to Kirk Truscott and Scott Carlon following the meeting for their immediate consideration. (Note: Rohrbach emailed a draft of the relevant minutes on June 26, 2019, to Truscott and Carlon, Cc Tom Kahler, John Ferguson, and Kristi Geris.)*
- *HCP Coordinating Committees representatives will email their own or their Hatchery Committees representative's comments and questions to Larissa Rohrbach for distribution by next Wednesday July 3, 2019. (Note: Per Tom Kahler's email on June 26, 2019, a CWT tagging date in August allows the issue to be brought to the HCP Hatchery Committees in the regular monthly meeting on July 17, 2019.)*
- *The HCP Coordinating Committees will vote on whether to approve Douglas PUD's request via email or at the next meeting depending on when a decision is needed for CWT tagging operations. (Note: Tom Kahler stated via email on June 26, 2019, that CWT tagging will occur in August, as distributed by Larissa Rohrbach the following day.)*

This action item will be discussed during today's meeting.

- *Lance Keller will provide an update by email on the performance of the new Rocky Reach Dam C3 Unit Chesterton seals by Friday, June 28, 2019 (Item III-A).*

Keller provided an update on July 19, 2019, which Kristi Geris distributed to the HCP Coordinating Committees on July 20, 2019.

- *Larissa Rohrbach will distribute by email the acoustic tag specifications sheets shared by Lance Keller following today's meeting (Item IV-A).*

Keller provided the specifications sheets following the meeting on June 25, 2019, which Larissa Rohrbach distributed to the HCP Coordinating Committees that same day.

- *Lance Keller will provide additional information on the change in ATS Inc. acoustic tag weights with different battery types (Item IV-A).*

Keller provided this information on July 22, 2019, which Kristi Geris distributed to the HCP Coordinating Committees that same day.

III. HCP Hatchery and Tributary Committees Update

A. HCP Hatchery and Tributary Committees Update (Tracy Hillman)

Tracy Hillman updated the HCP Coordinating Committees on the following actions and discussions that occurred during the HCP Tributary Committees meeting on July 16, 2019:

- *Lower Derby Fish Passage Project:* The Rock Island HCP Tributary Committee received a time extension request from Cascade Columbia Fisheries Enhancement Group (CCFEG). Because of a delay in completing final designs, CCFEG requested a time extension from December 1, 2019 to December 15, 2020. After discussion, the Rock Island HCP Tributary Committee agreed to the time extension.
- *General Salmon Habitat Program Proposals:* The HCP Tributary Committees received 13 proposals, including 12 cost shares with the Salmon Recovery Funding Board (SRFB). Before evaluating the projects, the HCP Tributary Committees identified the unallocated balance within each Plan Species Account. In total, there is just under \$10.5 million available to fund projects. As a result, the HCP Tributary Committees evaluated 13 proposals, including the 12 cost shares with SRFB, and six of the proposals were funded by the Rock Island HCP Tributary Committee at a cost totaling \$1.2 million. By comparison, the total request was for \$1.7 million in cost shares, with a total cost of \$11 million. The proposal that was not a cost share was from WDFW for the 2019 Eightmile Creek Fisheries Assessment Project. The purpose of the project is to identify fish abundance, stream flows, and water temperatures to guide permitting and selection of a brook trout removal strategy for Eightmile Creek, a tributary to the Chewuch River. The HCP Tributary Committees were unable to make a funding decision and asked the sponsor to provide additional information and a revised budget, which does not include genetic analysis of brook trout and bull trout (non-Plan Species).
- *HCP Policy Committees Guidance:* Hillman said John Ferguson will discuss this topic, but in general, the HCP Tributary Committees were pleased with the guidance provided by the HCP Policy Committees.
- *Next Meeting:* The next meeting of the HCP Tributary Committees will be on August 8, 2019.

Hillman updated the HCP Coordinating Committees on the following actions and discussions that occurred during the HCP Hatchery Committees meeting on July 17, 2019 (*note: joint HCP Hatchery Committees/PRCC Hatchery Subcommittee items are noted by "joint," Wells HCP Hatchery Committee items are noted by "Wells," and Rock Island and Rocky Reach HCP Hatchery Committees items are noted by "Rock Island/Rocky Reach"*):

- *Goat Wall Acclimation Site Performance Update (joint):* The Yakama Nation (YN) provided a presentation on the performance of the spring Chinook salmon Goat Wall Acclimation Site,

which is located on the Upper Methow River. Since using the site (2017), the YN has released between 25,000 to 30,000 spring Chinook salmon smolts from the site. Spring Chinook salmon survival within the acclimation pond has ranged from 98.0% to 99.9%. Smolt survival and travel times to McNary Dam are similar to those reported for Methow Fish Hatchery spring Chinook salmon.

- *Egg Treatment Study (joint)*: Douglas PUD provided results from their study to evaluate the effects of salt, hydrogen peroxide, and formalin in controlling saprolegnia fungus infections on summer Chinook salmon eggs during incubation. The study found no difference among treatments and a control group. This result may have been because there is a low level of pathogens at the Methow Fish Hatchery where the study was conducted. Douglas PUD proposed to conduct a similar study at Wells Fish Hatchery where the incidence of saprolegnia may be higher.
- *Outplanting Spring Chinook Adults in the Chewuch River (joint)*: Because of the low escapement of spring Chinook salmon to the Methow River basin, it is unlikely that spring Chinook salmon adults will be outplanted into the Chewuch River this year. This is a planned study to examine outplanting as an alternative to acclimation. Once escapements allow the study to be conducted, fish will be outplanted in areas where spring Chinook salmon are absent within the Chewuch River.
- *Wenatchee Spring Chinook Salmon Broodstock Collection (joint)*: Sufficient broodstock has been collected for the Wenatchee spring Chinook salmon programs. However, most of the broodstock collected consist of hatchery fish. Therefore, crews are trying to collect more natural-origin fish for the programs.
- *NMFS Consultation (joint)*: NMFS is completing their Finding of No Significant Impact for the Steelhead and Summer Chinook Salmon Environmental Assessments. Permits are currently going through internal review and hopefully will be signed soon.
- *Wells Summer Chinook Salmon Tagging for the 2020 Survival Study (Wells)*: Douglas PUD informed the Wells HCP Hatchery Committee that the Wells HCP Coordinating Committee intends to conduct the 10-year check-in study using yearling summer Chinook salmon in 2020. The 110,000 summer Chinook salmon used for the survival study will be part of the Wells Fish Hatchery yearling summer Chinook salmon production. To reduce tagging and handling effects, Douglas PUD proposed to tag the survival-study fish with only PIT tags and adipose fin clips, but no CWTs. The Wells HCP Coordinating Committee asked the Wells HCP Hatchery Committee if there are any issues with the proposed tagging plan. For monitoring purposes and harvest evaluations, the Wells HCP Hatchery Committee recommended that all fish be tagged with CWTs. Those fish used for the survival study could receive a code different from the rest of the production fish. Thus, all Wells Fish Hatchery yearling summer Chinook

salmon will be adipose clipped and CWT tagged. Those used for the survival study will also be PIT tagged.

- *2019 Hatchery Monitoring and Evaluation (M&E) Implementation Plan (Wells):* The Wells HCP Hatchery Committee reviewed and approved the 2019 Hatchery M&E Implementation Plan.
- *Expanded Wells Summer Chinook Salmon Production for the Southern Resident Killer Whale Population (Wells):* WDFW is preparing a proposal that will allow extra production of summer Chinook salmon at the Wells Fish Hatchery. The extra production is intended to benefit the Southern Resident Killer Whale population. The Wells HCP Hatchery Committee will evaluate the proposal to determine if the extra production will affect HCP production.
- *HCP Policy Committees Guidance (Wells, Rock Island/Rocky Reach):* Hillman shared with the HCP Hatchery Committees the guidance provided by the HCP Policy Committees to evaluate all decision items based on biological and technical merits, feasibility, and cost. Hillman said the HCP Hatchery Committees were not as pleased with this guidance, based on issues with the *US v. Oregon* process. Kirk Truscott clarified the direction from the HCP Policy Committees was to evaluate a proposal based on technical merit, which does not mean to make or not make a funding decision. He said the decision is whether the project is fundable and if there is a policy issue the decision to fund is an HCP Policy Committees decision. *(Note: The HCP Policy Committees direction was not intended to take decision-making away from the technical committees, but to provide those committees an option besides a dispute whenever a policy issue interferes with decision making.)*
- *Next Meeting:* The next meeting of the HCP Hatchery Committees will be on August 21, 2019.

IV. All

A. HCP Tributary Committees Dispute Update (John Ferguson)

John Ferguson said the HCP Policy Committees convened an in-person meeting on July 9, 2019. He said there was good discussion and development of four action items. He said there was good progress in terms of isolating issues to those that are within and outside the HCPs. He said guidance was developed for the HCP Tributary, Hatchery, and Coordinating Committees. He said there was discussion and agreement about the successful implementation of the HCPs to date and a shared desire to continue this trend. He said the HCP Policy Committees agreed it would be beneficial to meet more often, perhaps annually around the time when the HCP annual reports are complete, to review the past year's activities and current topics. Tom Kahler and Kirk Truscott, who also attended the in-person meeting on July 9, 2019, said they had nothing further to add.

Ferguson reviewed the action items from the HCP Policy Committees meeting on July 9, 2019, as follows:

- Steve Parker (YN HCP Policy Committees Representative) and Cody Desautel (CCT Natural Resources Director) will discuss with their respective policy staff about convening the YN and CCT Tribal Councils to discuss potential paths forward for the Scaffold Camp Acquisition #2 Project, including third-party ownership.
- Tracy Hillman (HCP Tributary and Hatchery Committees Chairman) will communicate HCP Policy Committees guidance to the HCP Tributary and Hatchery Committees to base funding decisions on technical merit, and to notify respective HCP Coordinating and Policy Committees representatives of any potential policy issues needing to be addressed in those forums.
- Steve Parker and Cody Desautel will discuss with their respective policy staff about convening the YN and CCT Tribal Councils to: 1) attend a joint meeting and presentation by Chelan PUD, Douglas PUD, and YN and CCT HCP technical representatives about the function of the HCPs; and 2) provide guidance on land ownership issues that might impact implementation of the HCPs.
- HCP Policy Committees representatives will each discuss with their respective HCP Tributary and Hatchery Committees representatives the option of abstaining in lieu of a disapproval vote to preserve a policy position.

Ferguson said two of the action items concern land ownership issues, which the HCP Policy Committees spent a lot of time discussing. He said regarding the first action item, the HCP Tributary Committees meeting minutes from July 16, 2019, indicate that the YN purchased the Scaffold Camp property; therefore, this action item is a moot point.

V. Douglas PUD

A. **DECISION: 2020 Survival Verification Study – Coded Wire Tags (Tom Kahler)**

Tom Kahler said the Wells HCP Hatchery Committee recommended that all fish be CWT tagged and Douglas PUD agrees this recommendation can be incorporated into the study; therefore, this is no longer an HCP Decision Item.

B. ***Wells Project Subyearling Chinook Life-History Study 2011–2013 Draft Final Report* (Tom Kahler)**

The draft *Wells Project Subyearling Chinook Life-History Study 2011–2013 Draft Final Report* was distributed to the HCP Coordinating Committees by Kristi Geris on May 24, 2019, and is available for a 60-day review with edits and comments due to Tom Kahler by Tuesday, July 23, 2019. Kahler said he wanted to provide an opportunity for the Wells HCP Coordinating Committee to ask final

questions, and if the Committee has no questions or comments Douglas PUD can make a few editorial corrections, finalize, and distribute. Kirk Truscott said he will submit CCT comments on the draft report by Friday, July 26, 2019.

Douglas PUD will request approval of the report during the HCP Coordinating Committees meeting on August 27, 2019.

VI. Chelan PUD

A. Rocky Reach Dam Turbine Unit C1 and C3 Update (Lance Keller)

Lance Keller said Rocky Reach Dam mechanics are moving forward with the trunnion seal repair in Turbine Unit C1, with the unit being returned to service after the 2019 juvenile bypass season. He said there is a conflict in scheduling for the recommissioning of Turbine Units C9 and C1. He said crews have never conducted concurrent unit commissioning and he does not believe there are plans to try to do so. He said currently, he is unsure which unit will be prioritized.

Keller said Turbine Unit C3 was returned to service on July 17, 2019. He said he provided an update on Turbine Unit C3 on July 19, 2019, which Kristi Geris distributed to the HCP Coordinating Committees on July 20, 2019. Keller apologized for not providing an update by June 28, 2019, per his action item from the HCP Coordinating Committees meeting on June 25, 2019; however, he said the unit was tested and re-tested because there was direction from the senior team to continue to pursue both the new seals and hydraulically locking the blades into place as options, which caused a brief delay in the schedule. He said currently, the unit is operating with the Chesterton seals installed and everything is running fine with no observations of anything out of the ordinary. He said there are plans to remove Turbine Unit C3 out of service periodically to reassess the performance of the new seals; however, he is unsure about the schedule for this. He said the outage will likely be weeks and not months. He said he reviewed bypass counts pre- and post-outage for Turbine Unit C3 and there was no evidence of any change in the index counts. Kirk Truscott asked if Chelan PUD plans to include these data and dates in a report, and Keller said he will, and these data are also available on DART.

B. Rock Island Dam Powerhouse 1 Maintenance Update (Lance Keller)

Lance Keller said work continues to move forward on Turbine Unit B4. He recalled that parts needed to repair the unit (the rotor poles and hydraulic power unit) have been delayed and now the rotor spider is also delayed. He said the return to service date of fourth quarter of 2019 is still accurate.

VII. HCP Administration

A. Next Meetings (John Ferguson)

The next scheduled HCP Coordinating Committees meeting is on August 27, 2019, to be held **in-person** at the Grant PUD Wenatchee office in Wenatchee, Washington.

The September 24 and October 22, 2019 meetings will be held by conference call or in-person at the Grant PUD Wenatchee office in Wenatchee, Washington, as is yet to be determined.

VIII. List of Attachments

Attachment A List of Attendees

Attachment B *Considerations in the Design and Analysis of Subyearling Chinook Salmon Survival Compliance Studies – 2019*

**Attachment A
List of Attendees**

Name	Organization
John Ferguson	Anchor QEA, LLC
Kristi Geris	Anchor QEA, LLC
Tracy Hillman ^{††}	BioAnalysts
Rebecca Buchanan	University of Washington, Columbia Basin Research
Lance Keller [*]	Chelan PUD
Tom Kahler [*]	Douglas PUD
Scott Carlon ^{*†}	National Marine Fisheries Service
Jim Craig [*]	U.S. Fish and Wildlife Service
Patrick Verhey ^{*†}	Washington Department of Fish and Wildlife
Keely Murdoch [*]	Yakama Nation
Kirk Truscott [*]	Colville Confederated Tribes
Peter Graf [*]	Grant PUD
Tom Skiles ^{**}	Columbia River Inter-Tribal Fish Commission

Notes:

- * Denotes HCP Coordinating Committees member or alternate
- † Joined by phone
- †† Joined by phone for the HCP Tributary and Hatchery Committees Update
- ** Joined for the joint HCP Coordinating Committees and PRCC portion of the meeting