

Yukon River Panel Restoration and Enhancement Fund
Project Proposals for 2018

Conservation

#1. Genetic Stock Identification of Pilot Station Chinook Salmon, Year 3.

Alaska Department of Fish & Game

Effective management of Yukon River Chinook (*Oncorhynchus tshawytscha*) salmon stocks originating from Canada requires an understanding of the stock composition of the run as it enters the river. 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 (GCL) creates in-season stock composition estimates using genotypes of samples from the sonar project test fishery in mixed stock analysis (MSA).

Genetic baselines are always evolving. This project has successfully used a baseline of 36 populations genotyped for 42 single nucleotide polymorphisms (SNPs) to estimate the contribution of Canadian-origin Chinook to Yukon River runs. This vetted baseline will be the default for use in 2018 analyses. However, we will investigate improving accuracy and precision of estimates by incorporating novel, informative SNPs to the baseline prior to the start of this project. We will only use the improved baseline if its ability to discriminate among stocks is better than the default baseline.

#2. Yukon River Chinook Salmon Subsistence Harvest Genetic Stock Identification, Year 3.

Alaska Department of Fish & Game and Spearfish Research

An understanding of the total harvest of both U.S. and Canadian-origin Yukon River Chinook salmon is necessary in order to address harvest sharing objectives outlined in the Pacific Salmon Treaty (PST). Important subsistence fisheries occur in Alaska across distinct fishery management districts on the Yukon River and stock composition of the subsistence harvest varies among these districts because of differences in harvest timing, location, and gear used. Complete information on these harvests is critical for creating Canadian-origin Chinook salmon brood year tables and run reconstruction, which form the basis of the spawner-recruit models used to estimate past and future run productivity and establish escapement goals for Canadian-origin Chinook salmon. These data also help managers understand effects of management actions and fishing gear on harvest composition. The objective of this proposal is to collect representative

mixed stock analysis (MSA) information, coupled with age, sex, length (ASL) data, from the Chinook salmon subsistence harvest in the Coastal District and Districts 1 through 5. Similar to previous programs, sampling will be done by local community members under the supervision of Spearfish Research biologists and in accordance with ADF&G sampling protocols (Eaton 2015). Participants will be paid for the samples they collect in order to encourage participation in the program. The co-principal investigators from ADF&G will receive the raw data and will estimate ASL and stock composition of the subsistence Chinook salmon harvests from Districts 1-5. A brood table will be published in the annual JTC report while a separate ADF&G report will document data collection, harvest composition, and comparisons to historical patterns.

#3. Genetic Stock Identification of Canadian-origin Yukon River Chinook and Chum Salmon.

Fisheries and Oceans Canada

Each year, tens of thousands of Chinook and chum salmon return to the upper Yukon River in Canada. The question arises: *Of all these fish that return, where do they go and what stock do they belong to?* Though physical and behavioural characteristics (e.g., timing of migration and fat content) can tell an observer some things about the regional origin of a salmon, the specific stock identity cannot be determined without examining genetic characteristics of these fish. Using genetic markers called microsatellites (though other genetic markers can also be used), it is possible to assess probabilities that a salmon originates from a specific stock of origin (Beacham 2003a and 2003b). This means we can create genetic profiles of every salmon sampled and assess the likelihood that it originates from a range of documented spawning populations represented within the genetic baseline.

Though we tend to think of Yukon River salmon as a single stock, in reality each year's salmon run is a stock complex that is composed of numerous stocks (or populations), that vary in proportional contributions through time. Each population originates from a different river, and in turn returns to this natal river to spawn. As a generality, these populations do not interbreed (i.e., they are reproductively isolated) and over time, have diverged from each other. Thus, within the Canadian-origin Yukon River salmon aggregate, there is biocomplexity. Evidence from other salmon stocks has highlighted the importance of diversity in metapopulations in maintaining resilience of stock aggregates (Hilborn et al. 2003). Much like economic theory, a diverse portfolio enables stability of the aggregate stock as individual populations are able to adapt and persevere under varying conditions through time (Moore et al. 2010).

This project describes the stock composition of salmon returning up the Yukon River to Canada. It estimates what proportion of these fish return to each of the genetically-identifiable stocks. Though monitoring of the aggregate is practical and the basis for much of the management (e.g., how many Chinook in total returned to the Yukon River this year, and how many Chinook in total returned to Canada), it is equally important to understand status and trends at the population (or stock) level. Given the size of the Yukon River watershed, different salmon populations may experience differences through time (e.g. climatic or environmental variation and adjacent management practices etc.).

#4. Blind Creek Chinook Salmon Enumeration Weir, Year 16.

J. Wilson and Associates

The purpose of the proposed project is to install and operate a weir in Blind Creek to enumerate the 2018 Chinook salmon escapement and conduct live sampling to obtain biological information from the stock. The weir project will also provide a salmon viewing opportunity and on-site interpretation of the salmon resource and management programs.

The goals of the project are: a) To enumerate Chinook salmon entering the Blind Creek watershed in 2018; b) To provide a long term data set of information on a Chinook spawning stock in the proposed Pelly River Conservation Unit and c) To increase public awareness of Yukon River salmon management programs and conservation. This project will build on the information obtained from the 2003 to 2017 Blind Creek weir projects.

#5. Sonar Enumeration of Chinook Salmon on the Big Salmon River, Year 14.

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 2018 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 escapement estimates of the Big Salmon and the Yukon River in addition to verifying the accuracy of the genetic stock proportions obtained from sampling efforts at the Eagle sonar project.

The specific objectives of the 2018 project are to:

- 1) Obtain an accurate count of the 2018 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 proposed 2018 DFO operated Big Salmon River Juvenile Chinook Out-migrant Assessment Study.

#6. Pelly River Chinook Sonar Program, Year 3.

Selkirk First Nation

This project proposes to operate a sonar enumeration program on the lower Pelly River (downstream of the community of Pelly Crossing) for the purpose of enumerating Chinook salmon that spawn in the mainstem Pelly River and all of its tributaries. The Pelly River supports SFN's 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). There are currently only two seasons of Chinook salmon escapement (one of which is only a partial season) for the mainstem of the Pelly River (data collected during the 2016 and 2017 Pelly River Chinook sonar program) and SFN is keen on developing a more localized means to understand the

population dynamics to inform management of this important Chinook stock. DFO fisheries managers have also indicated there are data gaps in the genetic sampling for the Pelly River and that 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 provides an index of escapement on an important spawning tributary to the upper Pelly River; however, the weir is located over 350 km upstream of the community of Pelly Crossing and does not provide an in-season count of Chinook in the lower Pelly River downstream of Pelly Crossing. 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 would provide a count that is local to Pelly Crossing, available in-season and accurate. Such a count will be used by SFN and DFO to actively manage its fishery.

#7. Upper Teslin River Watershed Chinook Radio Telemetry.

Teslin Tlingit Council

This project involves the application of radio tags to Chinook salmon in the Teslin River (upstream of mainstem spawning areas) to obtain a more comprehensive understanding of the distribution of Chinook spawning in the upper portion of the Teslin River watershed. Understanding of the extent and relative importance of tributaries used for spawning will guide monitoring efforts and future restoration activities to places where they are appropriate and will have the greatest potential for contributing to the restoration of Chinook salmon stocks. The total tags which migrated to this portion of the watershed during the 2002 and 2003 drainage wide telemetry projects (9 in 2002; 17 in 2003) is too small of a sample size to draw conclusions upon the relative importance of each of the tributaries in the watershed or to document the extent of spawning in the upper Teslin watershed. Furthermore, some well-known spawning areas did not contain any tags during 2002 and 2003 and thus there is additional information to be gained from a more focused telemetry project in the watershed. The new radio telemetry data will be combined with the existing data to strengthen the knowledge of Chinook spawning distributions and will make the data more relevant by applying tags throughout the run.

The primary goal of the project is to tag 60 Chinook in the very upper portion of the Teslin River near Johnson's Crossing. A secondary goal of this project is to collect genetic samples from Chinook salmon during the tagging process and assign these to specific tributaries using radio tag relocations.

#8. Yukon River Canadian-origin Juvenile Chinook Out-migrant Assessment, Year 4.

Fisheries and Oceans Canada

The goal is to understand the production, migration patterns, and growth of juvenile Chinook salmon from Upper Yukon River Canadian tributaries. This continuing project provides a rare opportunity to closely examine variability between adult and juvenile life stages of Chinook salmon by monitoring both juvenile abundance (through this project) and adult returns (see: Mercer and Wilson, 2017) annually within the same system. This will increase our understanding of the factors that can limit salmon production at early life

history stages. It will also allow us to assess the effects of environmental factors (e.g. river discharge and temperature) to better understand year-to-year variation in early life history survival.

Objectives:

- to investigate Chinook salmon survival between adult and fry life stages by comparing a known number of spawning adult Chinook salmon to the number of offspring (0+ salmon) produced the next year (i.e., estimate production and quantify variability),
- to estimate the abundance, timing, and rate of movement of 0+ juvenile Chinook salmon out of a spawning tributary,
- to understand the origin (natal vs. non-natal), movement, and abundance of 1+ juvenile Chinook salmon using a rearing habitat,
- assess the condition and growth of 0+ and 1+ Chinook salmon throughout the outmigration period, and;
- to assess the relationships of the above objectives with environmental factors.

The main project deliverable will be a report that details project findings during the 2018 season and provides analyses over the project period (2015-2018). The report will summarize biological data (age, length, weight) of juvenile Chinook salmon captured, catch per unit effort (CPUE) for each capture method over the study period, environmental data (water level, temperature, turbidity, discharge), rotary screw trap (RST) trap efficiency estimates, and abundance estimates based on our mark-recapture work.

#9. Developing a juvenile stock-recruitment relationship for Yukon River Chinook salmon.

Fisheries and Oceans Canada

The main goal of this project is to develop a juvenile stock-recruit relationship for Yukon River Chinook salmon. Information about limits to production in the freshwater environment can play a key role in augmenting standard stock-recruit analysis. Our second goal is to contribute to understanding about the extent that juvenile rearing habitat is limiting productivity at a given stock level which can then form the basis for setting restoration priorities.

The objective of the proposed work is to extend an existing 6-year database of juvenile Chinook salmon density for small non-natal streams tributary to the Yukon River near Dawson City. Sampling in 2018 and possibly 2019 will take advantage of recent strong returns to the Canadian basin. With an additional 2 years of data the relation between spawner abundance and subsequent juvenile density should be well established so that it can contribute to the goals identified above.

In addition to reporting to the R&E program, all data collected by this project will be merged with the existing DFO data and published in the DFO technical report series so that it is publicly accessible. There is strong potential that a short primary publication can result from this work given the uniqueness of the data series.

#10. Juvenile Chinook Outmigration at the Yukon River Mouth.

Yukon Delta Fisheries Development Association

Juvenile outmigration is an important life stage for Yukon River Chinook salmon. Recent research suggests that much of the variability in Chinook salmon production may occur prior to the first summer at sea (Howard et al. 2016, Murphy et al. 2017) and that larger fish with higher energy content at the end of their first marine summer had a greater chance of surviving to adulthood (Howard et al. 2016). Outmigration from the river to the marine environment is physiologically stressful. Larger in-river size has been linked to both downstream survival (Zabel & Achord 2004) and adult returns (Zabel & Williams 2002, Woodson et al. 2013) in wild Chinook populations, and suggests that early growth in fresh water may be an important indicator of later growth (Ruggerone et al. 2009). This is consistent with an emerging idea that fish need to prepare themselves for life history transitions such as smolting or offshore migrations. This preparation is associated with increased energy reserves, which are maximized by increased size. Understanding limits to production is a near term priority in the FY18 Yukon River Panel Restoration and Enhancement Fund Request for Proposal for the 2018 project year. Information on juvenile Chinook salmon outmigration in the lower Yukon River is limited. This project aims to fill gaps in knowledge of juvenile Yukon River Chinook salmon life history and condition during outmigration from the mouths of the three main lower Yukon River tributaries. The specific objectives of this research are to:

1. Quantify outmigration timing from ice out through the end of the August.
2. Examine size (length and weight), growth, diet, energetic condition, and smolting stage of out-migrating juveniles in relation to environmental variables in the freshwater and nearshore marine environment.
3. Collect genetic samples to assess out-migrant origin.

The cumulative results of this research will be reported annually to the Yukon River Panel.

#11. Michie Creek Salmon and Habitat Monitoring Project, Year 21.

Kwanlin Dun First Nation

As in previous years, the primary focus of this project continues to be providing access of migrating Chinook to the primary spawning location at the outlet of Michie Lake in upper Michie Creek. This project has been ongoing for well over a decade. Over the years barriers such as beaver dams and logjams have been breached to maintain the access for migrating Chinook to their primary spawning location. 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. It is also a stock that is more vulnerable to overharvest due to the fact that they migrate through multiple fisheries in both Alaska and the Yukon jurisdictions. The specific objectives of this project are to:

- 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 and DNA collections as requested;

- Continuation of KDFN stewardship activities (minimum of 3 field trips) related to the management, maintenance and protection of salmon stocks and habitat;
- Deliverables: Report, hourly temperature (Whitehorse Rapids Fish Ladder and Michie Creek) and flow data with presentations as requested, meeting with stakeholders, KDFN beneficiaries, the media and other researchers to disseminate information about the Michie Creek stock.

#12. Temperature monitoring of Yukon River Chinook Salmon spawning and migration habitats in Canada, Year 7.

AvF Research & Development

The goal of the project is to develop and maintain a publically accessible baseline of the thermal regimes of Yukon River Chinook Salmon spawning and migration habitats in Canada.

The objectives of the project are:

- 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.
- 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.
- To prepare an annual Project Report, resulting in dissemination of information and provision of network and environmental context to managers and interested parties.

#13. Impacts to Kluane Fall Chum Salmon Stock from a Major Hydrological Change.

Fisheries and Oceans Canada

A glacial-shift in the St. Elias Mountains (headwater areas) has affected Kluane Lake and River, causing a major hydrological change (reduced flow), with potentially significant consequences to the spawning habitat of this major population of Yukon River chum salmon.

The goal is to document and assess the effect of this change on the fall chum salmon spawning grounds in the Kluane River / White River system. Information gained from this project will facilitate an understanding of changes to productivity from this spawning area and will have implications on overall future production and ultimately chum salmon management in the upper Yukon River.

The objectives are:

- To describe the current years distribution and abundance of chum salmon spawning in Kluane River and Kluane Lake
- To assess the suitability of habitat for chum spawning and egg survival over the winter of 2018-19
- To compare the suitability of habitat for chum spawning and egg survival to information collected in the winter of 2017-18
- To collaborate with project partners to improve current hydrological data monitoring pertinent to understanding the impacts of the change, and
- To assess the impact of this hydrological change on Kluane chum salmon

Restoration

#14. Ta'an Kwäch'än Council Fox Creek Salmon Restoration Project, Year 13.

Ta'an Kwäch'än Council

Ta'an Kwäch'än Council's goal for the Fox Creek Chinook Salmon Restoration Program is to reestablish 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.

Since 2013 adult Chinook salmon have been returning to spawn and from 2015-2017 TKC increased survey frequency on Fox Creek to ensure any returning salmon were documented and spawning locations identified. This added effort allowed us to confirm sightings of 20-35 returning salmon each year and document redd locations. This resulted in the confirmation of spawning success in 2015 and 2016 with abundant wild 0+ fry emergence in the springs of 2016 and 2017.

After 12 years of data collection and 9 years of fry releases in Fox Creek, we are now in phase II or the second salmon life cycle of this project and with assistance and guidance from the Yukon Salmon Sub-Committee's (YSSC) R&E funded Yukon River Chinook Salmon Stock Restoration Community Technical Team and DFO we are analyzing the data to determine the success of reaching our overarching goal of this program.

#15. Deadman Creek Chinook Salmon Restoration Project, Year 3

Teslin Tlingit Council

This project involves the expansion of the 2016 and 2017 trial projects to reintroduce a spawning population of Chinook salmon to Deadman Creek using in-stream egg incubation (egg planting) methods. 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. The specific objectives of the Deadman Creek Chinook restoration project are as follows:

- Deploy fertilized Chinook salmon eggs into Deadman Creek during 2018 to restore a spawning population to Deadman Creek along with a smaller egg deployment in Morley River to serve as a control as well as to offset the removal of viable eggs from Morley River into Deadman Creek.
- Further test the feasibility of such methods for Chinook stock restoration initiatives in the Teslin River watershed and beyond. Conduct follow up monitoring to determine the success of the egg incubators and artificial redds during the late winter/early spring of 2019. Continued collection of information, including substrate size and site-specific velocities, from naturally occurring redds in Morley River to inform the selection of suitable planting sites in future years.
- Conduct a juvenile Chinook sampling program on Deadman Creek between June and August of 2018 to collect data on habitat utilization and the current status of beaver dams and/or other new barriers in the watershed.
- Provide local capacity building, including technical training and employment for local community members.

#16. Coded Wire Tagging of Hatchery Origin Canadian-Origin Chinook Salmon Fry – 2018.

Fisheries and Oceans Canada

Coded Wire Tags (CWTs) have been used as a tool in the management of Pacific salmon fisheries since the 1960s. The recovery and analysis of CWTs in Canada and the US can provide important information in the research and management of salmonids, and is an integral part of the Canada/US Pacific Salmon Treaty (Nandor, 2009).

Within the Fisheries and Oceans Canada Salmonid Enhancement Program (SEP) the information provided by CWTs is used to estimate hatchery contribution to catch and river returns, and survival rates for differential restoration strategies.

The specific project objectives are to:

1. Purchase sufficient CWTs to mark all Chinook salmon fry reared at hatcheries in Yukon (estimated 200,000 fry in 2018).
 - i. Whitehorse Rapids Fish Hatchery (WRFH)
 - ii. McIntyre Fish Hatchery
2. Employ an experienced contractor to help mark all Chinook salmon fry (adipose fin clip and CWT) of suitable size and condition.
 - i. Provide staff to assist contractor and develop local skill sets
3. Document and summarize tag data and activities, including biosampling data by tag group, tag retention, tagging mortality, and outplant information.
4. Document and summarize CWT tag recoveries and the information they provide.

#17. Tay River Chinook Salmon Access Investigation.

Metla Environmental Inc

The Tay River is a tributary of the Pelly River in the upper Yukon River drainage. The Tay River is one of the larger tributaries within the Pelly River watershed with an area of approximately 3,500 km². During the course of a three year upper Yukon River telemetry study all possible Chinook bearing systems were aerially surveyed for the presence of radio tagged Chinook. The Tay River was the only system where a probable barrier to salmon migration was observed in a major tributary. An aerial reconnaissance survey of the Tay River system was conducted by Metla Environmental in October, 2015. This survey re-affirmed the presence of the possible barrier as well as supported the probable existence of significant Chinook spawning and rearing habitat in the system.

It is the view of the proponent that due to its relatively large size and probable spawning and rearing habitat, the Tay River system may offer one of the better opportunities to significantly increase Chinook production within the upper Yukon River system. The increase in Chinook production would be accomplished by providing and/or improving access for Chinook salmon into the system through modification of the current barrier /impediment to salmon migration.

This 2018 proposal is centered on determining the presence or absence of Chinook salmon in the Tay system and conducting a preliminary investigation of the identified blockage to salmon migration.

#18. Assessing the fate of returning Upper Yukon River Chinook Salmon, Year 2.

Canadian Wildlife Federation

This project has two primary goals. The first is to identify depleted stocks that are candidates for restoration, along with potential spawning restoration sites. Specific objectives for this proposal associated with this goal are to assess:

- 1) Where salmon spawn in the M'Clintock River system;
- 2) What other terminal locations exist above Lake Laberge aside from the Takhini River, McIntyre Creek, the Yukon River below the WRGF, Wolf Creek and the M'Clintock River;
- 3) Whether some fish that pass the WRGF fail to reach Marsh Lake (and to subsequently assess whether these fish spawn successfully in the mainstem Yukon River or experience pre-spawning mortality).

The second goal is to assess whether challenges associated with passage at the WRGF are limiting production of Upper Yukon River Chinook stocks. Specific objectives for this proposal associated with this goal are to assess:

- 4) What proportion of fish approaching the WRGF successfully pass it;
- 5) The extent to which fish are delayed at the WRGF before passing and whether this affects migration success
- 6) What proportion of fish return downstream after passing the WRGF.

#19. Takhini River Chinook Salmon Restoration Investigation.

Fisheries and Oceans Canada

The objective of this project is to monitor the population abundance of adult Chinook salmon, to assess the distribution of adult spawners and summer-rearing juvenile Chinook salmon, and to quantify and characterize habitats used by Chinook salmon in the Takhini River. The aim is to establish a baseline understanding of current abundance and distribution in the Takhini River drainage. Last year (2017), we successfully established a sonar site and conducted 4 weeks of pilot sonar work. In addition, adult spawner surveys and juvenile index and habitat assessments were conducted in various locations throughout the drainage. The long-term goal of this project is to estimate the productive capacity of this system by considering existing population levels, habitat quality and historical data including Local and Traditional Knowledge (LTK), to identify whether the Takhini River drainage can host future stock restoration work.

#20. Klondike River Chinook Restoration Plan: In-stream Incubation Trial, Year 2.

Tr'ondëck Hwëch'in First Nation Government

The specific objectives of the Klondike River in-stream incubation trial project are as follows:

- Develop and implement on a trial basis, a juvenile Chinook monitoring program in accessible portions of the Klondike River watershed (incorporating existing data).
- Conduct an aerial Chinook spawning survey to obtain a count of spawners and redds in the Klondike River while also selecting potential broodstock and egg planting locations.

- Collect broodstock and deploy up to 15,000 fertilized Chinook salmon eggs into the mainstem of the Klondike River during 2018 to determine the applicability of this method for restoring Chinook stocks.
- Conduct follow up monitoring during the fall and winter of 2018/2019 to determine the success of the egg planting and document habitat conditions.
- Collect high definition aerial imagery of the Klondike River study area to provide baseline information on habitat extent and potential restoration sites.
- Conduct additional field and desktop investigations to determine the potential for incorporation of a moist air incubator or streamside incubation box at the groundwater channel adjacent to the TH Teaching and Learning Farm.
- Provide local capacity building, including technical training and employment for local community members.

#21. Fishing Branch River Chum Instream Egg Incubation Trial.

Vuntut Gwitch'in Government (VGG)

The Fishing Branch River is a major spawning destination for Porcupine River chum salmon. Past R&E Fund projects (CRE-27-03 through CRE-27-10) have indicated that in excess of 65% of chum salmon in the upper Porcupine River have been known to spawn in the upper reaches of Fishing Branch River, above the site of the DFO enumeration weir. The 2011 Integrated Fisheries Management Plan developed by DFO and the Yukon River Panel included an escapement goal of 22,000 to 49,000 chum salmon at the Fishing Branch weir (JTC 2011). Since 2006, counts at the Fishing Branch weir have displayed a downward trend and fallen within the lower end of, or below this range during the last several years. Returns during 2016 and preliminary results from 2017 have been stronger but still well below historical levels. In addition, recent chum salmon returns at the Fishing Branch weir have been lower relative to Yukon River border escapement than historical returns (JTC 2015), despite active in-season harvest management.

In light of these declines in chum salmon productivity, VGG conducted four years of chum spawning habitat assessments and monitoring to be completed during 2017/2018. During 2018, VGG is proposing to build upon the results of the four year project. A key finding is that a portion of the Fishing Branch River becomes dewatered during the winter months resulting in complete egg mortality for chum which spawn in this area. The extent of this seasonally dewatered area varies from year to year and increases in length over the course of the winter and early spring. With this information in mind, the primary objective of the 2018 project is to remove spawning female chum salmon from the seasonally dewatered area, conduct an on-site egg take/fertilization and plant the fertilized eggs elsewhere in the river in spawning areas which do not become dewatered.

Stewardship

#22. Tr'ondëk Hwëch'in First Fish Culture Camp. Year 13

Tr'ondëck Hwëch'in First Nation Government

Tr'ondëk Hwëch'in (TH) First Fish Youth Culture Camp goals and objectives include teaching youth about harvesting and processing fish, salmon biology, the life cycles of salmon, as well as conservation and stewardship of Yukon River salmon. During the camp, the youth are taught about the many aspects associated with subsistence salmon fishing on the Yukon River including where to set nets and fish wheels, how to pull a net or check a fish wheel, how to mend the nets, how to prepare the fish for processing, cutting the fish into strips and how to smoke and dry the fish. The youth are also taught important lessons consistent with Tr'ondëk Hwëch'in culture and values; these include stories about respecting the salmon, only harvesting what you need as well as the importance of distributing the harvest to community members. First Fish also includes teachings on the biology of salmon, salmon conservation and salmon habitat. Other important teachings include the youth receiving instructions and directions in boat safety, bear safety, salmon life cycles, spawning and rearing habitats and current global issues that are affecting salmon stocks.

#23. McIntyre Creek Salmon Incubation Project (MCSIP). Year 15

Yukon College

McIntyre Creek Salmon Incubation Project (MCSIP) is a groundwater sourced, gravity-fed salmon incubation facility capable of rearing fish from egg-take through to the tagged and release-ready stage. The facility has functioned for over 20 years in the provision of Yukon River Chinook salmon in the upper Canadian portion of the River. MCSIP operational capacity includes the collection of salmon broodstock from the wild, egg fertilization and incubation, rearing and feeding through the juvenile stage, as well as adipose fin clipping and insertion of coded-wire tags in preparation for release into the wild. A variety of educational programs aimed at students from elementary to College level have also integrated into the MCSIP mandate.

MCSIP has also provided facilities for the initial incubation of small numbers of other salmon eggs which are destined for classroom incubation projects as part of the Stream to Sea Program. In addition, MCSIP has served as a test site to refine hatchery incubator use and thermal marking units, which have been developed at the site. It is expected that the techniques used to rear, mark and release brood stock at McIntyre will benefit future Yukon River salmon stock restoration and enhancement projects. Past and continued interest in the site by the TKFN and other First Nations as well as students, Fisheries and Oceans, Canada and others is indicative of the value of this project as a resource to the community.

MCSIP has continued to do this work for over 20 years and is unique in the Yukon. The development of such a site within the City of Whitehorse and also close to the College makes it ideal for the types of stock restoration projects undertaken by groups such as the TKFN's project. The site has always had support in the form of technical support from Fisheries and Oceans as well as other community organizations and institutions.

#24. Yukon River North Mainstem Stewardship, Year 13.

Dawson District Renewable Resource Council

Our goal is the development and maintenance of community capacity in the Dawson City region to protect, maintain and restore salmon stocks and habitats. Our intent is to hire two local high school students who have not participated in the project in past years as Student Stewards. They will work under the field supervision of an experienced elder and the technical guidance of a retired DFO biologist. The Student Stewards will be provided with a wide range of hands-on training through participation in a variety of salmon and salmon habitat management and research activities. However, high risk activities and those activities requiring specific health and safety certification will not be conducted. Our proposed activities include 0+ Chinook salmon growth monitoring and habitat utilization investigations, ground water fed rearing channel habitat monitoring, riparian restoration principles, and monitoring the upstream migration of juvenile Chinook Salmon in a non-natal stream. Depending on environmental conditions, 0+ Chinook fry salvage and access restoration may take place. We will acquire samples from 0+ Chinook for genetic analysis as we did in 2009 and 2012-2017 inclusive). The context of any activities undertaken will be explained to the Student Stewards to allow them an opportunity not only to understand *what* they are doing, but *why* they are doing it. At the end of the funded field work component of the project, the Student Stewards will demonstrate their acquired skills and knowledge to local children and community members in a Public Involvement Day. Field monitoring and evaluation will take place in early spring and mid-September as an in-kind contribution by the Technical Advisor. The existing "Record of Activities" will be updated. Opportunities will be sought to increase the exposure of the project.

#25. Salmon Stewardship Coordinators for Yukon Schools. Year 4

Can-nic-a-nick Environmental Sciences

This program has been previously managed by DFO and funded by the YRP. The project is now being led by a local consultant located in Whitehorse, Yukon. The consultant serves as the Salmon Stewardship Coordinator (SSC) for the program and places other Salmon Stewards in Yukon communities to assist teachers with the delivery of DFO's Stream to Sea program to all interested Yukon Schools and learning centers. The SSC works closely with the Salmon Stewards and potential Education and Outreach personal (separate proposal) to provide support to teachers in Yukon River salmon education activities, including aquarium incubation set-up, operation and maintenance; salmon ecology and biology; and/or participate in egg takes or field trips near community schools.

The main target groups are Yukon students from Kindergarten to Grade 12. Through participation in the Stream to Sea program, which includes using online educational material developed by DFO, Yukon students gain knowledge and an appreciation of salmon and their habitats, and develop a stewardship ethic that could be conveyed into future careers and other outdoor recreational pursuits. Students also converse with other community and family members reflecting the value of fish and aquatic habitats in decisions that may have an impact in the future on salmon and their habitat. Selecting stewards from within the community and encouraging them to involve other citizens to participate in the program enhances this immediate transfer of knowledge and values. Informed citizens who value the resource will be equipped to make decisions that contribute to ensuring the long term sustainability of Yukon River salmon and their aquatic habitats.

#26. Whitehorse Rapids Fishway Salmon Stewardship.

Yukon Fish and Game Association

This is a cooperative project between the Yukon Fish and Game Association (YFGA) and Yukon Energy. The R&E Fund grant will contribute a portion of the wages of staff employed on the Whitehorse Fishway program. These staff, including youth, will provide educational services to visitors at the Fishway, including information on salmon species, life cycles, habitat and fisheries and they will be assisting with an open house in August. Fishway staff monitor the returns of Chinook to the ladder and report daily to DFO on the run composition (sex, approximate size, daily total, hatchery or wild). Staff will assist the Whitehorse Rapids Hatchery with broodstock collection and ASL sampling from the fishway. The ladder will be open from June to Sept 2017. YFGA will prepare a report summarizing the project.

This project provides a strong stewardship opportunity for its young employees and the various visitors to the Fishway. The stewardship portion of this project targets people of all ages who visit the fish ladder, but particular focus is on its employees, including local high school and university students. These employees develop a good understanding of the salmon life cycle, management and habitat as they monitor information from DFO and ADF&G to follow the passage of the salmon up the river, and work with hatchery staff to collect broodstock, look after salmon fry aquaria in the interpretive centre, communicate this information to fishway visitors daily and conduct stream walks at Wolf Creek to monitor adult returns.

#27. Selkirk First Nation Fall Chum Utilization Project

Selkirk First Nation

Selkirk First Nation people have traditionally harvested Fall Chum salmon, however, not to the same extent or for the same purposes as Chinook salmon. Traditionally used for dog food, there are few people within SFN that actively harvest Fall Chum for human consumption. With the severe restrictions on Chinook salmon and the desire to conserve those stocks, SFN would like to explore a Fall Chum harvest and research ways that Chum salmon can become an important source of SFN traditional food. The goal of the SFN Fall Chum Utilization Project is to build a SFN culture and demand around a Fall Chum harvest and utilization.

Objectives:

- To set nets in community fishing holes near Minto Landing in the fall when the Chum pass.
- To bring together youth and Elders to harvest and transfer knowledge around a Fall Chum harvest.
- To explore and document various uses of Fall Chum for SFN citizens.

The target group for this project is intended to be SFN citizens although the project will benefit and information will be shared directly with other Northern Tutchone First Nations (Little Salmon Carmacks and Nacho Nyak Dun). There will also be targeted effort through this project at engaging youth at the Eliza Van Bibber School as well as directly working with SFN Elders.

#28. Little Salmon Carmacks Juvenile Chinook Salmon Monitoring Program.

Little Salmon Carmacks First Nation

This project has 2 main goals; 1) to document the extent of juvenile chinook salmon utilization in the Carmacks area on an annual basis to create a meaningful database, and 2) to involve community (school and youth groups) in the collections in order to maintain a personal link between the year to year fluctuations of the salmon populations and in the process develop local stewardship of the salmon resources. To do this we will conduct a minnow trapping survey in 15 to 20 easily accessed sites within our traditional territory.

For the first year the sites will be chosen on the basis of ability to be repeated in subsequent years. The accumulated database, composed on an annual basis, will allow an opportunity to follow the relative abundance of juvenile Chinook salmon in the area. After several years of collection the data set will show trends and become a valuable tool in assessing health of individual areas. This will be the inaugural year of this project and it will serve as a vehicle to encourage community involvement with the project. We anticipate community involvement to grow with each year the project runs for. Existing data will be included in the database.

#29. Teslin Tlingit Salmon Steward

Teslin Tlingit Council

This project will take the form of a work experience program intended to offer a Teslin Tlingit youth the opportunity to explore a variety of fisheries-related work, building skills and experience in this field in the role of TTC Salmon Steward. This position will, in turn, build the long-term capacity of Teslin Tlingit Council (TTC) to carry out projects and programs that promote salmon restoration, conservation, communication and education.

The TTC Salmon Steward will be supported by experienced TTC staff technicians and managers and work with these staff, consultants, and TTC summer students over the course of one year. The range of work experiences that will be provided to the TTC Salmon Steward will be broad, and includes exposure to and participation in Chinook salmon management planning, meetings, and implementation, technical skills in restoration and monitoring, and educational and communication material development.

Communications

#30. Salmon Know No Borders - Yukon River Exchange. Year 14

Yukon River Drainage Fisheries Association & Yukon Salmon Sub-Committee

The 2018 *Salmon Know No Borders – Yukon River Exchange* was previously known as the Yukon River Educational Exchange and has been funded by the Yukon River Panel for the past 13 years. The Yukon River Educational Exchange was originally designed as a way for people who live on both sides of the

US/Canada border to increase their understanding of their neighbors' experiences and challenges as they relate to Yukon River salmon fisheries and as a forum for fisheries management agencies on both sides of the border to discuss Canadian-origin Chinook and fall chum salmon fisheries management issues directly with the people that rely on them. A group of 4-6 people travel across the border to their neighboring country each summer; alternating countries each year. The group is made up of a mix of fishermen, state/territorial and federal agency personnel, Yukon River Panel members, Elders, youth, fish processors and guides.

The goal of the Exchange is to foster cross-border collaboration and act as a bridge to greater understanding, dialogue and cooperation along the Yukon River. The program fosters community relationships focused on Canadian-origin Yukon River salmon, with the outcome of a more aware public, users, managers, commercial, recreational and subsistence fishers that will promote maintaining the long-term sustainable use and management of Canadian-origin salmon stocks.

#31. Yukon River Salmon Summer Pre-Season Preparation Meeting. Year 9

Yukon River Drainage Fisheries Association

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. Over the past eight 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 and other important issues related to the upcoming fishing season. Meeting attendees include Tribal Council representatives, state and federal agencies and other Yukon River fishery stakeholders. The meetings are an important accomplishment; stakeholders, representing a majority of Yukon River fishing communities along the Alaskan portion of the Yukon River meet together, with Alaskan agency fishery managers to discuss how to protect Canadian origin Chinook salmon.

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 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. Additionally, this meeting builds the working structure necessary for managers to gain the information and 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.

#32. Enhanced Education and Outreach – Salmonids in the Classroom, Year 2.

Rivers to Ridges & Fish on Yukon

The program is being piloted in 2017-18 and will still complement the existing R&E funded *Salmon Stewardship Coordinators* for Yukon Schools program currently being offered within Yukon.

Nick de Graff (Can-nic-a-Nick Environmental Services) and Rivers to Ridges/Fish on Yukon (R2R/FOY) will coordinate the two components of the program, with Can-nic-a-Nick Environmental Services focusing on the technical/aquaculture components of the program (aquarium set-up & maintenance, permitting, incubation, egg takes, and fry release) with R2R/FOY continuing to enhance the classroom, public relations, partnership development, media relations and general communications components of the program.

This new approach to the delivery of the Salmonids in the Classroom through the two separate funding requests will allow Can-nic-a-Nick to focus on the essential tasks related to the aquarium/fish culture or technical aspects while R2R/FOY will focus on enhancing the education and outreach. Through discussions with Nick de Graff, the maintenance, repair (i.e. chillers, tanks) and fish culture (obtaining eggs and milt) is often the priority throughout the school year and takes considerable effort and is prone to timing and logistical challenges. The challenges of combining the technical and educational aspects will be removed through this new approach. There is also value in a team approach to ensure that corporate knowledge on the program is not lost should there be turnover within the project.