

**Yukon River Panel Restoration and Enhancement Fund
Project Proposal Summaries for 2021**

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Conservation

#1. Genetic Stock Identification of Pilot Station Chinook Salmon, 2021. Year 6.

Alaska Department of Fish & Game

Effective management of Yukon River Chinook (*Oncorhynchus tshawytscha*) salmon stocks originating from Canada requires an understanding of the proportion of the total run of Yukon River Chinook salmon that is Canadian origin near the mouth of the Yukon River before substantial in river harvest occurs. Canadian-origin Chinook salmon migrate through approximately 1,200 miles of fisheries in the Alaska portion of the drainage, and the Alaska Department of Fish and Game (ADF&G) manages those fisheries with a view to delivering to the Alaska-Yukon border the agreed spawning objective plus the midpoint of the Canadian guideline harvest range as defined in the Yukon River Salmon Agreement. An estimate of the Canadian-origin Chinook salmon run strength and migration timing is vital to ensuring appropriate management actions are taken to meet border escapement objectives. This project improves management of Yukon River Chinook salmon by providing in season estimates of stock composition of Chinook salmon migrating past the mainstem sonar project near Pilot Station in the lower portion of the Yukon River during distinct pulses and by providing a total run composition estimate post season. The ADF&G Gene Conservation Laboratory uses mixed stock analysis techniques to create in season stock composition estimates using genotypes of samples collected from the sonar project test fishery.

#2. Pilot Station fall season extension. Year 1.

Alaska Department of Fish & Game

The primary objective of this project is to more completely assess the late portion of fall chum and coho salmon passage at the Pilot Station sonar project by extending field operations beyond the August 31 end date to September 7. The daily estimates from the extended period will be reported to fishery managers daily, archived in the Arctic-Yukon-Kuskokwim Database Management System and included in the annual project report.

#3. Pilot Station and Eagle Sonar summer season extension. Year 1.

Alaska Department of Fish & Game

The primary objective of this project is to increase the likelihood that the entire Chinook salmon run is fully estimated at both the Pilot Station and Eagle sonar projects, by beginning operations early enough to assess the front end of the run. The funds requested would allow both projects to begin field operations one week prior to their respective normal start dates of June 7 for Pilot Station and July 5 for Eagle. The proposed early operations would cover installation of the projects during the dates of May 24–May 31 at Pilot Station and June 23–June 30 at Eagle. The result of the early installation would be that the Pilot Station sonar would begin reporting counts by June 1 and Eagle sonar would begin reporting counts by July 1. Early project operations will improve the completeness and utility of information provided to U.S. and Canadian fisheries managers and researchers tasked with endeavoring to achieve the objectives set forth in the Yukon River Salmon Agreement between the U.S. and Canada. The estimates from the extended period will

be reported to fishery managers and stakeholders daily, archived in the Arctic- Yukon-Kuskokwim Database Management System and included in the annual project report.

#4. Klondike River Chinook Sonar. Year 2.

Tr'ondëk Hwëch'in First Nation Government

Tr'ondëk Hwëch'in (TH) citizens are physically, culturally and spiritually connected to the Yukon River salmon fishery. This fishery has been a major contributor to the traditional economy since time immemorial and the Tr'ondëk Hwëch'in, or people of the river, have historically focused salmon harvest at the confluence of the Yukon and Klondike Rivers, or Tr'ochëk. As a primary stakeholder in subsistence and commercial salmon fisheries, TH has a vested interest in the health of salmon stocks found within their Traditional Territory. Klondike River Chinook salmon have faced declining populations for a number of decades, and we have been involved with and have supported salmon restoration projects in our Traditional Territory. We hope that our continued and persistent involvement in restoration efforts will one day result in the return of healthy salmon stocks to this watershed.

There are several candidate streams for Chinook stock restoration within the TH Traditional Territory due to a combination of historical harvesting practices and habitat associated effects. These include Coal Creek, Fifteen-mile River, Chandindu River and Klondike River. The Klondike River appears to be the highest priority candidate for stock restoration due to connection with Tr'ondëk Hwëch'in culture and heritage, historic contributions, historical impacts and accessibility. Klondike River Chinook have been impacted both during and after the Klondike Gold Rush due to large scale dredging/placer mining and associated hydroelectric developments. It is for this reason that TH prepared a Chinook stock restoration plan for the Klondike River watershed during early 2018 (EDI and TH, 2018). The restoration plan identified an instream incubation trial be conducted on the Klondike River to gather information on egg survival and timing of development. This project was funded by the Yukon River Panel during 2018, 2019 and a third year in 2020, however a combination of high-water level, turbidity and poor run conditions prevented the instream incubation trails from occurring. Therefore, a fourth (final) year is proposed for 2021 through a concurrent proposal to the R&E Fund.

TH feels very strongly that the operation of a sonar on the Klondike River to enumerate escapement to the watershed is key to monitoring future restoration efforts in the watershed. The Klondike River stock is also relatively early in the run compared to other stocks in the Canadian portion of the Yukon River watershed and therefore may provide an early indication of run strength and this stock may be more strongly influenced by in river fisheries in Alaska as compared to those when migrate later and are destined to more upstream spawning areas. This current proposal is to continue sonar operations on the lower Klondike River during 2021 to monitor spawning escapement to the watershed. From 2009 to 2011, a sonar was operated successfully on the Klondike River by B. Mercer and Associates. However, the site used previously is no longer desirable during to land tenure and access constraints and therefore a new site was identified directly downstream of the Klondike River bridge 2.6 km downstream of the former site. In 2020, a sonar was operated successfully at this new site located on the north side of the river adjacent to a TH land parcel.

#5. Chinook Salmon Sonar Enumeration on the Big Salmon River. Year 17.

Metla Environmental Inc.

The purpose of the proposed project is to continue to operate a sonar station on the Big Salmon River to enumerate the Chinook salmon escapement in 2021 and conduct spawning ground sampling to obtain biological information on the stock. The goal of the project is to provide a long-term dataset for inter-annual stock strength, run timing, ASL composition, and annual Chinook escapement estimates to the Big Salmon River. In addition, Big Salmon River Chinook enumeration will allow for corroboration of the genetic stock proportions obtained from sampling efforts at the Eagle sonar project. The specific objectives of the 2021 project are to:

1. Obtain an accurate count of the 2021 Chinook escapement in the Big Salmon River.
2. Obtain age-sex-length (ASL) data from as many post-spawn Chinook as possible with a target goal of 5% of the total run.
3. Support the DFO operated Big Salmon River Juvenile Chinook Out-migrant Assessment Study by quantifying adult returns from the Big Salmon juvenile assessment study.

#6. Pelly River Chinook Salmon Sonar Program. Year 6.

Selkirk First Nation

This proposed program is for a subsequent year of the Pelly River Chinook salmon sonar program that has been running from 2016 to 2020. The Pelly River supports Selkirk First Nation's (SFN) Chinook salmon fishery and is one of the largest contributors of Canadian origin Yukon River Chinook salmon, based on stock identification using microsatellite DNA loci at the Eagle sonar site near the Canada/U.S. border (average of 15.1%, from 2007 to 2013; JTC 2015). There is currently only five seasons of Chinook salmon escapement (2016 was a partial season) for the mainstem of the Pelly River (data collected during the 2016 to 2020 Pelly River Chinook sonar programs) and SFN is keen on further developing a more localized means to understand the population dynamics to inform management of this important Chinook stock. Fisheries and Oceans Canada (DFO) fisheries managers have also indicated there are data gaps in the genetic sampling for the Pelly River and this sonar program would contribute valuable information on the use of the Pelly River by adult Chinook salmon. DFO has shown a strong interest in contributing resources to ensure the success of this program.

It is understood that the Blind Creek weir had previously provided an index of escapement on an important spawning tributary to the upper Pelly River; however, the weir was located over 350 km upstream of the community of Pelly Crossing and did not provide an in-season count of Chinook in the lower Pelly River downstream of Pelly Crossing. Furthermore, the Blind Creek weir has not been operational since 2018. The genetic stock identification data collected at the Eagle sonar site only provides a post-season estimate of the number of Chinook that entered the Pelly River. A sonar program on the lower Pelly River provides a count that is local to Pelly Crossing, available in-season and accurate. In the past few years, the count has been used by SFN and DFO to actively manage the fishery. SFN continues to have an ongoing dialogue with DFO's Yukon staff with regard to the local management of the Pelly Chinook salmon stock; it is SFN's intention to take on more responsibility in the management and conservation of Chinook in the Pelly River through a locally developed Salmon Management Plan. A significant component in the plan includes developing an SFN operated stock assessment program for Chinook salmon on the Pelly River. In support of this objective, SFN located a candidate site in 2015 and completed five

seasons of sonar enumeration for Chinook salmon from 2016 – 2020. The site was shown to be a suitable location and successful in accurately enumerating the Chinook salmon migration in the mainstem of the Pelly River. This site is located approximately 20 km upstream of the mouth of the Pelly River and is downstream of all but one of SFN Citizen fish camps.

#7. Juvenile Chinook Salmon Outmigration at the Yukon River Mouth. Year 3.

Yukon Delta Fisheries Development Association

Yukon Delta Fisheries Development Association (YDFDA) is requesting funding to continue developing a long-term data series on the outmigration of juvenile Chinook salmon from the Yukon River. This research provides information on outmigration timing, diet composition, and energetic condition of Chinook smolts immediately before ocean entry at the three primary river mouths. Substantial effort has been invested in understanding the factors contributing to the survival and recruitment of Chinook salmon once they enter the marine environment. Still, there is limited information on factors affecting juvenile Chinook salmon's condition just prior to reaching this critical threshold. The correlation between the number of juveniles suggests that factors affecting recruitment likely occur earlier in the salmon life cycle, during freshwater and early marine (estuarine) life stages. This argues for the need to better understand juvenile Chinook salmon size and condition before emigration from the Yukon River. New research has also identified a decrease in the mean body length of female spawners in the Yukon River since the early 1970s. This size reduction is estimated to have resulted in a 15% decline in mean fecundity and a 28% decline in mean egg mass (Ohlberger et al. 2020). Data on smolt abundance and variability from the sampling of out-migrating smolts could provide insight into Yukon salmon populations' productivity. The YDFDA and the National Marine Fisheries Service (NMFS) have been collaborating on this research since 2014, and YDFDA has been the Principal Investigator since 2018. YDFDA hires local fishermen and local student technicians from the villages of Emmonak and Alakanuk to collect fish samples and environmental data during the summer. In addition to providing the only source of information on juvenile Chinook from the entire Yukon River just before ocean entry, this research also actively involves Yukon River community members in conservation and habitat science. YDFDA collaborates with NMFS to provide laboratory analysis of field samples, including diet and energetic condition, and manage and analyze the field data. This year, YDFDA will be providing their own biologist to oversee the field data collection, resulting in cost savings from not having to import biologists.

The Yukon Panel provided funding through the R&E fund for data collection and analysis for this research in 2018 and 2020. Because field personnel are based in the Yukon Delta, field data were successfully collected in 2020 despite statewide quarantines resulting from the COVID-19 pandemic. The specific objectives of this research are to:

1. Quantify Chinook salmon outmigration timing from directly after ice-out through the end of July.
2. Examine size (length and weight), growth, diet, and energetic condition of out-migrating juvenile Chinook salmon in relation to environmental variables in the freshwater and nearshore marine environment.
3. Collect genetic samples of juvenile Chinook salmon to assess outmigrant origin.

#8. KDFN Michie Creek Salmon Monitoring Project 2021. Year 23.

Kwanlin Dün First Nation

The Michie Creek spawning population is important to maintain as it represents one of the longest migrations of Chinook salmon in the Yukon drainage basin (3,200 km) and is upstream of the Whitehorse Rapids Dam. This population receives the greatest harvest potential due to the fact that they migrate through fisheries in both Alaska and the Yukon jurisdictions. As in all previous years, the main focus of the project continues to be providing access of migrating Chinook salmon to the primary spawning location at the outlet of Michie Lake in upper Michie Creek.

This project has been ongoing for over two decades. Over the life of the project many beaver dams and logjams have been breached to maintain the access to their primary spawning location. The project has been very successful to date however the combination of low flows and a delayed migration in 2019 resulted in single persistent beaver dam that prevented migrating salmon accessing to the primary spawning location for the first time. This beaver dam was destroyed, and other potential barriers were dislodged by abnormally high-water flows that were experienced during the open water season of 2020. While habitat conditions were near perfect at Michie Creek only 216 migrants made it through the Whitehorse Rapids Fish Ladder in 2020. Of these only 55 were female fish. Usually about 1,200 salmon are counted through the ladder and this year's run represents one of the lowest returns since counting began in 1959. A foot survey of upper Michie Creek in early September enumerated only 4 salmon redds. These low numbers combined with the poor returns in 2019 has resulted in two consecutive years where the upper Michie Creek spawning site has been largely underutilized. We are hoping for a larger return in 2021 to break this declining trend. Michie Creek is recognized as excellent Chinook spawning habitat that has maintained this population for millennia. In the past, Michie Creek has served as a suitable template for other restoration projects in the watershed. Included in this proposal is a second year of study assessing egg survival and rates of development in Michie and Wolf creeks. This information is essential and serves as an important benchmark for comparison and evaluation of other restoration projects throughout the Yukon.

This component of the project is directly linked another KDFN project proposal entitled Ibx River Chinook Incubation Trial and indirectly linked to the Teslin Tlingit Council's Deadman Creek Chinook Restoration Project in Teslin and the Tr'ondëk Hwëch'in Klondike River Stock Restoration Project in Dawson City.

Specific objectives of the project in 2020 are as follows:

- Maintaining access by adult Chinook to the primary spawning sites at the outlet of Michie Lake by removing any barriers that impede their upstream movement;
- Environmental monitoring of hourly temperature and flow at the Michie Creek spawning site, and temperature at the Whitehorse Rapids Fish Ladder as an index of habitat quality;
- Monitoring of the spawning population in Michie Creek, by counting redds, collecting age, sex, and length data; coded wire tags; sonar-radio tags, and DNA collections as requested;
- Assess the survival and developmental timing of Chinook salmon eggs near known spawning locations at Michie and Wolf creeks through the deployment of fertilized eggs buried in the substrates of these creeks;
- Provide the findings from Michie Creek and Wolf Creek incubation studies to assist Chinook stock restoration planning by Teslin Tlingit Council (Deadman Creek, Morley River), Tr'ondëk Hwëch'in (Klondike River) and Kwanlin Dün First Nation (Ibx River);
- Continuation of KDFN stewardship activities related to the management, maintenance and protection of salmon stocks and habitat; beaver mitigation; and dissemination of related information to KDFN citizens;
- Deliverables: Detailed technical report, hourly temperature (including Whitehorse Rapids Fish Ladder) and temporal flow estimates during the open water

season, egg development and relative survival (including Wolf Creek), redd and carcass counts, presentations as requested, meeting with stakeholders, the media and other researchers; and to provide information about the current status of beaver mitigation, barriers and escapement trends of Chinook salmon into Michie Creek through the contribution of articles into KDFN newsletters.

#9. Temperature monitoring of Yukon River Chinook Salmon spawning and migration habitats in Canada. Year 9.

AvF Research & Development

Goal: to develop a publicly accessible baseline of the thermal regimes of Yukon River Chinook Salmon spawning and migration habitats in Canada.

The objectives of the project are:

1. To continue collection of high resolution, high quality water temperature data that are representative of the waters monitored, comparable to other streams and rivers, and allow measurements to be repeated in the near and more distant future. Deliverables: • Narrative of the conduct of the project in the Annual Project Report; deploying, retrieving and downloading data loggers from a minimum of 12 Annual and 3 Seasonal Stations, as may be amended due to environmental conditions or to address emerging opportunities; preparation of data sets, and determination of mean, minimum and maximum daily temperatures; analysis of data against Alaska Department of Environmental Conservation Water Temperature Standards and Canadian Fraser River watch Thresholds, and reporting results in the Annual Project Report.
2. To distribute data collected and the results of preliminary analysis (daily mean/maximum/minimum temperatures) to FN/State/Territory/Federal agencies, institutes and NGOs and others, encouraging a wide knowledge of water temperatures in the YR Canadian Sub-Basin. Deliverables: The Pacific Salmon Commission has agreed to host the data from this program on the Yukon River Panel website. I am working with Michael Foulkes and John Son to accomplish this. It has been delayed due to the COVID situation.
3. To prepare an annual Project Report, resulting in dissemination of information and provision of network and environmental context to managers and interested parties. Deliverables: completion of report.

#10. Kluane Lake Chum Salmon Investigations. Year 1.

Kluane First Nation

This proposed project, primarily a research project proposed by the Kluane First Nation, aims to increase knowledge of a unique lake spawning population of chum salmon in Kluane Lake in the southwest Yukon. The initial rationale for this project arose when large (15–20 cm) juvenile chum salmon were found in a lake trout captured in Kluane Lake in March 2019. These juvenile chum salmon were photographed, and samples were positively identified by Department of Fisheries and Oceans (DFO) fisheries biologists in Whitehorse. This was the first time juvenile chum salmon of this size have been documented in freshwater within the Yukon River watershed, since juvenile chum salmon typically migrate to the ocean immediately after ice-out, when they are approximately 3–4 cm long. Kluane First Nation (KFN), Dan Keyi Renewable Resources Council (DKRRC) and DFO were interested in investigating this further.

To investigate the potential presence of large juvenile chum, KFN obtained funding from the Yukon Fish and Wildlife Enhancement Trust Fund in 2020 to complete a preliminary year of data collection, which encompassed:

1. Beach seining known and suspected spawning locations in Kluane Lake to look for young-of-the-year chum salmon in late June 2020.
2. Sampling lake trout stomachs (submitted by recreational fishers) for juvenile chum salmon. Other freshwater fish information was also collected incidentally. Approximately 40 stomach samples were submitted; these will be analyzed in fall 2020.
3. Beach seining for young-of-the-year chum salmon was conducted June 26–28, 2020. A total of 34 beach seine hauls were completed, with 1,302 fish captured and 16 non-lethal genetic samples collected. Species captured include slimy sculpin, round whitefish, lake whitefish, lake trout, longnose sucker, and Arctic grayling. Although no chum salmon were captured, the timing of the trip (which was affected by COVID-19-related decision-making and permit delays) may have been too late to capture young-of-the-year chum salmon given that it was over a month after ice-out.

The specific objectives of the 2021 Kluane Lake chum salmon investigations project are as follows:

1. Increase knowledge of chum salmon spawning habitat and life history specific to Kluane Lake by completing additional beach seining to capture young-of-the-year chum salmon and conducting aerial surveys for spawning chum salmon along the shoreline of Kluane Lake. Three beach seining trips are proposed, to increase the likelihood of correct timing.
2. Provide data to inform chum stock monitoring and restoration planning for Kluane Lake.
3. Provide local capacity building, including technical training and employment for Kluane First Nation citizens. The deliverables of this project will include:
4. A detailed technical report outlining the methods used and summarizing the results of the project. The report will also make recommendations for future studies and/or restoration opportunities, in particular for the shoreline spawning areas.
5. Information dissemination after the completion of the technical report. KFN and the DKRRC will share project results with the public via posters, newsletters, and public information sessions. A presentation will also be given to students at the local elementary school.

#11. Stewart River Chinook Salmon Sonar Site Feasibility. Year 1.

First Nation of the Na'Cho Nyäk Dun

The proposed project is a sonar feasibility assessment for the mainstem Stewart River within the Traditional Territory of the First Nation of the Na'Cho Nyäk Dun (FNNND). The FNNND remains concerned about low Chinook returns to the Stewart River watershed in recent years and has a goal to initiate operation of a sonar enumeration project in the near future in order to provide an escapement count for the watershed. The Stewart River watershed does not currently have any assessment projects for Chinook despite being defined as a Yukon Chinook salmon conservation unit (CU-74) and accounting for 6-10% of the Canadian origin Chinook (based on drainage wide telemetry projects and recent genetic sampling at Eagle Sonar).

The FNNND collaborated with EDI during 2015 to determine the feasibility of operating sonar on the mainstem Stewart River including the investigation of 26 candidate sites between the McQuesten River and the confluence with the Yukon River. Much of the work done by this 2015 project is still applicable and does not need to be repeated; however, in order to ensure that sonar can adequately be deployed in the next 1-3 years, confirmation of the two high suitability sites identified during 2015 is proposed for 2021. The proposed project will involve visiting these two candidate sites to: deploy an ARIS sonar to determine image quality, collect bathymetric data, determine test fishing locations, and investigate camp and access point locations.

The specific objectives of the Stewart River Chinook sonar feasibility project are as follows:

1. Confirm the suitability of the feasibility of sonar enumeration at candidate sites on the mainstem Stewart River building off of the 2015 candidate site investigation through: sonar test deployment, bathymetric data collection, test fishing site investigation and camp logistics.
2. Provide local capacity building, including technical training and employment for FNNND citizens.

The deliverables of the 2021 project will include a detailed technical report outlining the methods used and results from this project and recommendations for the future operation of a sonar enumeration project. The findings of this project will also feed into the FNNND's Community Salmon Management Plan, which is currently underway, similarly funded by the Yukon River Panel Restoration & Enhancement Fund. The future operation of a sonar on the mainstem Stewart River is an important component of future Chinook salmon in the FNNND Traditional Territory and the proposed 2021 project will be an important first step in achieving this goal.

#12. Porcupine River Salmon Predation by Freshwater Fish.

Vuntut Gwitchin Government

Salmon migrating up the Porcupine River through the Traditional Territory of the Vuntut Gwitchin First Nation (VGFN) are culturally important to VGFN citizens. Old Crow, the only Canadian community on the Porcupine River, relies on the salmon fishery as a traditional food source. The subsistence harvest is also an important component in the traditional lifestyle of Old Crow residents. The Porcupine River is one of the largest tributaries of the Yukon River watershed, much of which is located within the Traditional Territory of the VGFN. It has a number of large tributaries within Canada, including the Whitestone, Miner, and Fishing Branch rivers. Old Crow is located approximately 80 kilometers east of the Canada/U.S. border at the confluence of the Old Crow and Porcupine rivers. Old Crow has a population of approximately 300 people, mainly VGFN citizens. The Yukon portion of the Porcupine River watershed contains both Chinook and chum salmon, as well as the only population of coho salmon in the Canadian portion of the Yukon River watershed. DFO operates a sonar enumeration project on the mainstem Porcupine near Old Crow for both Chinook and chum in addition to an enumeration weir on the Fishing Branch River. The Fishing Branch River is the primary spawning area for chum salmon and is a truly unique spawning habitat due to prominent and persistent groundwater springs which allow the river to remain completely ice-free all winter, despite being located very near the Arctic Circle.

Despite efforts to manage harvest downstream, chum salmon returns at the Fishing Branch River have fallen below or within the bottom end of the escapement target for the last 5 to 10 years. This proposed project is a research project aimed at better understanding the amount of predation

on juvenile salmon by freshwater fish in the Porcupine River. It is envisioned that the proposed project would include collecting samples during two different times of year – late winter when local subsistence fishing takes place through the ice, and in later spring/early summer during the juvenile salmon outmigration period.

The July 2018 draft of the Porcupine Salmon Restoration Plan identified existing salmon monitoring and research activities currently underway in the Porcupine River watershed. The Plan also identified a number of projects for future consideration, one of which is the effect of predation on juvenile salmon by freshwater fish due to concerns raised by local community members. Page 5 of the Plan states: VGG citizens used to be spread widely across the Porcupine River Basin. Freshwater fisheries took place at numerous locations and captures were large. Most of these fisheries no longer take place, and there is a concern that more juvenile salmon are being eaten by freshwater fish (mainly Northern Pike, Inconnu/Sheefish and Burbot).

The proposed project plans to engage local VG subsistence fishers to submit stomach samples from captured burbot, inconnu and northern pike during the late March/early April burbot subsistence fishing period. Sample kits will be prepared for fishers including a Ziploc bag for stomach samples, sampling cards to ensure that fishers collect the required data, and a measuring tape. The Vuntut Gwitchin Government will plan to hire a local technician to assist in the sample collection and preparation during this sampling period. This component of the project will also provide an outreach opportunity to involve students from the local elementary school to partake in the project. During the late spring/early summer sampling trip, the project plan is to set nets farther upstream on the Porcupine River, potentially as far as the river reach known as “Porcupine Lake”. This area is about 120 km upstream of Old Crow and is well known by community members as a highly productive area for predatory freshwater fish. It is also located along the outmigration route for juvenile chum, Chinook and coho which originate from nearby spawning areas, most of which are further upstream of this location. Up to three days of sampling are planned to take stomach samples for analysis, with target freshwater species including northern pike, inconnu, whitefish, and burbot. As Porcupine Lake is a significant journey, there will be discussions with locals on more easily accessible locations that are also known to have high numbers of predatory fish if the trip to Porcupine Lake is deemed too ambitious. All harvested freshwater fish will be distributed in Old Crow for subsistence purposes. This project will also provide information on freshwater fish and therefore a proposal for this project will also been submitted to the Yukon Fish and Wildlife Enhancement Trust Fund (YFWET) during March 2021; this funder does not focus on salmon related projects. Also note that some of the project activities are planned to be completed prior to the funding decision from the R&E Fund, these components are to be funded by VGG and any R&E funds received will be applied to the components after these funds are made available.

Restoration

#13. Ta’an Kwäch’än Council - Fox Creek Salmon Restoration Project. Year 16.

Ta’an Kwäch’än Council

Fox Creek is a lake-headed tributary to Lake Laberge and the Yukon River, located approximately 50 km north of Whitehorse. It lies within the traditional territory of Ta’an Kwäch’än Council (TKC) and historically supported a Chinook salmon fishery. However, since the late 1950’s this stock has been extirpated. Habitat changes (forest fire, beavers and/or overfishing) may have played a role in this decline. To rebuild this extirpated stock, the Fox Creek Salmon Restoration Project, formerly known as the Community Stewardship Project, was designed in 2006 and field work on

the project began in the spring of 2007. The Chinook Salmon Stock Restoration Plan was completed in 2008 and was based on Oceans (DFO). The first fry were released in Fox Creek in 2009 and since then, Ta'an Kwäch'än Council (TKC) has worked closely with project partners; DFO, Yukon Energy Corporation, Whitehorse Rapids Fish Hatchery, McIntyre Creek Incubation Facility, Yukon College and Yukon Salmon Sub-Committee, to restore salmon habitat and salmon stocks in Fox Creek.

Since 2013 adult Chinook salmon have been observed returning to spawn. In subsequent years TKC increased adult survey frequency on Fox Creek to ensure returning salmon were documented and spawning locations identified. This added effort allowed TKC to document redd locations, and observations and sampling efforts at these sites, in the following season, resulted in the confirmation of spawning success with abundant wild 0+fry emergence documented each summer since 2016. In 2020 TKC implemented a video enumeration weir to obtain a more accurate number of total adult Chinook returning to Fox Creek. This also allowed for condition, size, sex, and origin of the adults to be more accurately documented. In the 2020 season four adult Chinook were documented passing through the video weir. However, due to technical difficulties and time constraints a full enumeration of adult Chinook in Fox Creek for 2020 was not possible - but with the lessons learned from this year, and some upgrades to the system, an accurate enumeration of adult Chinook in Fox Creek is anticipated for the 2021 season.

After 14 years of data collection and 11 years of fry releases in Fox Creek, we are now in phase II or the second salmon life cycle of this project. With assistance and guidance from project partners we are analyzing the data to determine the success of reaching our overarching goal and the future direction of this program. Overarching Goal "Ta'an Kwäch'än Council's goal for the Fox Creek Chinook Salmon Restoration Program is to re-establish a self-sustaining population of Chinook with sufficient spawners to have a high probability of long-term persistence, in the face of variability in survival due to natural changes in the environment. TKC aims to ensure that a viable natural stock is abundant enough to contribute to a sustainable harvest for current and future generations as part of their natural culture and heritage". Measurable project objectives, categorized into components, are detailed in Appendix B of the Fox Creek Chinook Salmon Restoration Plan Phase II – The Second Salmon Life Cycle. The components are:

- Project Planning and Implementation
- Training, Mentoring and Capacity Building
- Juvenile Chinook Monitoring
- Hydrology and Water Quality
- Trail Maintenance
- Beaver Management
- Redd Monitoring
- Adult Chinook Monitoring and Enumeration (using a video weir).

Deliverables:

1. TKC, with support from project partners, will continue to compile and analyze data collected over the life of the project including: juvenile Chinook condition factors; wild vs. enhanced present; spawning activity; enumeration of adults returning; water quality and temperature; hydrology. The results and conclusions will form part of the annual YRP reporting process.
2. By February 28, 2022, a complete 2021 Fox Creek Chinook Salmon Restoration annual report and financial update as well as an update of Appendix B – Phase II Annual Implementation and Monitoring Plan of the Fox Creek Chinook Salmon Restoration Plan will be provided.

#14. Deadman Creek Chinook Salmon Restoration Project - Year 5.

Teslin Tlingit Council

This project involves the continuation of the 2016-19 projects to reintroduce a spawning population of Chinook salmon to Deadman Creek using in-stream egg incubation (egg planting) methods and to further refine these methods as a restoration tool for Yukon River Chinook.

The 2016 work followed a project conducted by TTC during 2015 to identify potential Chinook stock and/or habitat restoration projects in the Teslin River watershed. In 2016 TTC began the process of preparing a Chinook restoration plan for the Teslin River watershed and now has a working summary of this plan. TTC also has a working version of a stock restoration plan for Deadman Creek. Although the proposed 2021/2022 project builds upon and continues the work from previous years, this year plans to scale back on the number of eggs planted and focus on monitoring rather than attempting to achieve the annual egg planting target of 50,000-60,000 eggs. The collection of sufficient brood stock from Morley River has proven to be unfeasible in some recent years due to low returns of spawners, necessitating a review of broodstock collection options and adapting project approaches to suit this situation. While the broodstock situation is reassessed, we plan to turn our efforts toward further understanding how the egg survival data from Deadman Creek in recent years compares to other Chinook spawning areas in the Teslin River watershed. Taking these factors into consideration, the 2021/2022 project will include planting a small number of eggs into Deadman Creek for monitoring purposes, and will be coordinated with continued, comparative data collection on other streams in the Teslin River watershed (see concurrent Morley and Nisutlin river proposals). A new component will also be incorporated into the project during 2021/2022 to determine, through the use of a video counter, whether adult Chinook are returning to Deadman Creek as a result of eggs planted in Deadman Creek in previous years. Eggs have been planted in Deadman Creek annually since 2016 and therefore returns during 2021 could include 4-year olds planted as eggs during 2017 and 5-year olds planted as eggs during 2016. Other components of the 2021/2022 project will include: the continuation of water temperature and water level monitoring, juvenile monitoring and the associated genetics analysis of the juveniles captured in Deadman Creek during the open water season, and the placement of fertilized eggs into a simulated water temperature regime (aquarium) to compare the effects of water temperatures on egg survival compared to the Morley River water temperature regime.

Specific objectives of the Deadman Creek Chinook restoration project are as follows:

1. Plant a small number of fertilized Chinook salmon eggs into Deadman Creek during 2021 to allow for continued monitoring of egg survival to hatching and emergence. Information to be considered along with comparative data from other Teslin River spawning areas to inform future egg planting efforts on Deadman Creek.
2. Deploy a video counter on lower Deadman Creek to determine if adult Chinook are returning to the stream as a result of egg planting efforts during 2016 and 2017.
3. Conduct a juvenile Chinook sampling program on Deadman Creek during the late summer of 2021 to determine the origin of the juveniles present in the stream (via genetic analysis).
4. Use simulated water temperatures in aquariums, to understand the effects of water temperatures on egg survival (in combination with TTC's concurrent Morley River proposal).
5. Provide local capacity building, including technical training and employment for local community members and TTC personnel.

The deliverables of the 2021/2022 project will include:

1. A detailed technical report outlining the methods used and the findings of the project activities conducted.
2. Samples (genetics and scales) will be collected from all adult Chinook captured on Morley River during brood stock collection and subsequently provided to DFO. It is important to note that the results of this project will also be used to guide TTC's future plans for Chinook stock restoration in the watershed by identifying suitable methods/conditions for hands-on restoration projects.

TTC has a concurrent proposal to the R&E Fund to continue investigations and collection of comparative egg survival data on the Morley and Nisutlin rivers.

#15. Klondike River Chinook In-stream Incubation Trial - Year 5.

Tr'ondëk Hwëch'in First Nation Government

Tr'ondëk Hwëch'in (TH) citizens are physically, culturally and spiritually connected to the Yukon River salmon fishery. This fishery has been a major contributor to the traditional economy since time immemorial and the Tr'ondëk Hwëch'in, or *people of the river*, have historically focused salmon harvest at the confluence of the Yukon and Klondike Rivers, or *Tr'ochëk*. As a primary stakeholder in subsistence and commercial salmon fisheries, TH has a vested interest in the health of salmon stocks found within their Traditional Territory. Klondike River Chinook salmon have faced declining populations for a number of decades, and we have been involved with and have supported salmon restoration projects in our Traditional Territory. We hope that our continued and persistent involvement in restoration efforts will one day result in the return of healthy salmon stocks to this watershed. There are a number of candidate streams for Chinook stock restoration within the TH Traditional Territory due to a combination of historical harvesting practices and habitat associated effects. These include Coal Creek, Fifteen mile River, Chandindu River and Klondike River. The Klondike River appears to be the highest priority candidate for stock restoration due to connection with Tr'ondëk Hwëch'in culture and heritage, historic contributions, historical impacts and accessibility.

Klondike River Chinook have been impacted both during and after the Klondike Gold Rush due to large scale dredging/placer mining and associated hydroelectric developments. It is for this reason that TH prepared a Chinook stock restoration plan for the Klondike River watershed during early 2018 (EDI and TH 2018). The restoration plan identified an instream incubation trial be conducted on the Klondike River to gather information on egg survival and timing of development. This project was funded by the Yukon River Panel during 2018/2019 and also during 2019/2020 and at the time this proposal was prepared, the project is well underway. A primary focus of this work to date has been to plant small numbers of eggs in various locations within the Klondike River watershed which have differing water temperature regimes to test how this influences egg survival and development. This information is planned to feed directly into TH's plans for some form of incubation facility on the Klondike River in the near future. However, the 2019/2020 season was troubled by low returns of spawning Chinook to the Klondike and therefore TH restricted the number of females collected for broodstock. For this reason, TH is proposing to conduct the project for a fourth and final year during 2021/2022 to provide more confidence in the data collected and test additional water temperature regimes. Using this information, a second main component of the proposed 2021 project is to work with DFO to receive input on how to design and implement an incubation facility on the Klondike River. This would also include the refinement

of the Klondike River Chinook Stock Restoration Plan to set the stage for continued Chinook stock restoration on the Klondike.

The specific objectives of the Klondike River instream incubation trial project are as follows:

1. Conduct an aerial Chinook spawning survey to obtain a count of spawners and redds in the Klondike River and North Klondike River while also identifying potential broodstock and egg planting locations.
2. Collect broodstock and deploy up to 30,000 fertilized Chinook salmon eggs into the mainstem of the Klondike River during late July 2021 to determine the applicability of this method for restoring Chinook stocks and to better understand the timing of egg/alevin development and survival.
3. Complete a second egg planting trip in late August 2021 to plant eyed eggs in the Klondike River – see Incorporation of an egg-eyeing isolation system (OPTIONAL COMPONENT) in Part 2 (eggs to be planted involve a portion of the 30,000 eggs indicated in the point above)..
4. Conduct follow up monitoring during the fall and winter of 2021/2022 to determine the success of the egg planting and document habitat conditions.
5. Work with DFO to update the Klondike River Chinook Stock Restoration Plan to design and implement some for incubation facility in the Klondike watershed.
6. Provide local capacity building, including technical training and employment for local community members.

The deliverables of this project will include:

1. A detailed technical report outlining the methods used and the findings of the field investigations conducted. This report will include a detailed description of the survival of eggs deployed into the Klondike River using a variety of methods. The aerial survey results and water temperature data collected at the egg planting sites will also be included in the final report.
2. An updated Klondike River Chinook Stock Restoration Plan to design and implement some form or larger scale restoration project on the Klondike such as an incubation facility.
3. Samples (genetics and scales) will be collected from all adult Chinook encountered in the Klondike River broodstock collection and subsequently provided to DFO.

#16. Ibex River Chinook Incubation Trial. Year 2.

Kwanlin Dün First Nation

This project is a small-scale instream incubation trial on the Ibex River (Takhini River tributary) to collect information on the suitability of the river as Chinook egg incubation habitat and inform restoration planning for the Takhini River as a whole. The Ibex River provides high quality juvenile Chinook rearing habitat and although spawning Chinook have been documented in the river in small numbers during the recent past, this project is required to better assess the quality of spawning habitat present and understand how the timing of egg development and survival to hatching and emergence compares to other Yukon River Chinook spawning areas where similar work is being undertaken in the Teslin and Klondike watersheds for example. The specific objectives of the Ibex River Chinook instream incubation trial project are as follows:

1. Assess the survival and timing of development of Chinook salmon eggs in the thermal regime at potential spawning sites in the Ibex River through the deployment of a maximum of 8,000 fertilized eggs. Review this information comparison to similarly collected data on the Ibex and Takhini Rivers as per KDFN's concurrent proposal for a similar trial on Michie and Wolf creeks and other streams elsewhere in the Yukon (Deadman Creek, Morley River, Nisutlin River and Klondike River) being assessed by other Yukon First Nations.
2. Assess the survival and timing of development of Chinook salmon eggs in the thermal regime in the upper Takhini River (Kusawa Lake downstream to Stony Creek) through the deployment of a maximum of 8,000 fertilized eggs.
3. Provide data to inform Chinook stock restoration planning for the Takhini River watershed and the future implementation of a larger scale restoration project within the watershed,
4. Provide local capacity building, including technical training and employment for Kwanlin Dun First Nation Citizens.

During 2019, Kwanlin Dün First Nation (KDFN) partnered with EDI Environmental Dynamics Inc. and Department of Fisheries and Oceans (DFO) to conduct a very small trial of this project on the Ibex River. Approximately 1,000 eggs were collected from two females in the Takhini on August 29, 2019. Monitoring of the development and survival of the eggs was completed throughout the winter and spring. Egg hatching was determined to occur during late February and emergence occurred at sometime during June; however, this could not be accurately determined due to unseasonably high water levels at this time. A complete estimate of egg survival could not be obtained due to the disturbance of the egg incubation media for the purpose of monitoring development. However, survival appeared to be highly variable ranging 10 to 40 % to hatching. A single mesh bag has survival to early emergence (advanced alevin) of 10%. During 2020, KDFN again partnered with EDI Environmental Dynamics Inc. to continue a second year of the egg incubation trial with the goal of having more egg planting sites and increasing the number of eggs planted for monitoring survival and egg development. Prior to the brood stock collection, an aerial survey was flown on the Takhini River from Mendenhall Landing upstream to the outlet of Kusawa Lake on August 25, 2020. A total of 61 Chinook was observed during the survey, including two clusters of 10 and 28 fish, however, portions of the survey (Kusawa Lake outlet) had poor visibility due to high water levels. The aerial survey was followed by brood stock collection on the Takhini; a total of 1,084 eggs were collected from a single female and fertilized/planted into 3 sites on the Ibex River. The ability to effectively plant the eggs was hampered by high water levels in the Ibex River; however, eggs were successfully planted for monitoring over the winter and spring of 2021. The amount of eggs planted during 2020 was less than initially planned due to the low returns of Chinook during 2020 and for this same reason, no eggs planted in the Takhini River during 2020.

The deliverables of the 2021 project will include:

1. A detailed technical report outlining the methods used and the findings of the field investigations conducted. This report will include a detailed description of the survival of eggs deployed into the Ibex River and Takhini River. The conclusion of the report will also outline recommended next steps for the continuation of this project in subsequent years.
2. Samples (genetics and scales) will be collected from all adult Chinook encountered in the Takhini River during brood stock collection and subsequently provided to DFO. The findings of this project will feed into the stock restoration plan for the Takhini River. This plan is currently under development by DFO and the results of this project will be very important in the identification of future restoration options for the watershed.

#17. Mica Creek Chinook Restoration Investigation. Year 2.

Selkirk First Nation

Mica Creek is a tributary to the Pelly River within the Selkirk First Nation (SFN) traditional territory and is situated in the community of Pelly Crossing. Mica Creek had previously boasted a population of spawning Chinook salmon that was an important cultural and subsistence fishery for SFN. Concerns have been raised for years over the dwindling Chinook salmon returns, with particular emphasis during the 2018 May Gathering held for all Northern Tutchone citizens. There is a considerable knowledge base of salmon utilization in the watershed; however, this information is dated (1990s, early 2000s) and required updating. As a result, a project was initiated in 2018 to update existing information of Chinook salmon in Mica Creek, to assist in determining suitable options for salmon restoration and enhancement within the stream. Existing community information indicates that although Chinook currently do spawn in the watershed, their numbers and extent of spawning habitat have diminished significantly from the recent-past. In addition to Pacific salmon stock numbers dwindling across the entirety of their range, habitat connectivity due to beaver activity was also cited as a concern for upstream migration of returning Chinook salmon. Chinook salmon are culturally and spiritually significant to Selkirk First Nation; as such, all aspects of this project would be in-line with SFN's Salmon Management Plan *Our Way - Salmon from Long Time Ago and Today*.

Following the reconnaissance work from summer and fall 2019, there continued to be growing interest in the community to pursue stock enhancements to help the salmon that are so culturally valued by SFN citizens. The 2019 work identified connectivity concerns due to beaver activity. High water levels in 2020 removed all dams before the 2020 spawning season began. The likelihood of beavers re-establishing these dams is high – thus SFN will address any new barriers in the spring and early summer of 2021, before Chinook spawning occurs. As connectivity becomes less of a concern following barrier removal, SFN wishes to focus on the broader goals of maintaining stock diversity and create sustainable harvesting opportunities. As such, SFN wishes to pursue a stock enhancement program by means of instream incubation of wild Chinook salmon in 2021 as a trial project. Mica Creek is located in a relatively pristine area, and the importance of focusing on sustainable actions to help native fish species is of the utmost importance to SFN. As this would be the first year of stock enhancement efforts, work would be completed on a feasibility scale. Three or four sites in proximity to Pelly Crossing will be prepared for egg planting and incubation on Mica Creek, with a maximum of 15,000 fertilized eggs planted into the stream. Selkirk First Nation's commitment to Chinook conservation is also demonstrated through two other initiatives within the SFN Salmon Management Plan: the Salmon Citizen Outreach and Communication Initiative, which is currently underway, as well as the Pelly Sonar which has operated since 2016.

This initiative is reaching out both within and beyond the SFN community, educating and engaging SFN Citizens and others about salmon management, assessment, and restorative efforts that SFN is working towards. Selkirk First Nation has hosted community meetings and made several presentations at the Northern Tutchone May Gathering to the Yukon River Panel, and by request at another First Nation General Assembly. There has been considerable interest from other First Nations to learn more about SFN's salmon-related activities. This project has strong community support and would provide employment and engagement opportunities for local youth and participation of elders. Due to the proximity of Mica Creek to the community of Pelly Crossing, community members and school groups would have the opportunity to participate and see Chinook salmon at different stages of development and feel a sense of stewardship and connection.

This project is intended to provide SFN citizens with an option for stock restoration that falls in-line with SFN's Salmon Management Plan *Our Way - Salmon from Long Time Ago and Today*. The specific objectives include:

1. Conduct an instream incubation trial to determine whether this is an effective stock enhancement technique for the watershed, based on survivorship of planted egg to alevin and fry developmental stages. Collect broodstock from nearby Kalzas River and transport eggs and milt to be fertilized and planted into Mica Creek.
2. Conduct stress physiology sampling on broodstock to determine the effects of parental stress on offspring survivorship in co-ordination with a project being led by Teslin Tlingit Council.
3. Monitor the development and survival of fertilized eggs during the fall, winter, and spring and relate to accumulated thermal units (ATUs) and parental stress parameters.
4. Conduct aerial spawning surveys for Chinook salmon from the mouth of Mica Creek to Towhata Lake during mid to late August 2021.
5. Provide training and capacity building opportunities for SFN citizens interested in fisheries biology and/or natural resources.

The deliverables of this project will include:

1. A detailed technical report outlining the methods used and the findings of the field investigations conducted. This report will include a detailed description of the survival of eggs deployed into Mica Creek. The conclusion of the report will also outline recommended steps for the continuation of this project on Mica Creek in subsequent years.
2. Samples (genetics and scales) will be collected from all adult Chinook encountered on Kalzas River during broodstock collection and subsequently provided to the Department of Fisheries and Oceans (DFO).
3. Stress physiology parameters will be collected and added to a body of research conducted throughout the Canadian Yukon River watershed – there is the potential to collaborate with researchers in Alaska. A peer-reviewed journal article is a potential deliverable; the results from the Mica Creek study would contribute to these works.

#18. Morley River Chinook Stock Restoration Planning. Year 2.

Teslin Tlingit Council

This project involves the continuation of a combination of field assessments and office-based tasks to set the stage for Chinook stock restoration on the Morley River, a tributary of Teslin Lake in the upper portion of the Teslin River watershed. Morley River is well known as a high-quality Chinook spawning stream and the stream continues to be used for spawning currently. During TTC's 2018 and 2019 upper Teslin River Chinook telemetry project, 10% of the Chinook which migrated upstream of Teslin Lake were relocated in the Morley River. The watershed has two distinct portions, the first of which extends 22 km from Teslin Lake upstream to Morley Lake. The second portion extends nearly 50 km upstream to Slim and Morris lakes. Although there are historic records of Chinook upstream as far as Slim Lake, the lower portion of the river between Teslin and Morley lakes is the most extensively used. The Deadman Creek Chinook stock restoration project has collected a considerable amount of information on Chinook spawning in Morley as this stream has served as a source of brood stock and a control stream for egg planting

methods being used in Deadman Creek. From 2016 to 2019 (2020 in progress), both egg-hatching and emergence success were high and provided strong evidence of the quality of the incubation conditions in Morley River, particularly the portion directly downstream of Morley Lake where this work has focused. The portion of the Morley River where this work was undertaken is located 1-2 km downstream of Morley Lake and therefore has very little fine sediment present and the stream remains open during the winter months due to the outflow of relatively warm water from the lake. Despite these highly suitable conditions for spawning, spawner returns to the watershed are far below historic levels based upon local/traditional knowledge and historical aerial survey data. For example, four aerial surveys were completed on Morley River (August 2019) between Teslin Lake and Morley Lake as a component of the 2019 Deadman Creek Restoration project. The surveys indicated a high count of 71 Chinook on August 20 and a total count of 85 redds was made on August 29 when it is expected that nearly all spawning was complete. Aerial surveys were again completed during 2020 with the highest counts observed on August 27 counting 15 live fish and 36 redds. Historical aerial surveys conducted during the early 1980s counted as many as 326 Chinook (Barton 1984) which appears to be considerably more than have been present in recent years. Based upon this collective information and the accessibility of the watershed, Morley River is an ideal location to conduct a stock restoration initiative.

The current project is proposed to collect additional information on the Morley River Chinook stock to refine a working version of a watershed-specific restoration plan for Morley River Chinook and to set the stage for implementation of a restoration initiative in the watershed. The specific objectives of the 2020/2021 Morley River Chinook stock restoration project are as follows:

1. Conduct two aerial surveys on the lower Morley River (Teslin Lake to Morley Lake) and one survey of the upper Morley River (Morley Lake to Slim Lake) to help inform future restoration efforts and provide an indication of spawning habitat utilization. Surveys to be timed for peak spawning (to count spawners) and at the end of the spawning period (to obtain a total redd count).
2. Assess wild egg survival in a small number of natural redds in the Morley River using freeze coring methodology. The information collected is a key consideration for future stock restoration in Morley River through instream incubation (egg planting). Instream incubation intervenes in the first portion of the salmon reproductive life cycle (egg fertilization) and therefore obtaining an estimate of wild egg survival is a critical component of future restoration efforts on Morley River. Consistent data collection is also planned for the Nisutlin River during 2021 (separate proposal).
3. Conduct an additional year of egg planting on Morley River in order to continue to collect egg survival data and provide a benchmark of comparison for this high quality spawning habitat as compared to Deadman Creek, Nisutlin River and the two simulated water temperature regimes (see following bullet).
4. In combination with TTC's concurrent Deadman Creek proposal, use simulated water temperatures in aquariums, to understand the effects of water temperatures on egg survival.
5. Conduct stress physiology sampling of brood stock captured to document stress levels in Morley River Chinook and the potential effects on egg survival.
6. Refine the Morley River Chinook stock restoration plan prepared as a component of the 2020/2021 project with new information gained during the 2021/2022 project.
7. Provide local capacity building, including technical training and employment for local community members.

The deliverables of this project will include:

1. A detailed technical report outlining the methods used and the findings of the field investigations conducted. This report will include a detailed description of the aerial surveys and the wild survival monitoring and draw upon comparative data from elsewhere in Teslin River watershed and further afar from other portions of the Yukon River watershed.
2. A revised stock Chinook stock restoration plan specific to the Morley River watershed to set the stage for future stock restoration efforts. It is important to note that the results of this project (wild survival) will not only be useful for this project but will also fill a considerable data gap for Yukon River Chinook and will help to inform Chinook stock restoration projects elsewhere in the Yukon River watershed, particularly those involving instream incubation.

#19. Takhini River Chinook Salmon Sonar Project. Year 1.

Kwanlin Dün First Nation

This project involves Chinook salmon enumeration on the Takhini River (Yukon River tributary) to monitor spawning escapement in the watershed. During 2017 and 2018, sonar enumeration of Chinook salmon was successfully completed by the Department of Fisheries and Oceans, Whitehorse. It is proposed that the site used by DFO be utilize again to set up and run and sonar enumeration program through the 2021 Chinook salmon migration period and to set the stage for operation of the sonar in future years. During 2017, DFO successfully conducted an assessment to determine the feasibility on sonar enumeration on the lower Takhini River. The sonar operated from August 10 to September 5 and including run expansion and species apportionment, an estimate of 1,872 Chinook was derived. Test netting was also conducted; 15 Chinook salmon and 36 freshwater fish were captured. The sonar was operated again during 2018 in an effort to enumerate a larger portion of the Chinook run with the project operational from August 1 to September 5. An estimate of 1,554 Chinook was derived, again including run expansion and species apportionment. The amount of test netting was increased compared to 2017 and resulted in the capture of 54 Chinook salmon and 11 freshwater fish.

The specific objectives of the Takhini River Chinook salmon sonar project are as follows:

1. Provide an accurate, in-season and post season count of Chinook salmon escapement into the Takhini River during 2021;
2. Conduct test netting to confirm species in the sonar count data between Chinook salmon and all other larger freshwater species;
3. Collect age, sex, length (ASL), genetic and scale samples from Chinook salmon captured during the test netting program; and
4. Provide local capacity building, including technical training and employment for Kwanlin Dun First Nation Citizens including site tours and visits to the sonar.

The deliverables of the 2021 project will include:

1. Daily sonar counts provided by KDFN and fisheries managers (DFO) during the operation of the sonar.

2. A detailed technical report outlining the methods used and results from this project (daily and cumulative estimates of Chinook salmon passage at the sonar site, test netting effort and capture data, pre and post season expansion and a discussion of suggestions for subsequent years of operation).
3. Samples (genetics and scales) will be collected from all adult Chinook encountered in the Takhini River during test netting and subsequently provided to DFO. The findings of this project will help to set the stage for stock restoration in the Takhini River watershed by providing accurate estimates of spawning escapement prior to the initiation of a well-designed restoration project.

#20. Nisutlin River instream incubation trial and aerial surveys. Year 1.

Teslin Tlingit Council

This project involves a combination of field work and assessments, aerial surveys, and office tasks to complete a small instream incubation trial in the mainstem of the Nisutlin River with the intent of gathering comparative data for Chinook egg survival in Deadman Creek, Morley River and other Yukon Chinook spawning areas. The Nisutlin River is the largest Chinook spawning area in the upstream portion of the Teslin River watershed (upstream of Teslin Lake) as determined by local knowledge, historical information, and further supported by the results of the 2018/2019 Upper Teslin River Chinook telemetry project conducted by Teslin Tlingit Council. In recent years, Morley River has been used as a control for Chinook restoration in the Teslin River watershed (Deadman Creek). It is now believed that the incubation conditions in Morley River are near to perfectly ideal for Chinook and as such, observed survival rates from monitoring activities here likely misrepresent the average natural survival rates of salmon eggs through to emergence that would be naturally expected for a healthy spawning population to exist in other water bodies throughout this watershed. Egg survival during the 2018/19 Deadman project indicated a mean hatching rate of 75% in Morley River and 44% in Deadman Creek. Previous work done on the Nisutlin River has shown that it could potentially be a better control to compare to restoration efforts in the Teslin River watershed, and, more specifically, provide more appropriate comparisons for assessing the success of incubating activities in Deadman Creek.

The specific objectives of the project are as follows:

1. Conduct 2 aerial surveys on the Nisutlin River mainstem, and single surveys on One Hundred Mile Creek and the Wolf River, to help inform future restoration efforts, provide an index of spawners, and aid in locating broodstock collection areas. Surveys to be timed for peak spawning (to count spawners) and at the end of the spawning period (to obtain a total redd count).
2. Complete an instream incubation investigation with eggs planted at 4-6 sites in the mainstem of the Nisutlin River between the access point known as Portage and One Hundred Mile Creek to assess the utility of instream incubation restoration methods in this and similar water ways.
3. Assess wild egg survival in a small number of natural redds in the Nisutlin River using freeze coring methodology. The information collected is a key consideration for future stock restoration in the Nisutlin River through instream incubation (egg planting), and to compare to Deadman creek.
4. Conduct stress physiology sampling of brood stock captured to document stress levels in Nisutlin River Chinook and the potential effects on egg survival.

5. As an *OPTIONAL COMPONENT* to serve as comparative data for Deadman Creek, conduct assessments on One Hundred Mile creek, a small creek in the Nisutlin tributary similar in size to Deadman Creek, including a small instream incubation trial to assess egg survival and a wild survival assessment.
6. Provide local capacity building, including technical training and employment for local community members.

The deliverables of this project will include a detailed technical report outlining the methods used and the findings of the field investigations conducted. This report will include a detailed description of the aerial surveys and the wild survival monitoring as well as the optional field assessments on 100 Mile Creek. It is important to note that the results of this project (wild survival) will not only be useful for this project but will also fill a considerable data gap for Yukon River Chinook and will help to inform Chinook stock restoration projects elsewhere in the Yukon River watershed, particularly those involving instream incubation.

Stewardship

#21. Southern Lakes Community-Based Salmon Management Plan. Year 3.

Big Fish Little Fish Consultants & Infinity SES

The Southern Lakes Salmon Management Plan has been proceeding well over the last two years. The initial phase included extensive background research, literature review and community engagement. This culminated in the 80-page final report titled 2019 Southern Lakes Community-based Salmon Planning Year End Report. The second year was to be the final phase with additional strategic oversight by the First Nation's Technical Working Group (TWG), implementation, community engagement and final plan production and review. Unfortunately, with the onset of covid-19 the final plan review with the community through traditional engagement processes was impossible with First Nation communities and Governments no longer physically meeting with citizens. Efforts were made over year two with consistent meetings with the TWG and consultants to conduct internal community engagement and to proceed to the Final DRAFT plan stage. In order to reflect the true "community-based" nature of the plan, a third and final stage is being proposed in order to complete the project due to the covid-19 complications with community engagement. The final DRAFT plan will have been completed by March 31st of 2021. This final phase 3 will focus on taking the final DRAFT to the citizens of Kwanlin Dün First Nation, Ta'an Kwäch'än Council and Carcross/Tagish First Nation to produce a vetted, revised and professionally designed and printed FINAL plan.

Specific Objectives and Goals for the Engagement and Plan Production:

1. Take the final DRAFT Southern Lakes Community-based Salmon Management Plan (from year two of the project 2020-21) to the community and First Nations Governments for final review.
2. Facilitate engagement with the community and First Nation Governments of Kwanlin Dün First Nation, Ta'an Kwäch'än Council and Carcross/Tagish First Nation.
3. Update and revise the final DRAFT Southern Lakes Community-based Salmon Management Plan to FINAL status based on feedback from engagement efforts.
4. Produce, design and print the FINAL Southern Lakes Community-based Salmon Management Plan.

Communications

#22. Yukon River Salmon Summer Pre-Season Preparation Meeting. Year 12.

Yukon River Drainage Fisheries Association

Provide a short and concise summary of the project that includes your goals and objectives, and the specific deliverables you'll provide to the Yukon River Panel by the end of this project. The project goal is to conduct public outreach to an adult audience of active Yukon River fishers to build a more aware public constituency that is motivated to maintain and protect salmon stocks of Canadian origin. Over the past eleven years the Yukon River Drainage Fisheries Association (YRDFA) has hosted a one-day meeting to discuss pre-season planning for the management of declining Canadian origin Chinook salmon, fall chum, and other important issues related to the upcoming fishing season. Meeting attendees include Tribal Council representatives, state and federal fisheries management agencies and other Yukon River fishery stakeholders. The meetings are a necessary annual event convening stakeholders, representing a majority of Yukon River fishing communities along the Alaskan portion of the Yukon River, with Alaskan agency fishery managers to discuss how to protect Canadian origin Chinook and fall chum salmon and meet other management goals. Meeting the Canadian escapement goals defined through the Yukon River Salmon Agreement of 2001, requires a close, respectful, and detailed approach to fisheries management and social communications support in Alaska. There is no replacement for finding agreement on management objectives, gaining buy-in from fishers from the 42 villages along the length of the Alaskan Yukon River than the Summer Pre-season Preparation meeting. This meeting sets the stage for the fishing season to come. Through an inclusive process with the fishers and communities they represent, the views and concerns of those most affected by management goals and decisions are incorporated and this process builds the social and scientific support they need to make difficult sacrifices, when called upon. Additionally, this meeting maintains and builds the working structure necessary for managers to gain the information and working relationships necessary to meet management goals. Paramount among these goals is meeting the agreed upon escapement range of 42,500-55,000 Canadian origin Chinook salmon and 70,000-104,000 fall chum salmon and the fishing allocations for Canada and Alaska as described in the Yukon River Salmon Agreement.

#23. Enhanced Education and Outreach – Salmon in the Schools. Year 3.

Rivers to Ridges

The Salmon in the Schools (SIS) program was piloted in 2017-18, delivered and refined in 2018-19, was further enhanced for 2019-2020, and continued to be offered in 2020-2021. We propose to sustain and maintain the programming and content in 2020-2021. Rivers to Ridges (R2R) will continue to enhance the classroom, public relations, partnership development, media relations and communications components of the program. R2R delivers meaningful land-based programming that connects young people to their outdoor environments with a focus on stewardship and environmental awareness. In this next stage of the program, we aim to work with the relevant stories and modules we made in the past, and work with and support Yukon teachers and local salmon stewards to provide training with educators so they can learn to facilitate the curriculum we have developed. While DFO currently supports these technical elements (tanks, egg takes, maintenance etc.) of the Stream to Sea program, R2R will offer relevant educational follow-up support to teachers in the form of offering resources, classroom visits across the Yukon, relevant educational support that is outdoor, land-based, and culturally connected. The curriculum document we spent three years producing with this fund ('Salmon in the Schools' Yukon) - has

been printed 150+ copies and has now been distributed across the Yukon at many classrooms and communities for educators to access. The impetus for this project continues to be driven by the concern that the Yukon public is losing their connection to Yukon salmon. In the absence of being able to fish for Canadian-origin Yukon River and Porcupine salmon (recreational and commercial) and drastic conservation (subsistence) amongst First Nations and rural Alaska and Yukon, there are limited opportunities to harvest and make a connection. In the absence of this connection there is a concern that they will no longer value and protect this resource.

The goals of the project are:

1. To increase public education and awareness around Yukon River and Porcupine River salmon,
2. To support and encourage students and teachers across the territory to learn about Yukon River and Porcupine River salmon
3. To increase the profile and utilization of the Salmon in the Schools program in Yukon, and
4. To ensure the Salmon in the Schools message reflects the current resource and management realities for Yukon River and Porcupine River salmon and the people and communities that depend upon them.

The objectives of the project are:

1. To work with current teachers and educators to ensure the Salmon in the Schools program is well understood, utilized and fully subscribed,
2. To connect those educators and classrooms in the program together to continue to build the Salmon in the Schools community (especially our online platform)
3. To ensure the curriculum reflects the current resource status (i.e. low productivity, lack of females, size changes), the sacrifices being made by Alaskans and Yukoners, and the Yukon River Salmon Agreement treaty specifics and implications,
4. To ensure the media and other salmon stakeholders are aware of the program through media releases, stories in publications, social media,
5. To document the successes of the program through testimonials (written and visual), photography, and/or video,
6. To build capacity within rural Yukon communities through mentoring opportunities.

For 2021-2022, the deliverables for this project include:

1. Visit schools throughout the Yukon as needed to work with students and teachers to deliver Salmon in the Schools curriculum Build up the online website for educators to include audio and/or video footage that can be used in classrooms for teachers, as well as other media and materials required for school delivery
2. Contact existing and new educators and the Department of Education to ensure they are aware of the specifics and the enhanced education and outreach status of the program (continued from last year)
3. Deliver the new curriculum in selected Yukon schools Some of our main findings from previous years of working on this project have been enlightening, and which have led us to apply for funding again to sustain this program.

Between 2019 and 2020, (<https://salmonintheschools.com/>), we have had many teachers across the Yukon and BC download or receive a paper copy our resource manual to use in their classroom with their students. We have had numerous positive testimonials and interest in us returning to the schools in the coming years. For the 2021-2022 year, our main intention is to support Yukon schools and teachers in offering innovative, Yukon-based salmon programming with resources and virtual/in-person visits.