



Conference Call Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties

Date: January 12, 2022

From: John Ferguson, Chair, Anchor QEA, LLC

Re: Final Minutes of the December 8, 2021, Aquatic SWG Conference Call

The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, December 8, 2021, from 10:00 a.m. to 12:00 p.m. Attendees are listed in Attachment A of these conference call minutes.

I. Summary of Action Items

1. Anchor QEA, LLC, will add a recurring Aquatic SWG meeting agenda item for the Yakama Nation (YN) to provide monthly updates on the Pacific Lamprey Conservation Initiative's (PLCI's) Lamprey Technical Workgroup 5th Annual Lamprey Information Exchange Webinar Series, which will convene on the second Tuesday of each month from January to May 2022 (Item VI-3). *(Note: Kristi Geris added these monthly updates to the agendas, as discussed.)*
2. Douglas PUD will inquire internally about possibly accommodating an in-person tour of the dewatered Wells Dam east fishway on January 3, 2022 (anytime), or January 4, 2022, at 10:00 a.m. (Item VI-6).
3. U.S. Fish and Wildlife Service (USFWS) will provide comments on the draft *Bull Trout Movement and Life History Investigation 2022* (2022 Bull Trout Passive Integrated Transponder [PIT] Study Plan) to Douglas PUD to incorporate into a revised study plan for distribution prior to the Aquatic SWG conference call on January 12, 2022 (Item VI-7). *(Note: Steve Lewis provided USFWS comments to the Aquatic SWG on December 14, 2021.)*
4. Douglas PUD will distribute for review the table of encounter histories (Program MARK inputs) used in the example *Capture-Recapture Closed Capture Model for Estimating Abundance* (Attachment C) to estimate the abundance of White Sturgeon in the Wells Reservoir (Item VI-9).

5. Douglas PUD will distribute for review the Cormack-Jolly-Seber (CJS) brood year (BY)-specific survival estimation for the White Sturgeon population in the Wells Reservoir as developed by Blue Leaf Environmental/LGL Limited following 2021 Wells Project White Sturgeon Monitoring and Evaluation (M&E) data collection (Item VI-9). *(Note: Andrew Gingerich provided this table following the Aquatic SWG conference call on December 8, 2021, which Kristi Geris distributed to the Aquatic SWG that same day.)*
6. Douglas PUD will review Wells Project White Sturgeon M&E data (all years) for the number of unique individuals handled towards comparing this count to the CJS survival estimates and mark-recapture population estimate (Program MARK derived) presented during today's Aquatic SWG conference call (Item VI-9).
7. Douglas PUD will inquire with Dave Robichaud (Blue Leaf Environmental/LGL Limited) about a possible robust model design for estimating White Sturgeon abundance that pools data across BYs (Item VI-9).
8. The Aquatic SWG meeting on January 12, 2022, will be held by conference call (Item VII-1).

II. Summary of Decisions

1. There were no decisions approved during today's conference call.

III. Agreements

1. There were no agreements discussed during today's conference call.

IV. Review Items

1. The draft 2022 Bull Trout PIT Study Plan was distributed to the Aquatic SWG by Kristi Geris on December 2, 2021. A revised draft plan was distributed on January 10, 2022 (Item VI-7).
2. A *Capture-Recapture Closed Capture Model for Estimating Abundance* (Attachment C) was distributed to the Aquatic SWG by Kristi Geris on December 3, 2021 (Item VI-9).
3. The draft *2022 Aquatic Settlement Agreement and Workgroup Action Plan* was distributed to the Aquatic SWG by Kristi Geris on December 16, 2021.
4. The draft *Adult Lamprey Approach and Passage Study Plan, Wells Dam – 2022* was distributed to the Aquatic SWG by Kristi Geris on January 7, 2022 (Item VI-5).
5. The draft Statement of Agreement (SOA), *To translocate adult Pacific Lamprey from Priest Rapids Dam to areas within or upstream of the Wells Project and to implement the Adult Lamprey Approach and Passage Study, Wells Dam – 2022 Study Plan*, was distributed to the Aquatic SWG by Kristi Geris on January 7, 2022 (Item VI-5).

6. The draft *2022 Total Dissolved Gas Abatement Plan* (and appended *Wells Bypass Operating Plan*) was distributed to the Aquatic SWG by Kristi Geris on January 11, 2022. Douglas PUD will request approval of the draft plan during the Aquatic SWG conference call on February 9, 2022.
7. The draft *2021 Annual Report Total Dissolved Gas Abatement Plan* was distributed to the Aquatic SWG by Kristi Geris on January 11, 2022. Douglas PUD will request approval of the draft report during the Aquatic SWG conference call on February 9, 2022.

V. Documents Finalized

1. There are no documents that have been recently finalized.

VI. Summary of Discussions

1. Welcome, Review Agenda, Meeting Minutes Approval, and Review of Action Items (John Ferguson):

John Ferguson welcomed the Aquatic SWG members (Attachment A). Ferguson asked for any additions or changes to the agenda. No additions or changes were requested.

The revised draft November 10, 2021, conference call minutes were reviewed. Kristi Geris said edits and comments received from members of the Aquatic SWG were incorporated into the revised minutes. Geris added under *Review Items* distribution of the draft 2022 Bull Trout PIT Study Plan and example White Sturgeon model for estimating abundance. Under the *Wells Fish Hatchery White Sturgeon Stocking Considerations* discussion, she reviewed two parenthetical notes she added (based on comments received from Douglas PUD) and asked if the Aquatic SWG approves of these edits. Andrew Gingerich explained that these comments, which Geris added as parenthetical notes, were intended to clarify the discussion. No one disapproved of these edits. Jason McLellan noted that CJS is a mark-recapture model, not an age-structured model. This was corrected in the edits.

Aquatic SWG members present approved the November 10, 2021, conference call minutes, as revised. Washington State Department of Ecology (Ecology) abstained because a representative was not present during the November 10, 2021, conference call. USFWS also abstained because Steve Lewis joined today's meeting late and missed review of the latest edits.

Action items from the Aquatic SWG conference call on November 10, 2021, are as follows (Note: the following italicized item numbers correspond to agenda items from the November 10, 2021, meeting):

- *Aquatic SWG members will provide to Douglas PUD any new documents members wish to include in the juvenile and adult Pacific Lamprey literature reviews prior to next month's Aquatic SWG conference call, and Douglas PUD will add these documents to the respective document libraries and will provide an update during the Aquatic SWG conference call on December 8, 2021 (Item VI-1).*

This will be discussed during today's conference call.

- *Ecology will inquire internally about the schedule for implementation of the Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake rivers (initially published by the Environmental Protection Agency on May 20, 2020, and issued as the final TMDL on August 13, 2021) and will provide an update to the Aquatic SWG when one is available (Item VI-1).*

Breean Zimmerman recalled that she believed there was no implementation schedule established as of yet, and she confirmed this is still true. Ecology is on the cusp of scheduling meetings with regional PUDs to further discuss the TMDL, and she will update the Aquatic SWG as she learns more.

- *Aquatic SWG members will review Sections 4.3.1, 4.3.2., and 4.3.3 of the White Sturgeon Management Plan, regarding Wells Fish Hatchery White Sturgeon stocking considerations for collection of BY 2022 larvae for rearing and planting in 2023, and the YN will continue internal discussions with technical experts and Chelan PUD, in preparation for further discussion on this topic during the Aquatic SWG conference call on December 8, 2021 (Item VI-4).*

This will be discussed during today's conference call.

- *The YN will share available information on the structure used at Tumwater Dam to release adult Pacific Lamprey directly into the fish ladder, for consideration in the Douglas PUD 2022 Adult Pacific Lamprey Study Plan (Item VI-6).*

Ralph Lampman provided this information to Kristi Geris on November 23, 2021, which Geris distributed to the Aquatic SWG that same day.

2. Coronavirus Disease 2019 Updates (John Ferguson):

John Ferguson asked if Aquatic SWG members had any new updates to share regarding impacts of coronavirus disease 2019 (COVID-19) on Aquatic SWG-related M&E activities. The Aquatic SWG had no new COVID-19 updates to announce.

3. Pacific Lamprey Conservation Initiative Updates (Ralph Lampman):

Ralph Lampman distributed an email on December 2, 2021, about the PLCI's "Lamprey Week," which is happening this week. On Monday, December 6, 2021, the PLCI Policy

Committee convened a 2-hour meeting to discuss updates to a Conservation Agreement, which PLCI hopes to have resigned by the end of 2023. The Policy Committee also discussed policy-level accomplishments, goals for next year, and roadblocks that entities have encountered. Tuesday, December 7, 2021, was the kick-off for PLCI's Lamprey Technical Workgroup 5th Annual Lamprey Information Exchange Webinar Series. Today, Wednesday, December 8, 2021, the Lamprey Technical Workgroup will convene a meeting, which happens twice per year. Tomorrow, Thursday, December 9, 2021, there will be a Lamprey information exchange titled, *Lamprey Around the World*, and will include talks by Cindy Baker (New Zealand National Institute of Water and Atmospheric Research Ltd.) and Catarina Mateus (Marine and Environmental Sciences Centre, Universidade de Évora, Portugal). Lampman said he will share a talk about Finnish and Japanese Lamprey culture. The session on Friday, December 10, 2021, is titled *Lamprey Kahoot* and is an outreach session to network that includes Pacific Lamprey activities and prizes.

Lampman said the schedule for the Lamprey Information Exchange Webinar Series was included in the email he distributed on December 2, 2021. These webinars will occur on the second Tuesday of each month from January to May 2022. The January 2022 webinar covers Environmental DNA; the February 2022 webinar covers climate change; the March 2022 webinar covers passage; the April 2022 webinar covers restoration, entrainment, and salvage; and the May 2022 webinar covers supplementation and disease. Unfortunately, in-person meetings have not yet reconvened, but these webinars still allow for a wide range of speakers.

Andrew Gingerich said he appreciates this update, and he noted that John Rohrback (Douglas PUD) is participating in this week's activities on behalf of Douglas PUD.

John Ferguson said the Fish Passage 2022 symposium is scheduled for June 13 to 16, 2022. This is an international symposium that occurs every few years, and locations for the symposium rotate between Europe and the United States. In recent years, the symposium has been hosted in Corvallis, Oregon. In 2022, the symposium will be hosted by Pacific Northwest National Laboratory in Richland, Washington. Ferguson received a call from National Marine Fisheries Service earlier this week about possibly putting together a symposium on salmonid fish passage. Ferguson said it seems a symposium on Lamprey passage might be of interest, and he asked Lampman if he is aware of this event. Ferguson said the deadline for topics is January 14, 2022. Lampman said he has not seen any discussions on creating a Lamprey session for this event. However, National American Fisheries Society and Oregon American Fisheries Society meetings are happening in 2022 and will include Lamprey sessions.

Ferguson said he sent Kristi Geris the web link¹ for more information on the Fish Passage 2022 symposium. (Note: Geris forwarded this link to the Aquatic SWG following the conference call on December 8, 2021.)

Anchor QEA will add a reoccurring Aquatic SWG meeting agenda item for the YN to provide monthly updates on the PLCI's Lamprey Technical Workgroup 5th Annual Lamprey Information Exchange Webinar Series, which will convene on the second Tuesday of each month from January to May 2022. (Note: Geris added these monthly updates to the agendas, as discussed.)

Lampman said the PLCI Policy Committee also mentioned that any party can apply for PLCI funding so long as the project is located within the basin. The Committee provided updates on deadlines for funding sources and how to apply.

4. Juvenile and Adult Pacific Lamprey Literature Review Libraries (Chas Kyger):

Chas Kyger said no documents were received from Aquatic SWG members to add to the Pacific Lamprey literature review libraries, but Douglas PUD added three papers to the libraries. For the adult Pacific Lamprey library, two papers were added: 1) Clemens and Schreck (2021)² is a study in the mainstem Willamette River about how Pacific Lamprey move through different river segments depending on temperature and other variables; and 2) Moser et al. (2019)³ is about entrance modifications for Pacific Lamprey at Bonneville Dam. For the juvenile Pacific Lamprey library, one paper was added: 1) PLCI Lamprey Technical Workgroup (2021)⁴, which is an update to a white paper by the PLCI Lamprey Technical Workgroup on dredging recommendations to minimize effects on Lamprey. These papers are now uploaded to the extranet and are available for review.

5. 2022 Adult Pacific Lamprey Study Plan (Andrew Gingerich):

Andrew Gingerich said a completed draft 2022 Adult Pacific Lamprey Study Plan is in internal review and he hopes to distribute the draft plan in the next couple of weeks. He recalled wanting to distribute the draft plan before dewatering of the Wells Dam fishways for annual winter maintenance, in case decisions need to be made about installing infrastructure for the study. However, because Aquatic SWG interest seems to be centered around acoustic and

¹ Fish Passage Symposium, 2021. Fish Passage 2022 Symposium, June 13 to 16, 2022, hosted by Pacific Northwest National Laboratory, Richland, Washington. Information available at: <https://fishpassage.fisheries.org/>.

² Clemens, Benjamin J. and C.B. Schreck, 2021. "Microhabitat use by pre-spawning Pacific lamprey *Entosphenus tridentatus* in a large, regulated river differs by year, river segment, and availability." *Environ Biol Fish* 104, 325–340 (2021). Available at: <https://doi.org/10.1007/s10641-021-01079-7>.

³ Mary L. Moser, Steve C. Corbett, Matthew L. Keefer, Kinsey E. Frick, Siena Lopez-Johnston, and Christopher C. Caudill, 2019. "Novel fishway entrance modifications for Pacific lamprey." *Journal of Ecohydraulics*. DOI: 10.1080/24705357.2019.1604090.

⁴ PLCI Lamprey Technical Workgroup, 2021. *Monitoring and Minimizing Effects of Dredging on Lampreys*. Living Document, Original Version 1.0. March 2021. Available at: <https://www.fws.gov/pacifclamprey/LTWGMmainpage.cfm>.

PIT detection, the fishways are in good standing, as is. The acoustic receivers can be deployed on mounts during wet fishway conditions, and unlike other equipment, these mounts will allow for conducting data downloads mid-season instead of needing to wait for the next dewatered fishway.

The draft *Adult Lamprey Approach and Passage Study Plan, Wells Dam – 2022* and draft SOA, *To translocate adult Pacific Lamprey from Priest Rapids Dam to areas within or upstream of the Wells Project and to implement the Adult Lamprey Approach and Passage Study, Wells Dam – 2022 Study Plan*, were distributed to the Aquatic SWG by Kristi Geris on January 7, 2022.

6. Wells Dam Fishway Dewatering Schedule (Andrew Gingerich):

Andrew Gingerich said a tentative fish ladder maintenance schedule at Wells Dam was distributed to the Aquatic SWG by Kristi Geris on November 29, 2021. The east fishway is the shorter outage this year and will be taken out of service for 2 weeks on December 27, 2021. Recall, mechanics at Wells Dam work four 10-hour shifts per week. Assuming the east fishway is back in service by January 7, 2022, the west fishway will be taken out of service for the longer outage from January 10 through January 28, 2022. Again, these are tentative dates that may shift as things evolve.

Gingerich said Ralph Lampman expressed interest in touring the east fishway, which Douglas PUD can likely accommodate. If other Aquatic SWG members are interested, he does not believe there are any COVID-19 protocols in place to preclude this. That said, it would be ideal to keep this group small due to COVID-19 concerns. Taking a ladder out of service is a 2-day process, so dates available for a possible tour include December 30, 2021, through January 6, 2022. He will inquire about the availability of a crane operator; although, some plating can be viewed without being lowered down into the fishway via a man basket.

Lampman said he understands that plating installed to close diffuser grating gaps for Pacific Lamprey passage has occurred in both ladders. Gingerich said all plating and closing of gaps is complete in both ladders and the collection galleries. This includes Weirs 1 to 22 in the lower fishways and Weir 56 in the upper fishways, where there are floor diffuser gratings that provide water via the auxiliary water supply.

John Ferguson asked if any other Aquatic SWG members are interested in touring the east fishway. Steve Lewis said USFWS may soon have new representation involved in the Aquatic SWG and it would be helpful for them to tour the fishway. He guessed, at a minimum, this might include two USFWS staff for the tour. Patrick Verhey said he is also interested in attending a tour; however, if he cannot make it, he asked that photographs of

the Pacific Lamprey passage improvements be circulated to the Aquatic SWG. Gingerich said Douglas PUD can do this.

Gingerich, Lampman, and Lewis discussed possible dates for the tour and decided that Douglas PUD will inquire internally about possibly accommodating an in-person tour of the dewatered Wells Dam east fishway on January 3, 2022 (anytime), or January 4, 2022, at 10:00 a.m.

7. 2022 Bull Trout Passive Integrated Transponder Study (Chas Kyger):

Chas Kyger said a draft 2022 Bull Trout PIT Study Plan was distributed to the Aquatic SWG by Kristi Geris on December 2, 2021.

Kyger said the only edits and comments received were from the Colville Confederated Tribes. Jason McLellan's main comment was regarding genetic samples. He noted that the purpose of this study is to track fish and collect genetic samples when fish are handled and is not necessarily about conducting the genetic analyses. McLellan suggested removing details about the actual genetic analyses, which can be addressed separately from this study plan. John Ferguson asked if this is regarding Objective 4 of the draft study plan. Kyger said that is correct—details about what will be done with the genetic samples are not really part of this study.

Steve Lewis said in part, Objective 4 is about identifying a genetic baseline to link back to the population. He is not sure about holding off on this and suggested keeping these details in the study plan. Kyger said if USFWS can provide specifics about the genetic analyses these can be inserted in the study plan. McLellan agreed and clarified he was suggesting that, if there are no specific methodologies, do not include these details at all; however, if this level of detail is known, include it. Lewis said he is not advocating to insert a level of detail explaining the methodologies used by Abernathy Fish Technological Center. Kyger said just including the general type of analyses should suffice. Andrew Gingerich suggested simply referencing the genetics approach used for the 2016 study, *Bull Trout Passage and Take Monitoring at Wells Dam and Twisp River Weir*. Per the *Bull Trout Management Plan*, the Year-10 study being discussed was intended to be a check-in study consistent with past studies. The 2016 study preserved samples in ethanol, and samples were sent to the Washington Department of Fish and Wildlife fish genetics laboratory in Olympia, Washington. Samples were analyzed and assigned back to a local population to show connectivity in fish populations above and below Wells Dam.

Ferguson said Objective 5 in the *Bull Trout Management Plan* states:

Participate in the development and implementation of the USFWS Bull Trout Recovery Plan including information exchange and genetic analysis.

Ferguson said the draft 2022 Bull Trout PIT Study Plan addresses collection of samples, but how these samples will be collected and sent to a laboratory for processing is not part of this study design or cost to Douglas PUD—or is it? Ferguson questioned who pays for the genetic analyses, because this has bearing on how much detail to include in this study plan. McLellan said this is essentially what his comment was. In one section of the draft study plan, Objective 4 indicates plans to collect genetic samples for future analysis. In another section of the draft study plan, Objective 4 indicates that genetic samples will assign fish to local populations but does not include who will conduct the analyses, what methods will be used, or who is responsible for these data; nor does it indicate how these results will be recorded and linked back to PIT-tag data collection. McLellan said his comment requested to clarify or separate these details and make this consistent throughout the study plan.

Gingerich said Section 4.5.2 of the *Bull Trout Management Plan* includes a requirement for Douglas PUD to fund 10 adult Bull Trout genetic analyses every 10 years, if recommended by the Aquatic SWG. For this study, he believes Douglas PUD can not only fund 10 genetic analyses but can fund analyses for all 60 fish. There just needs to be more details added to the draft study plan, and he is proposing to reference the same methodologies used for the 2016 study. Regarding McLellan's question about how to tie these results back to the PIT-tag analysis, these results can inform how different populations interact with the project. Gingerich recommended reviewing the final report for the 2016 study, *Bull Trout Passage and Take Monitoring at Wells Dam and the Twisp River Weir, Final Report*, specifically Appendix B, which is the report, *Genetic Assignments for Bull Trout Collected at Wells Dam in the Upper Columbia River*. (Note: Gingerich provided this report to Geris following the Aquatic SWG conference call on December 8, 2021, which Geris redistributed to the Aquatic SWG that same day.)

Lewis asked, under Section 3.4 of the draft study plan, regarding *Objective 1 – Interactions with the Wells Project Fishways*, in addition to the first bullet to monitor detections at Pools 19 and 67, and the second bullet to monitor the count station, is it possible to add a third bullet to assess how spill and powerhouse operations effect routes of passage for study fish? For example, which *Wells Hydroelectric Project Spill Playbook*⁵ operations result in fish choosing a particular passage route? Kyger said, although this will be difficult to do for

⁵ Douglas County PUD (Public Utility District No. 1 of Douglas County), 2021. *2021 Total Dissolved Gas Abatement Plan and Bypass Operating Plan for the Wells Hydroelectric Project: Appendix 1 - Wells Hydroelectric Project Spill Playbook*. Prepared for: Washington Department of Ecology Water Quality Program and Aquatic Settlement Work Group. February 2021.

individual study fish in the tailrace due to the time gap between detection in the tailrace and subsequent detection in a ladder or counted at a window (which may be several hours), he can summarize how conditions line up broadly with PIT detections and count window video for upstream passage and how they compare to conditions in previous years. For downstream passage, as discussed before, there is no way of knowing how migration patterns relate to project operations.

Lewis said USFWS has a few more comments, but he needs to leave the call now. USFWS will provide comments on the draft 2022 Bull Trout PIT Study Plan to Douglas PUD to incorporate into a revised study plan for distribution prior to the Aquatic SWG conference call on January 12, 2022. (Note: Lewis provided USFWS comments to the Aquatic SWG on December 14, 2021.)

8. Brood Year 2021 White Sturgeon Rearing Update (Chas Kyger):

Chas Kyger summarized a BY 2021 White Sturgeon Rearing Update (Attachment B), which was distributed to the Aquatic SWG by Kristi Geris following the conference call on December 8, 2021. Kyger said as of December 6, 2021, there were approximately 1,800 fish on station at Wells Fish Hatchery. After sorting, this count is higher than what was estimated last month. Fish are currently in 12 tanks and have an average size of approximately 131 grams, with more than 500 fish already exceeding the 200-gram threshold. On average, fish have more than doubled in weight since last month. Mortality is low and fish are continuing to grow.

9. Wells Fish Hatchery White Sturgeon Stocking Considerations – Brood Year 2022 for Planting in 2023 (Andrew Gingerich):

Andrew Gingerich said Chas Kyger developed an example White Sturgeon model for estimating abundance titled *Capture-Recapture Closed Capture Model for Estimating Abundance* (based on Otis et al., 1978⁶; Attachment C), which was distributed to the Aquatic SWG by Kristi Geris on December 3, 2021. Gingerich recalled that Douglas PUD and the Aquatic SWG White Sturgeon technical subgroup have been discussing model selection to estimate survival and population abundance in the Wells Reservoir. Douglas PUD has also discussed this internally, as well as with Dave Robichaud, regarding BY-specific survival estimates. These discussions have felt a bit obscure, so Douglas PUD thought to take a different approach and use recent Wells Project White Sturgeon M&E data to develop a simple mark-recapture estimate to determine population size, to serve as a conversation piece. He believes a similar approach has been used in Columbia River Zone 6 (McNary Dam

⁶ Otis, D.L., K. P. Burnahm, G.C. White, and D.R. Anderson, 1978. "Statistical inference from capture data on closed animal populations." *Wildlife Monographs* No. 62; pp. 3–135 (133 pages). October 1978.

to Bonneville Dam). Douglas PUD has a goal to stock approximately 1,100 adults (i.e., greater than 165-centimeter fork length) in the Wells Reservoir. It seems rational to try and determine what the current population size is towards meeting this goal, and this was the thought process behind this exercise.

Kyger said Attachment C is an example of what can be done with current M&E data. This is a classic capture-recapture design expanded from a Lincoln-Petersen estimate. This design calculates how many fish were missed during sampling. Design elements include 8 weeks of sampling sessions separated by 2 days off, where sites were selected using a Generalized Random-Tessellation Stratified design to develop spatially balanced sites, and each first encounter was treated as a marking occasion. After this, if the same fish was recaptured it would be counted as such, and then these data were entered into Program MARK. In this case, different candidate models were used. The bottom line is that the most supported model was Model Mt (time varying), which resulted in a population estimate of approximately 2,200 fish. Attachment C (page 2) shows abundance estimates by release year, using an expansion based on proportion of total catch in 2021 and a total abundance estimate of 2,200 fish. The same can be done with fish size, as shown in Figure 1 on page 3 of Attachment C.

Gingerich said Douglas PUD's position is that this is a reasonable way to estimate abundance. Based on this analysis, it seems Douglas PUD is reasonably on the way to reaching the goal of 1,100 adult fish and may perhaps be on the verge of having too many fish. He caveated that there are not a lot of data available for fish released in 2018 to 2021, as expected, because recruitment of these fish to the M&E gear is not very high; this is something that can be continually updated.

Jason McLellan asked if Douglas PUD can distribute for review the table of encounter histories (Program MARK inputs) used in the example *Capture-Recapture Closed Capture Model for Estimating Abundance* (Attachment C) to estimate abundance of White Sturgeon in the Wells Reservoir. He is curious about the delineation of 5-day sessions with only 2 days in between, and whether behavioral effects are captured in the model selection procedure. He thinks there is some debate about this and recalled when he was doing similar modeling, the AICc (or "Akaike information criterion corrected") values suggested a need to review the capture histories because he suspects there were not a lot of recaptures in the consecutive sessions. Kyger said if Douglas PUD had been dialed into these methods, sampling would have been set up differently. This is more of a post-hoc analysis using already developed sampling protocol. He agreed that this is a weakness in the sampling design with how the model produces these estimates.

McLellan also noted that because White Sturgeon in the Wells Reservoir move up into and out of the Okanogan River, the timing of this needs to be clarified to understand whether the assumption required for this approach—that the Wells Reservoir is a closed system—was met, especially with the low level of mortality. He thinks he recalls the CJS BY-specific mortality rates were higher than those shown in Attachment C, and he suggested providing the CJS results, as well, to compare the two approaches. Gingerich said this is good feedback, and he can distribute the CJS BY-specific survival estimation for the White Sturgeon population in the Wells Reservoir, as developed by Blue Leaf Environmental/LGL Limited, following 2021 Wells Project White Sturgeon M&E data collection. He thinks the CJS BY-specific survival estimation reasonably comports with the results in Attachment C, which indicate that when monthly survival estimates are applied, survival is really quite low in the first year in the Wells Reservoir. Again, survival estimates for the fish released at bigger sizes in recent years are unknown. *(Note: Gingerich provided this table following the Aquatic SWG conference call on December 8, 2021, which Geris distributed to the Aquatic SWG that same day.)*

McLellan said he also has questions about using a monthly survival estimate. In the Upper Columbia River, pooling data across BYs results in many more recaptures, which may affect the variability in the estimates. There are other approaches to evaluate data for survival, and pooling data across BYs may be more useful for generating estimates of future abundance. Gingerich said these are all good points. He also struggled with using a CJS monthly survival estimate, which is why Douglas PUD also looked at a CJS BY-specific survival estimation with Robichaud. The Douglas PUD program is still in its infancy, and he wonders if this kind of simple approach in Attachment C is good for the time being. He agrees Douglas PUD and the Aquatic SWG should continue working on these questions, and he thinks the feedback is pointing to the same thing—that there are still questions. McLellan said he is not necessarily opposed to the approach in Attachment C; rather, he is just making these points as part of a technical review. It is important to have all the information to evaluate differences and uncertainties among approaches and make an informed decision.

McLellan said he is also curious about the number of unique fish captured in each year of M&E, for each BY. He suspects that when summed, these numbers will equal more than the total abundance because most of the recaptures occurred after 1 year when survival rates should be in the high 90s (%), which suggests this estimate might be biased low. Further, the frequency distribution in Attachment C (page 3) suggests capture probability is not equal across size class. If mortality is highest in small fish and the more recent releases are much larger fish, one would expect to have a higher number of larger fish, if not an equal amount. Additionally, if survival rates are truly what has been discussed, there should be fewer small

fish remaining. Gingerich said Douglas PUD will review Wells Project White Sturgeon M&E data (all years) for the number of unique individuals handled towards comparing this count to the CJS survival estimates and mark-recapture population estimate (Program MARK derived) presented during today's Aquatic SWG conference call.

Gingerich noted the approximate number of four hundred, 1,100-millimeter size fish in Attachment C (page 3). He thinks these are the largest fish stocked in the first 4 years, which had the highest survival versus the subsequent 3 years of fish. To McLellan's point about lower numbers of the smaller large fish, this could be due to capture probability not being the same among size groups or that the program switched from stocking 5,000 fish to 325 fish. Even with higher survival, the program is now releasing fewer fish. This dataset just needs more years to better inform the recent release years that included fewer, but larger fish. Kyger agreed with these comments and said he could add a covariate.

McLellan said, back to the model selection process, he thinks it is obvious there is some heterogeneity in calculating capture probability. In reviewing the capture history frequencies that Douglas PUD plans to provide, he suspects there will be a low number of fish handled in the consecutive session, indicating behavior effects on capture probability. Then almost every time, the most supported model will be the Model Mt (time varying). He reiterated he is not saying he is against this approach; rather, these are just things that need to be considered.

Gingerich asked if McLellan is concerned there are many more fish in the Wells Reservoir. McLellan said yes, he thinks this estimate is biased low. When reviewing simulation models, if there are biases in the capture probability, the estimate is biased low. He thinks that, when the unique individual captures are reviewed, this will suggest the same.

Kyger said he agrees with McLellan's comments regarding whether the closure assumption was met. This model only accounts for fish in observable states, and it is known that Douglas PUD's M&E gear does not fish in fast currents like those near Bridgeport, Washington. Then, there is the question of fish moving in and out of the Okanogan River. This could be addressed by using an open model or robust design that accounts for fish in unobservable states. McLellan suggested that Douglas PUD inquire with Robichaud about a possible model design for estimating White Sturgeon abundance that pools data across BYs, as opposed to by intervals post-release. Kyger said he can do this.

Kyger also noted it was challenging finding a way to analyze the data using different models given the current M&E sampling design, notably because some M&E years included consecutive sampling, and some did not. However, as McLellan suggests, there are many ways to pool the data. Gingerich agreed and added that release locations, size at release, and

number of releases have all changed throughout the years, which makes it difficult to do these across-year comparisons. McLellan agreed and said he has had similar experiences with modeling in the Upper Columbia River that required adding all kinds of covariates and assumptions. This may be what is needed here or maybe not. Maybe this does not need to be this complex right now.

John Ferguson asked if a relative survival of 10% in the Wells Reservoir is low, compared to other reservoirs that are lightly populated and seeded with mitigation. McLellan said 10% is lower than the estimate for the Upper Columbia River. He has not looked at the Kootenai River White Sturgeon Program lately but, when he looked most recently, their estimate was a fair bit higher; although, they did have a year class failure where all fish were planted at small sizes. He thinks the Rocky Reach White Sturgeon Program estimates are higher, at least compared to the initial four BYs presented here. Survival estimates below 20% are pretty low, even for 125-gram fish. In the Upper Columbia River, the mean survival for 100-gram fish is approximately 40%. The Upper Columbia River does not have the bird predation issue that is present in the Wells Reservoir, but there is otter predation, which he thinks is underestimated. He would not be surprised if survival is in fact lower—but not that much lower.

Gingerich noted, regarding disproportionate bird predation, that in April 2018 Douglas PUD recovered 500 White Sturgeon PIT tags from a cormorant rookery in the Wells Reservoir. Of these 500 PIT tags, only 15 came from Grant PUD or Chelan PUD, and the balance came from Wells Project releases. He is unsure if there are other bird colonies that frequent Chelan PUD waters but, based on these numbers, it might be reasonable to guess that predation is higher in the Wells Reservoir. Ferguson asked, 500 PIT tags out of how many? Gingerich said that he would need to review these data and only brought this up because of uncertainties about bird predation being the same across the Columbia River Basin.

Ferguson said regarding the current White Sturgeon SOA, *Wells Reservoir White Sturgeon Supplementation 2018–2022*⁷, which stipulates releasing 325 fish per year at 200 grams per fish, his default thinking is whatever modeling is done needs to show a good reason to change what is stipulated in this SOA. The goal is to produce a population of 1,100 adults, and the indication, so far, is that Douglas PUD may be above this target, and these estimates may even be low. Gingerich said Douglas PUD will review the topics raised by McLellan.

⁷ Approved by the Aquatic SWG on January 11, 2017, and distributed on January 12, 2017.

Patrick Verhey asked if Douglas PUD and the Aquatic SWG have abandoned considering the Blue Leaf Environmental/LGL Limited model or “Shiny application”⁸? Gingerich said from Douglas PUD’s perspective, whatever path forward is decided does not preclude the Aquatic SWG from doing additional modeling in the future. Personally, he is advocating for a simplified approach using M&E data because it seems like forecasting population dynamics under various stocking and harvest scenarios, as done with the Shiny application, are more management issues than *White Sturgeon Management Plan* issues. Verhey said he understands this but noted that the *White Sturgeon Management Plan* does stipulate that some harvest will be provided. It seems important to understand what the carrying capacity of the Wells Reservoir is and what harvest is available. He thinks these details are important to know regarding future stocking rates. Therefore, he thinks there is some importance behind the Shiny application modeling.

McLellan said this approach is a way to get at vital rates and model inputs, but there is still a need to project stocking number estimates to achieve the objective. He does not believe the objective is just to reach 1,100 adults. This population goal then needs to be maintained. He thinks there is an understanding that there will be some level of stocking ongoing for the remainder of the license. This approach focuses on achieving the necessary model inputs and does not represent the actual projections, which will be an additional step separate from what Douglas PUD has put together here.

Gingerich said it is always a worthwhile exercise to review the specific language in the *White Sturgeon Management Plan*. There is some language that maintains authority of fish managers and co-managers around the harvest component, which seems outside of the *White Sturgeon Management Plan* objective, which is to achieve an adult population composed of diverse ages and sizes. He understands these are linked, but it is important for Douglas PUD to keep at the forefront of their minds what the requirements are regarding supplementation and mitigation under the *White Sturgeon Management Plan*.

10. Water Year and Total Dissolved Gas Performance for 2021 Bypass Season

(John Rohrback):

John Rohrback said the updated presentation *2021 Total Dissolved Gas* (Attachment D) was distributed to the Aquatic SWG by Kristi Geris on December 6, 2021. Rohrback reviewed the total dissolved gas (TDG) standards and TDG measurements for the Wells Project in 2021. In summary, there were no exceedances of the 125% or 126% TDG standards in the Wells Dam tailrace during the April to June period. There were no exceedances of the 120% or 125%

⁸ Chang, C., J. Cheng, J.J. Allaire, C. Sievert, B. Schloerke, Y. Xie, J. Allen, J. McPherson, A. Dipert, and B. Borges, 2021. Shiny: Web Application Framework for R. Available at: <https://CRAN.R-project.org/package=shiny>.

TDG standards in the Wells Dam tailrace during the July to August period. On July 15, 2021, the Wells Project had one exceedance of the 115% TDG standard in the Rocky Reach Dam forebay, which equates to 98% compliance. In 2021, TDG exceeded the 110% standard in the Wells Dam tailrace on eight hourly readings, which equates to 99.9% compliance. Columbia River flows passing Wells Dam were slightly higher than average in January and February, then decreased below average for the balance of the year. River flow never approached the 7-day, 10-year-frequency (7Q10) flow at Wells Dam⁹.

Breean Zimmerman thanked Douglas PUD for postponing this presentation until she could attend. She asked about possible reasons for the eight hourly TDG exceedances of the 110% standard in the Wells Dam tailrace. Rohrback said these were simply the effects of more inflow than could be passed through the turbine units, resulting in forced spill and a response in TDG. Zimmerman said she had no particular concerns about these exceedances but was just curious if they were caused by something other than the obvious.

VII. Administration

1. Upcoming Meetings (John Ferguson):

The Aquatic SWG meeting on January 12, 2022, will be held by conference call.

Other upcoming meetings include February 9 and March 9, 2022 (location to be determined).

List of Attachments

Attachment A List of Attendees

Attachment B Brood Year 2021 White Sturgeon Rearing Update

Attachment C Capture-Recapture Closed Capture Model for Estimating Abundance

Attachment D 2021 Total Dissolved Gas (Presentation)

⁹ 7Q10 flow at Wells Dam is 246,000 cubic feet per second (246 kcfs), where state water quality standards are waived, and flood control and human safety are prioritized.

Attachment A - Attendees

Name	Role	Organization
John Ferguson	Aquatic SWG Chairman	Anchor QEA, LLC
Kristi Geris	Administration/Technical Support	Anchor QEA, LLC
Andrew Gingerich	Aquatic SWG Technical Representative	Douglas PUD
Chas Kyger	Aquatic SWG Technical Alternate	Douglas PUD
John Rohrback	Aquatic SWG Technical Support	Douglas PUD
Steve Lewist†	Aquatic SWG Technical Representative	U.S. Fish and Wildlife Service
Breean Zimmerman	Aquatic SWG Technical Representative	Washington State Department of Ecology
Patrick Verhey	Aquatic SWG Technical Representative	Washington Department of Fish and Wildlife
Laura Heironimus*	Aquatic SWG Technical Alternate	Washington Department of Fish and Wildlife
Ralph Lampman	Aquatic SWG Technical Representative	Yakama Nation
Jason McLellan	Aquatic SWG Technical Representative	Colville Confederated Tribes

Notes:

- † Present during agenda Item VI-6 and Item VI-7
- * Present during agenda Item VI-9