Board Members in Attendance:

Bob Blanford Business Carl Petrick US Forest Service Chuck Roady, Landowner/Industry Dave Bobbitt, Idaho fish and Game Dick Staples, Mayor, City of Bonners Ferry, KVRI Co-Chair Ed Atkins, Corp. Ag/Landowner Eric Olson, Soil/Conservation Gary Aitken, Jr., KVRI Co-Chair Kennon Mclintok, Conservation/Environmentalist Tim Bertling, Boundary County, KVRI Co-Chair Sandy Ashworth, Social, Cultural, Historical

Agency/Others in Attendance:

Aaron Black, Idaho Fish and Game Aaron Gagnon, USFS Aaron Lawrence, USACE Austin Terrell, OSC Ben Robertson, Boundary County Bob Smathers, Farm -Bureau Caleb Davis, Office of Rep. Fulcher Carl Petrick, USFS Carson Watkins, IDFG Chris Bachman, Conservation Director, Yaak Valley Forest Christy Johnson-Hughes, U.S. Fish & Wildlife Cindy Lewis, NRCS, Bonners Ferry Dave Gray, Social/Cultural/Historical Dave Wattenbarger, Private Citizen Dick Staples, City of Bonners Eddie Whitcomb, FWS Emily Bonsant, Bonners Ferry Herald Ethan Cheng USACE Frank Edelman, Idaho Forest Group Genny Hoyle, KTOI Greg Hoffman, U.S. Army Corps of Engineers Jake Garringer, Governor Little's Office Jim Cadnum, Landowner/Industry Josh Stanley, District Conservation

Julie Smith, Office of Senator Crapo Karen Schumacher, KTOI Kevin Jones, Citizen Kevin Knauth, USFS Kierstin Cox, KTOI Leon Basdekas, U.S. Army Corp. Engineers Lumas Helaire, USACE Marc Klimer, Office of Senator Risch Michelle Richman, Department of Water Resources Nate Jensen KTOI, Fish & Wildlife Dept. Olivia Drake, Boundary County **Riley Jones, USFWS** Rob Morris, Citizen **Robert Atkin IDFG** Robert Vickaryous, Citizen Scott Soults, KTOI, Fish & Wildlife Dept. Sean Wilson, Idaho Fish & Game Shannon Ehlers, USFWS Shawn Young, KTOI, Fish & Wildlife Dept. Theresa Wheat, KTOI, KVRI Facilitator Tim Patton, Citizen Wally Cossairt, Boundary County William Barquin, KTOI

Tim Bertling Called the meeting to order at 7:02 and facilitated introductions in the room. *Theresa Wheat* assisted Zoom attendees in their introductions. Following introductions, Tim asked if there were any corrections or comments for the February 13th Draft minutes. None were had and the minutes passed by consensus.

Nathen Jensen was the first speaker of the evening presenting on Conservation Aquaculture.

Conservation Aquaculture

- Background
- Fish Restoration
- Release number
- Outcomes

1990 KTOI Sturgeon aquaculture 'Experimental'
1992 Burbot fishing closed, Sturgeon releases on
2000 Paragamian et al. Burbot collapse
2003 U of I Burbot aquaculture development
2005 MOU signed; conservation strategy
completed by stakeholders
2012 Master planning process complete
2015 KTOI hatchery 2 operational
2019 Burbot fishery re-opens
2020-2023 Sturgeon population restructuring,
early life stage releases now a part of Conservation Aquaculture program.

The aquaculture program for fish restoration and release strategies has a rich history spanning back to the early 1990s when the Sturgeon aquaculture program was in its experimental phase. The construction of the old facility in the late 1980s led to the commencement of sturgeon releases in the early 1990s. Similarly, Burbot aquaculture developments began in 2000, following the documented Bourbot collapse, with the signing of an MOU involving various stakeholders, co-managers, and action agencies. The Twin Rivers Hatchery became operational in 2015, following a master planning process in 2012. The reopening of the Burbot fishery in 2019 marked a major milestone in the program's history. Currently, the program is focused on Sturgeon population restructuring in the river and implementing a diversified release strategy for different species as part of the conservation aquaculture program.

What is Conservation Aquaculture? Conservation Aquaculture is the use of aquaculture to conserve and recover endangered fish populations. Paul Anders, the former official Wildlife Director, coined the term in 1998. However, a review paper by Frolic in 2017 criticized Anders' definition for being narrow and proposed a broader definition that separated conservation and aquaculture. Conservation refers to the careful preservation and management of natural resources, while aquaculture is the cultivation of aquatic organisms, especially for food. Therefore, Conservation Aquaculture is not food fish aquaculture, but rather, it focuses on conservation, recovery, research, stewardship, economics, and fisheries management.

Nathen Jensen, discussed the program's goals. The primary objectives are to prevent the extinction of Kootenai River endangered white Sturgeon and rebuild and maintain the population. The program's success has led to the reopening of a fishery in the river. Conservation Aquaculture aims to preserve wild genetics and create a healthy age class structure in the river. The program also aims to restore natural recruitment and identify bottlenecks through fish planting. Adaptive management plans are essential for success, and the program updates these living documents every year. The plans contain co-manager agreements and identify the program's direction for sturgeon and Burbot separately. Nathen emphasized that adaptive management is crucial for success.

Nathen Jensen discussed the different phases of the Conservation Aquaculture program's evolution, citing a step document dating back to 2004. In the experimental phase, the program had limited knowledge about producing and releasing families of fish. However, in 2009, the program released fish

back into the system from aquaculture, which was a significant milestone. From 2014 to 2018, the Twin Rivers Burbot facility came online and became one of the top two or three large-scale Burbot aquaculture facilities globally. Now, the program is focused on pulling adult fish from the river to use as broodstock, working closely with Idaho Fish and Game's program. The program is creating family groups that include multiple dads and releasing larvae and juvenile fish. They are no longer releasing fish over age one, and the program is focused on identifying bottlenecks in natural recruitment for Sturgeon and Burbot. Despite seeing some low levels of natural recruitment in the wild, the program is still chasing this bottleneck.

During the meeting, Nathen provided an overview of the program's different phases over the years. The experimental phase began in 2004, followed by the first release of fish back into the system from aquaculture in 2009. The Twin Rivers Burbot facility came online between 2014 and 2018 and is considered one of the top two or three large-scale Burbot aquaculture facilities in the country or world. Currently, the program is focused on creating family groups consisting of multiple fathers and one mother. Larvae and juvenile releases are the primary focus, and the program no longer releases fish over the age of one. The program is now using hatchery stocks from the river to provide broodstock and working closely with Idaho Fish and Game to ensure that 100% of the broodstock comes from the river. The program is also focused on addressing bottlenecks in natural recruitment, which has been low so far.

Nathen provided an example of a certain phase of the program during the meeting. The example included the first five years of the program and the last five years, demonstrating the changes in complexity over time. The program has gone through different phases with various hatcheries and release strategies over the years. The last five years have seen an increased complexity with changes in release timing and fish size. While some fish were released untagged early on, the program now aims to tag all fish for identification purposes. It's important to note that there are no unmarked fish in the program, as all fish have scute marks to identify them externally. Furthermore, in 2020, the program achieved another major milestone when the first Hatchery male was observed by Idaho Fish and Game. The following year, there were two males, and in 2022, there were four. The program is interested to see how the situation develops this year.

What is a Scute? Sturgeon fish have bony plates along their bodies, called scutes, which can be removed using a scalpel to create a unique number code on the fish. The scutes are arranged in rows along the fish's body, and the code is created by cutting away specific scutes in a particular pattern. This code can be read like Braille and indicates the year and hatchery of release for the fish.

Program Considerations: There are several program considerations for the conservation aquaculture program, including the large recovery area with limited areas to work in and genetic considerations for the donor stocks. Adult brood stock captures of Burbot and Sturgeon are coordinated with Idaho Fish and Game, and the success of permitting is a huge challenge. Disease susceptibility and specific pathogen-free certification of fish stocks are significant challenges, especially for transporting and releasing fish across international and state lines. Multiple species with overlapping life cycles, multiple crews, hatcheries, and a live feed laboratory all need to be coordinated to make the program work. There are approximately 20 employees within the Aquaculture Program

Challenges: During the meeting, Nathen Jensen discussed the challenges faced in fish restoration, including the low abundance of plankton and nutrients in the river, which affects the food for larval fish. Temperature-related issues are also a concern. The program needs to coordinate with other comanaging agencies and balance different priorities, such as ducks vs. fish, fish vs. cottonwood trees, and frogs vs. fish. The program uses a diversified release strategy that involves releasing multiple year classes and life stages within a two-year class for Burbot and Sturgeon. Parental-based tagging is crucial for monitoring and learning about survival rates for different life stages. The program also coordinates with habitat restoration programs to release fish into those areas. However, determining how many releases are enough is a trial-and-error process, and one example in 2017 showed no survival from 7 million larvae released into the main stem of the river.

General Considerations:

- Other species may be considered in restoration efforts alongside with habitat restoration program(s)
- Releasing hatchery fish in habitat restoration areas
- Each release effort (#s) needs to be "enough" to support population rebuilding... ex. lots of eggs vs. few juveniles ex. 2017 released 7M larvae in a cold high flow river condition = no survival
- This is a multi-phase, transboundary, multi-agency program (KTOI, BC, MFWP, IDFG, USACE, USFWS, USDA, CFIA, U of I, KVRI, BPA)
- Tag/release strategies (Co-manager agreements)
- Post-release survival, M&E (IDFG, BCMOF, KTOI)
- Spontaneous Autoploidy (SA) in the river (chromosome abnormality of Sturgeon)

Nathen discussed the annual program reviews and introduced a new topic of spontaneous autoploidy. Spontaneous autoploidy refers to an abnormal chromosome number in Sturgeon, where the polar body is retained within the egg, resulting in three sets of chromosomes. This can make the fish different and have long-term effects on generations down the road. The high incidence of spontaneous autoploidy can be costly, and if it's more than 50%, the entire family is killed. If it's between 10-50%, the fish are tested and sorted, and if it's less than 10%, they are released. The team has a co-manager agreement where only 500 individual juveniles from a single-family group are released, and the chances of a spontaneously autoploidy fish surviving to adulthood are minimal.

KTOI Rearing Strategies:

- KTOI only raises fish from egg to juvenile, and they do not rear fish to maturity.
- The juveniles are raised for either 3, 6, or 8 months, depending on when the egg is taken.
- For WST, the accelerated growth period is 10-11 months, and the fish are released in the spring.

KTOI Release Strategies:

- To aid in the transition of the released fish, they are released near cover.
- The fish are released in "family groups" to support RM&E (research, monitoring, and evaluation) studies.
- The project uses Parental Based Tagging (PBT) to identify and track the released fish

Nathen discussed that the program uses a diversified release strategy to release different life stages of sturgeon and burbot into the river for restoration. They release fertilized eggs, pre-feeding larvae, and juveniles, depending on the program's goals for the year. They isolate and rear family groups separately and use parental base tagging to track them to specific release areas in the river. The program focuses on releasing juveniles as their primary goal and avoids releasing fish in October due to low temperatures. The program also emphasizes monitoring and evaluation (RM&E) to assess the success of their release strategies. The Hatchery Manager is experimenting with a more natural incubation method that reduces handling stress during egg preparation to reduce the incidence of spontaneous autoploidy.

Example Release 2020: In March 2020, the pandemic hit, and the team had plans to take Sturgeon to Canada and stock Burbot all over the place, sitting on almost 30 million Burbot eggs at the time. However, COVID-19 forced the team to release everything rather than kill everything. With permission from the Tribal Council, the team stayed on for two days to take Burbot eggs and put them everywhere they possibly could with a co-manager agreement. This is an example of adaptive management and flexibility needed for the program, and while it was an extreme example, the team stocked all the West Side Tribes, and the Surgeon went to the primary stocking locations.

Results are starting to come back, and they have seen survival in three areas: Creeks, Boundary Creek, and Dodge Creek, and Upper Deep Creek. These two areas flow into MacArthur Lake, which is a unique habitat, and the team thinks that might be the reason for the survival. Water depth, substrate temperature, dissolved oxygen saturation are standard data that the team collects during releases, and these numbers provide a very accurate way of estimating the numbers of these eggs released early in life. Early life releases are now a major part of the program, with specific areas targeted. Idaho Fish and Game does large-scale RM&E around survival, but KTOI also goes in and collects data.

The team is culling high-graded fish from a family group, which includes fish with slow growth, deformity, not swimming right, swimming upside down, etc. They are trying to reshape the population and family groups they put out into the wild because there has been three decades of planting of fish. Recovery area disproportion in Canada compared to the United States is an issue, and the team's primary focus for releases is Idaho. Montana has a natural land barrier, and the team would like to release more sturgeon there. There are some issues cropping up around putting so many fish in a small area.

Early life releases now a major component of program: Nathan Jensen discussed the various life stages of Sturgeon that are released, including eggs, pre-feeding larvae, post-feeding larvae, and juveniles. The team has diversified release strategies, and there has been an increase in release numbers since Twin Rivers came online in 2015. While adult releases were more common in the past due to experimental work, the focus has shifted to younger life stages. The presentation zoomed in on the 2015 releases, emphasizing the diversified releases that took place even during the pandemic. They are accelerating growth and high grading those sturgeon, targeting a larger size for release in the spring when water temperatures are increasing in the river, which has proven to be more conducive to their survival.

Review of General RM&E Results of Hatchery Fish In-River: Over the decades, multiple hatcheries have been involved in Sturgeon releases. The program is now focused on accelerating growth and high-

grading Sturgeon, targeting larger sizes for release. Releasing Sturgeon in the spring, when water temperatures are increasing, has proven to be more conducive to their survival.

Marking and tagging practices have varied over the years, with some new studies being conducted by Idaho Fish and Game. The program is now also exploring in-river removals of earlier Sturgeon year classes that were not tested for spontaneous autoploidy prior to 2012. High numbers of fish released before 2012 were not tested for this condition, and as testing has now become more prevalent, it has been discovered that some families have over 50% spontaneous autoploidy.

What is spontaneous autoploidy? Sturgeon have eight sets of chromosomes, which means they have two sets of four chromosomes. However, if a set of chromosomes is retained, they can have 12 sets, making them dodecaploid. This still results in an even number of chromosomes, allowing for normal cell division (mitosis) to occur, where the cell can split into two equal parts, each with six sets of chromosomes.

When the autoploidy Sturgeon with 12 sets of chromosomes mates with a normal Sturgeon with eight sets, the next generation will have 10 sets of chromosomes (six from the autoploidy parent and four from the normal parent). This creates an issue during mitosis, as the cell cannot evenly split the 10 sets of chromosomes into two equal parts (5 and 5), resulting in an odd number of chromosome sets. This can create multi-generational impacts and potential issues for the Sturgeon population down the road.

The methods used in the program have evolved and become gentler over time. In the past, adult Sturgeon eggs were collected using more invasive methods, like using a salad spoon to remove eggs. Today, the program has adopted more refined techniques to ensure the well-being of the sturgeon population.

The population structure includes multiple year classes and families within each year class. The program aims to maximize genetic diversity by using as many brood-stock as possible and crossing multiple males with each female. Spawning fish are maturing, and growth rates are variable but overall good. Recruitment, however, remains uncertain, with low levels observed. The team is focusing on researching recruitment failure and potential obstacles that may be impacting the survival of young fish.

The Conservation Aquaculture Program aims to maximize genetic contributions within each year class. Parental-based tagging (PBT) has been a game-changer, allowing for more effective post-release research and monitoring. With PBT, a fin clip can be taken from the parent fish, genotyped, and entered into a database. This allows researchers to trace the offspring back to their parents, providing valuable information on the population's genetics.

PBT is a relatively new technique for Sturgeon, having been introduced around last year, while for burbot, it has been in use since around 2012-2013. The team has been using PBT exclusively for early life stage releases, as these fish cannot be tagged or marked in other ways.

Sturgeon, being classified as endangered species, fall under the Endangered Species Act Section 10 permitting. This means that they are required to be marked or tagged before release, ensuring proper monitoring and management of the population. Overall, the use of PBT and other innovative techniques have greatly enhanced the effectiveness of the conservation aquaculture program, providing valuable insights into the genetics and survival of these fish species.

Aaron Black was the next speaker, he discussed the monitoring tools and methods used for the Burbot population in the Kootenai River. These include hoop nets, pit tags, acoustic tags, genetic fin clips, and angler science program. The hoop nets are set up in different locations with different mesh sizes to target different size classes of Burbot. Five index locations have been established to identify trends in catch rates over time, these locations have been sampled since the early 90s. Once caught, the Burbot are subjected to a work-up process that involves length and weight measurements, pit tagging, floy tagging, and genetic fin clipping for parentage-based tagging and genetic stock identification. The fish are released back into the river except for those that meet a certain size class in January and February, which are brought to the Twin Rivers Hatchery for year class production.

The Kootenai River, experienced fishery closures in the 90's before conservation efforts began in 2005. The Kootenai Tribe of Idaho's Twin Rivers Hatchery opened in 2015 and the Burbot fishery in the Idaho portion of the river was reopened in 2019. Catch rates were consistently low prior to 2014. The 2022 season was the highest catch rate observed at the index sites since burbot monitoring began. The 2015 year class is of particular interest, with lengths ranging from 400 to 800 and various life stages released. Successful year class production and stocking success is important for maintaining representation of various size classes throughout the system.

Angler Science Program: is a passive survey method designed to monitor the Burbot fishery in the Kootenai River. Adapted from the Lake Pend Oreille Angler Science Program, it involves distributing packets to anglers containing information and instructions on collecting samples and recording fishing efforts. Each packet includes an informational brochure, a logbook for documenting hours, location, and catches, as well as a contact card for questions and to receive raffle prizes.

The primary goal of the program is to gather more samples and data on Burbot catches and angler interactions with the fishery. This data helps identify angler effort and catch rates, which can be used to supplement other monitoring tools such as hoop nets and genetic tagging.

Last year, they distributed ~140 packets and received 22 back. Within those 22 packets were 71 fish, resulting in an overall catch rate of 0.27 Burbot per hour fished. They also received PBT results from last year's program, which showed that the majority of the catch was from 2018- and 2019-year class fish, with fewer 2015 fish making up more of the larger size categories. This is consistent with the results of their hoop net sampling.

Aaron Black also discussed the use of environmental DNA (eDNA) to identify specific species and the quantity of their DNA in the water. They began using eDNA in 2021 and continued in 2022 during prespawn and peak spawn periods. Deep Creek stood out as an exception from the previous year's results, with a massive spike in DNA copies per liter during the mid-February peak spawn. This led to a project to set up hoop nets, pit tag arrays, in Deep Creek below McArthur Dam to capture and transplant Burbot above McArthur Dam. Fin clips will be used to later identify if transplanted Burbot successfully spawned in Upper Deep and Dodge Creek where co-managers have identified successful egg incubation and hatching after KTOI stocking events. While the season was not super successful, they were able to move 2 Burbot over the dam and will be able to use fin clips as part of a spawning matrix to identify if either of those 2 fish successfully spawned in Upper Deep and Dodge Creek. The project will continue with more netting locations and consideration of environmental variables that affect fish mobility.

Shawn Young presented next, he discussed the challenges faced in restoring natural recruitment in the area. While the objectives set 20-30 years ago have been exceeded, habitat issues still need to be addressed. Additionally, a new challenge has emerged in the form of contamination from runoff in the Elk Valley, due to large-scale coal mining in British Columbia. The Elk River Valley houses some of the largest coal mines in the world, and as they continue to expand to reach high-grade steel-making coal, the environmental cost has become apparent. Initially, the pollutants were localized, but now the discussion has expanded to include the Koocanusa Reservoir and the lower river. The issue of transboundary pollution also needs to be addressed.

Elk River Valley Mining: As the mines have deepened and expanded, the environmental costs have become increasingly apparent, with pollutants being first localized and then spreading to the Kootenai and ultimately the Koocanusa Reservoir. The selenium concentration in the water has steadily risen since 1984, with levels currently eight to nine times higher than historical background levels. Nitrogen is also present in high concentrations and is throwing off the balance of water chemistry in parts of the ecosystem. Both contaminants have significant ramifications for the ecosystem, fish, wildlife, and waterfowl. Shawn presented a graph showing the increasing selenium concentration in the Elk River over time.

During the meeting, Shawn Young discussed the significance of the number 15.1 in relation to the levels of selenium found in the egg ovary tissue of female fish. He explained that the Environmental Protection Agency had conducted a large-scale analysis of selenium's impact on aquatic organisms, specifically fish. The EPA found that if the selenium levels were below 15, the fish and its offspring would not be significantly impacted. However, if the levels were above 15.1, the fish would likely experience negative impacts on its health and reproduction. Shawn noted that this was the most important number to consider.

Shawn went on to discuss the monitoring of Mountain White fish, a fish species that had been collected for toxic analysis. He pointed out that almost every female Mountain White fish exceeded the protective criteria of 15.1, which was a cause for concern. The meeting then moved on to discuss the adult White Sturgeon, with Shawn noting that although the eggs' selenium levels were not exceeding the protective criteria, the highest egg selenium concentrations to date were found in the most recent sampling year. Shawn highlighted the importance of these findings, given the significance of the Sturgeon to their work.

Shawn provided an example of concerning data related to the Burbot population. The team had concentrated on female Burbot as they wanted to understand the situation with the eggs, which were crucial for the population's reproduction. They found that in around half of the sampled young females, selenium levels were approaching the protective criteria, which was unexpected, given the quick recovery of the population.

PBT with Tracking Toxins in Fish: Shawn went on to discuss the parental base tagging and how it allowed them to track where the fish were released and where they accumulated toxins. He explained that they knew which habitat the fish lived in and where they were likely to accumulate selenium. They found it strange that if they released the Burbot in Kootenai Lake, they did not accumulate selenium nearly as much as if they were released in other wetlands in Idaho or the main river.

Shawn highlighted the power of PBT to segregate which toxicants were accumulating where in the Kootenai ecosystem. He noted that they found high selenium levels in the liver of many males, and they were not catching many old males. This unbalanced sex ratio was unexpected, and they could not rule out the possibility that high liver selenium levels were contributing to it.

Shawn went on to discuss the issue of mercury, which had its own suite of issues to consider, including the need for human consumption advisories if fish with high mercury levels were being caught. They found that fish released in Kootenai Lake had high mercury but low selenium levels, while fish from river releases had high selenium and lower mercury levels. This was a matter of concern for the future.

The discussion also touched on the deformities seen in trout pictures sent in by anglers, which raised concerns about the impact of mining issues on the ecosystem. Eric noted that this issue was widespread and affected various fish species, including Burbot, Whitefish, some Rainbow Trout, Northern Pike, Red Side and Shiner females, and Sculpin females. The team planned to continue the conversation in April, following decades of efforts to help the ecosystem rebound.

Shawn noted the potential dilemma of restoring the habitat while allowing polluted water to transport toxins along with it. He explained that there were possible remedies to consider, but no substantial movement had been made on either side of the border yet.

Leon Badeskas discussed the water supply forecast for the Libby Dam area. The current forecast is lower than average at 84% (5.1 million acre-feet) due to a below-average snowpack, particularly in the upper East Kootenai region. The forecast may change as snowfall varies in the coming months.

So far this year, outflows from the dam have been adjusted according to the changing water supply forecasts. Minimum outflows have been maintained since February, and this is expected to continue at least until April.

Upcoming events include an Emergency Action Plan tabletop exercise, which aims to test emergency response preparedness with relevant agencies. A public meeting is scheduled for May 15th, where the official water supply forecast will be presented. The Dam Safety Office will also discuss risk communication and dam safety basics at the meeting.

Sub-Committee Updates:

Scott Soults gave a summary of the Grizzly Bear Sub Committee Meeting that happened in February.

Congressional Updates:

Marc Klimer spoke on a proposed bill *Good Neighbor Authority* that would allow Tribes and Counties to retain receipts from conservation projects on federal land, similar to how states already can. The bill would also allow Good Neighbor agreements to include State, Tribal, or other lands around forests and simplify contracting for forest management projects across borders. This proposal could potentially be *included in the upcoming Farm Bill.*

Agency Updates:

Fish and Game Department: The department has set Spring Chinook seasons for certain fisheries and will be scoping potential changes to the Honkers season to allow for more hunting opportunities. There is also an open house at their Coeur d'Alene office for public comment on a Drop Hold Management Plan. In terms of wildlife management, the department is working on controlling Chronic Wasting Disease (CWD) in the Slate grip drainage area and has detected 21 CWD-positive deer out of an estimated 500-800. They are also checking for CWD in the Salmon River area. There has been a 13% decline in the wolf population from its peak in 2020.

There were no further questions and the meeting was called 8:59 p.m.

Minutes prepared by Kierstin Cox