Kus-kus-sum: Un-paving Paradise Phase I Continued

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Final Report

Prepared for: Fish and Wildlife Compensation Program

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Executive Summary

The Kus-kus-sum project is an initiative, being undertaken by the Comox Valley Project Watershed Society (CVPWS) in partnership with the K'ómoks First Nation (KFN) and the City of Courtenay (CoC), the overarching goal of securing a former industrial sawmill site alongside the Courtenay River, within K'ómoks Estuary, is for the purpose of reverting it back to fish and wildlife habitat and once restored protecting it for long-term conservation. CVPWS and their project partners successfully negotiated a deal to purchase the property from Interfor Corporation and title officially transferred over on Feb. 23, 2021, at which point restoration of the site could begin. With this goal in mind, CVPWS secured funding from the Fish and Wildlife Compensation Program (FWCP) to begin the restoration of the site in the summer of 2021. This initiative aligns with the priority action PUN.RLR.HB.16.01 in the FWCP Puntledge River Watershed Action Plan.

The first phase of the restoration involved the removal of all the hard surfacing – concrete (with embedded rebar and wire mesh that had to be separated out) and asphalt - that covered the entire 8.39-acre site, as well as the underground utilities. Before beginning this work CVPWS sought and obtained approvals from the applicable regulatory authorities (federal, provincial and municipal); and developed a comprehensive Construction Environmental Management Plan (CEMP) with support from Current Environmental. A tender process was then undertaken by CVPWS and administered by Northwest Hydraulic Consultants (NHC). Copcan Civil Ltd. was the successful bidder and were contracted to undertake the work during the summer of 2021. More than twice as much concrete as was originally estimated was found on the site, and work was extended into the fall of 2021 and spring of 2022 to complete the job. Completed work included the removal of 12,100 m^3 of crushed concrete from the site, forty-three 40-yard bins of metal, and four 40-yard bins of wood waste (including one of hazardous creosote timbers), as well as all the excavation of subsurface utilities. As many materials as possible were repurposed or recycled throughout the project to align with CVPWS's sustainability policy and ethic of environmental stewardship, and since beginning restoration, only two 20-yard bins of waste have been taken to the local waste disposal facility. Now that initial phase of restoration

work has been completed, the “un-paving of paradise”, the project can move forward to complete the restoration of the site by 2023.

Introduction

In 2016, Comox Valley Project Watershed Society (CVPWS), in partnership with the K'ómoks First Nation (KFN) and the City of Courtenay (CoC), embarked on a mission to acquire and restore a decommissioned sawmill site, formerly referred to as the Field sawmill, and now known as Kus-kus-sum. The Kus-kus-sum site was once a tidally-influenced forested riparian area that provided habitat resources for fish and wildlife at the confluence of the Courtenay River and the K'ómoks Estuary. It is located along the salmonid migration corridor that connects the K'ómoks Estuary to upper watershed spawning habitats in the Puntledge, Morrison and Tsolum Watersheds.

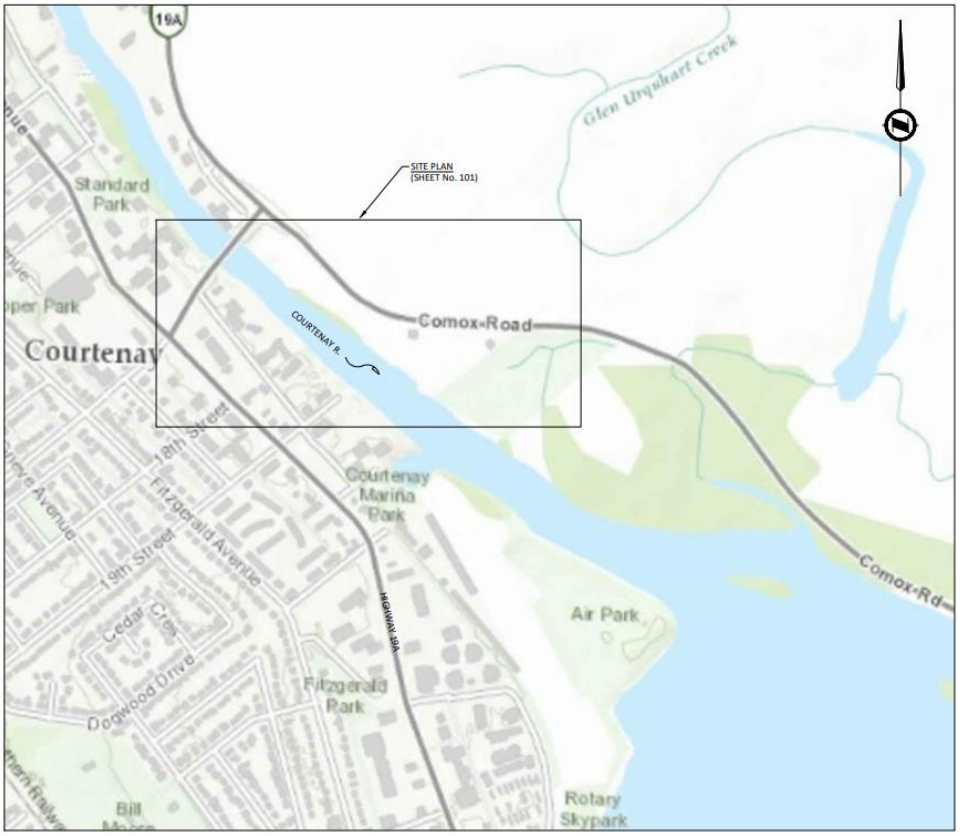

Figure 1: Location of the Kus-kus-sum site in relation to the K'ómoks Estuary and adjacent watersheds.

Site History

Historic air photos from 1946 and 1951 show that the area was forested and indicate that one or more channels crossed the property and connected to the Dyke Slough (Figure 1). These channels would have provided brackish off-channel habitat for salmonids, a type of habitat that is limited in the K'ómoks Estuary. Off-channel habitat allows juvenile salmonids to escape high river flows and seal predation, as well as providing holding areas to allow for forage, growth, and acclimatization to increasing salinities before they migrate to the marine environment (Beechie et al. 1994) (Sommer et al. 2001) (Ebersole et al. 2003).

Figure 2: 1946 Aerial image of Kus-kus-sum site

A sawmill was built on the Kus-kus-sum site location in 1949. Over the next 50 years, to facilitate industrial sawmill operations, the area was cleared and paved and a steel-clad concrete retaining wall (which encroaches on the river) was erected along the shoreline. These alterations have removed much of the historic fish and wildlife habitat from the site. A 1977 governmental report on Comox Harbor stated that the estuary is one of the richest in Canada and that the sawmill operations and associated log booming should be relocated, in part due to impacts to these salmon runs (Burns,1977). The decline of the once bountiful runs of Chinook salmon is one of the legacy impacts from logging and milling activities (Sommer et al. 2001). At the Kus-kus-sum site, seals utilize the steel wall as well as the Dyke Slough, which is now a blind channel, to easily trap and prey upon salmonids (both out-migrating juveniles and returning spawners). One study indicated that seals consumed an estimated 36% of endangered Chinook runs in the estuary (Ebersole et al. 2003).

In 2005, sawmill operations at the site were shut down and the land was put up for sale in 2008 by Interfor Corporation. This created an opportunity to reclaim the area, restore it to functioning salt marsh and riparian forest habitat, and protect the site from future development. In 2010, a study done to identify the restoration and protection opportunities for enhancing juvenile salmonid survival classified restoring and it listed conserving the Kus-kus-sum site as a high priority (Tryon, 2011). In addition to the CVPWS, others have suggested that it would be prudent to investigate the extent of saltmarsh historically present in the upper estuary, and that returning a portion of the former estuary floodplains to marsh would improve the productivity of the area for salmonids and other wildlife (Jeffres et al. 2008). There are five species of salmon that use the estuary, including a very depressed population of summer-run Chinook salmon, considered to be a unique, endangered stock (Richards et al. 1992) (Bellmore et al. 2012). The restored habitat would connect with and support the adjacent conservation areas providing over 25 acres of tidally influenced wetland for salmonids to access. In addition, the restoration would help attenuate localized flooding issues and help mitigate climate change. The area is one of significant cultural importance to the K'ómoks First Nation, and one of the important aims of the project is to restore the site through the lens of reconciliation.

BACKGROUND

The Kus-kus-sum project is an initiative, being undertaken by the Comox Valley Project Watershed Society (CVPWS) in partnership with the K'ómoks First Nation (KFN) and the City of Courtenay (CoC), the overarching goal of securing a former industrial sawmill site alongside the Courtenay River, within K'ómoks Estuary, for the purpose of reverting it back to fish and wildlife habitat and once restored protecting it for long-term conservation. The Kus-kus-sum initiative aligns with the priority action PUN.RLR.HB.16.01 in the FWCP Puntledge River Watershed Action Plan, and previous funding from FWCP allowed CVPWS to undertake baseline studies, a restoration plan and associated budget, and hydrodynamic modelling. This helped us make great advances on the project and chart a path forward. Last year, we completed the purchase of the site from Interfor Corporation and, after the title was transferred, began initial restoration activities on the site including the demolition of the derelict office building. This

year's FWCP funding supported the removal of the hard surfacing (concrete and asphalt) and subsurface utilities at the site, as well as the concomitant recycling and/or repurposing of these industrial materials. This was the first of three phases of restoration of the site, which will re-establish and conserve its' habitat and wildlife values in perpetuity.

Goals and Objectives

The overarching goal of the Kus-kus-sum Land Securement for Puntledge Salmonids project is to acquire and restore the old Field Sawmill Site (Kus-kus-sum) to natural habitat. The objectives for this funding agreement were to support the removal of all the hard surfacing from the 8.39-acre property as well as the underground utilities, to de-construct the site, in preparation for further phases of restoration.

Objectives for FWCP Funding 2021/2022:

1. Secure appropriate authorizations (federal, provincial, and municipal)
2. Create a Construction Environmental Management Plan (CEMP)
3. Undertake an open tender process
4. Hard surfacing removal
5. Removal of subsurface and above ground utilities
6. Re-purposing and recycling of industrial materials

Study Area

Kus-kus-sum is located at 1901 Comox Road in the City of Courtenay on the east coast of Vancouver Island, British Columbia. It lies along the Courtenay River which branches into the Comox Valley's two main salmon bearing streams, the Puntledge and Tsolum Rivers. The site is situated within the boundary of the K'ómoks Estuary (Figure 3) and the K'ómoks Important Bird Area. It is within easy walking distance of the Courtenay Riverway Heritage Walk, the Courtenay Marina and Airpark, and is within walking and biking distance of downtown Courtenay. As the property borders Comox Road, which is the main thoroughfare connecting the City of Courtenay and the Town of Comox, it experiences high traffic flow daily. The site sits alongside the Courtenay River and presently consists of 8.39 acres of paved surface separated from the river by a 440m steel wall (Figure 4). Cottonwood and alder trees are coming up through the cement, along with some small shrubs and common rushes.

Figure 3: Map of Kus-kus-sum site within a Courtenay, BC context. Image from Google Earth, 2021.

The name Kus-kus-sum was given to the site by the K'ómoks First Nation in honour of an ancient village of the same name that was in the area. Some the current property may have served as a Sitka Spruce tree burial site for that traditional village (J. Morin, pers. comms., 2016).

Figure 4: Panorama of the 440m steel clad retaining wall that separates the current site from Courtenay River.

METHODS

AUTHORIZATIONS

In order to undertake restoration activities in the summer of 2021, CVPWS's Senior Staff Biologist made submissions to the applicable regulatory authorities for project authorizations early in the new year of 2021. These regulatory authorities included the federal government of Canada - Fisheries and Oceans Canada (DFO), The Province of BC, and the City of Courtenay. CVPWS also worked with Baseline Archeological Services Ltd. to apply to the province for a Heritage Inspection Permit (HIP) for the project, to provide recommendations on best management practices regarding any archeological deposits that may be encountered during the restoration processes.

Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) is a document that provides an overview of how activities undertaken during the construction phase of the project will be managed to avoid or mitigate environmental impacts, and how those environmental management requirements or best management practices (BMPs) will be implemented. The CEMP was a necessary document to provide as a part of the tender package to the potential Contractors so they would understand the BMPs that they would need to employ as part of the project works to avoid and/or mitigate the identified potential environmental impacts. There was an initial discussion of having CVPWS prepare the CEMP, however CVPWS felt it would be better to have a third party prepare the CEMP to avoid a perceived conflict of interest and to get a fresh set of eyes to review the project for potential environmental impacts.

Tender Process

In addition to a grant application to FWCP, CVPWS submitted grant applications to multiple funding agencies in the fall of 2021 to secure the necessary funding to undertake the removal of all the hard surfacing at the site in the 2021/22 fiscal year (from April 01, 2021, to March 31, 2022). Once the results of these applications were known and the project budget confirmed a tender process was initiated to get competitive bids and find a qualified Contractor to undertake the de-construction of the property. Northwest Hydraulic Consultants (NHC) Ltd.

were contracted to put together and oversee this tender process with input from CVPWS (the project 'owner').

Hard Surfacing Removal

Almost the entire 8.39-acre site was covered with impervious surfacing consisting of concrete (with embedded metal rebar or wire mesh) and asphalt. The only exceptions were areas where the concrete had been previously broken up by the former property owner, Interfor Corporation, to remediate contaminated soils prior to listing the property for sale. The contaminated soils were excavated out, moved off site and replaced with clean gravel fill; vegetation – Alder and Cottonwood trees - had started growing and infilling these sections. Therefore, vegetation that was in the way had to first be cleared and grubbed out to allow for heavy machinery access for hard surface removal. The concrete could then be broken using an excavator fitted with a specialized breaker and the embedded metal separated out. An excavator fitted with a regular digging bucket was able to break up the asphalt. Removal of this hard surfacing was by far the largest task that had to be accomplished as part of the first phase of restoration. The industrial materials that were separated out would then be moved off the site in preparation for the second phase of the project, the earthworks.

Surface and Sub-surface Utilities Removal

Surface Utilities Removal

The only surface utility that needed to be removed at the site was a power pole next to where the old office building had been located, before it was demolished. Although de-energized prior to the demolition of the office building, this power pole was in the way of the concrete removal and was connected by lines, both electrical and communication, across the busy Comox Road to a power pole on the other side. It was determined that the pole, although located on the private property, was an asset of BC Hydro. Therefore, a file was started with BC Hydro to have the pole removed.

Sub-Surface Utilities Removal

A previous survey done by GeoScan in the spring of 2021 used ground penetrating radar to map out all the sub-surface utilities and pipes. Water lines were located on site at varying depths between 0.8m and 1.2m. Some of these lines are suspected to be Asbestos Concrete. Storm and sanitary lines were also found between 0.3 and 2.8m depths. One known sewage line to a neighbouring pump station was also located and mapped. In addition, a couple of cement sceptic tanks and other cement storage tanks, associated with the past industrial infrastructure, were shown on engineered drawings that CVPWS procured as part of the initial baseline project work. All the utilities were planned to be removed as part of the first phase of the restoration. Any subsurface excavation work that was to be undertaken to remove the sub-surface utilities had to have the archeological oversight of the KFN Guardians.

Re-purposing and Recycling

Recycling and re-use of the materials generated from the de-construction of the site is important to CVPWS as it aligns with the Society's sustainability policy and environmental best practices. By far, the largest amount of industrial material that had to be dealt with from the was concrete. In order to recycle the concrete, it was decided to use a rock crusher to break it down into a 3"-minus size which is suitable for use as structural fill in construction projects such as road building or residential development. The embedded rebar and wire mesh in the concrete were extracted, separated out and recycled at a local metal recycling facility. The plan for the asphalt removed from the site was to grind, heat it and mix it with gravel to produce Reclaimed Asphalt Pavement (RAP), which is a cost effective environmentally responsible product that can be used in highway construction.

Results and Outcomes

Authorizations

In terms of the DFO authorization, they determined that since the removal of the hard surfaces (concrete/asphalt) was in areas that are neither fish habitat nor currently connected to fish habitat, and where potential impacts to fish and fish habitat can be fully mitigated using best

management practices (BMPs), that the project did not require approval from DFO prior to undertaking it. Furthermore, DFO noted that the area will continue to be fully contained/isolated from fish habitat (via the existing sheet pile wall) during the excavation activities.

Similarly, the Province of BC via Front Counter BC, under Section 11 of the Water Sustainability Act, indicated that as no instream works were proposed, the project was authorized to proceed. The only caveat being that fencing should be installed so that debris from the upland demolition did not enter the water course. CVPWS worked with Baseline Archeological Services Ltd. to apply to the province for a Heritage Inspection Permit (HIP) for the project, to provide recommendations on the BMPs regarding any archeological deposits that may be encountered. That file application #11200-30/22A0012 is currently being reviewed by the province. There is not a high likelihood of finding cultural artifacts at the site as it was built on imported fill. For the initial phase of hard surfacing removal, it was deemed that there was not a significant risk of finding archeological deposits as there would be no excavation of any native soils. Archaeological monitoring by the KFN Guardians during the removal of the concrete and asphalt in the summer of 2021 did not identify any archeologically sensitive areas or sediments.

There was an additional authorization requirement from the City of Courtenay that had to be met. The City required that CVPWS apply for an exemption from their Environmental Development Permit (EDP) process. CVPWS put together a package of seven different reports and documents which the City reviewed, including the project approvals from DFO and the Province. Following their review of the materials that we submitted, the City formally exempted the proposed works from and EDP pursuant to sections 8.7.4(14) and (15) of the City's Official Community Plan.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

A local Comox Valley consulting company, Current Environmental Ltd., was hired to develop the CEMP for the entire project, including all phases of the planned restoration. Due to time constraints with the upcoming summer construction work window Current Environmental decided to focus on a CEMP for the first phase of work at KKS – specifically the hard surfacing

removal – they called this the 'interim' CEMP. The interim CEMP outlined the valued ecosystem components, potential environmental impacts, regulatory setting, proposed work, interim mitigation measures during the excavation and removals phase, and roles and responsibilities (See Appendix A). Once the interim CEMP was finished, Current Environmental then completed the final CEMP for the entire life cycle of the project (see Appendix B).

Tender Process

A detailed tender package and associated scope of work (see Figure 5 and Appendix C) for the removal of all the hard surfacing was developed and an invitation to tender was put out to interested parties on the BC Bid Central website, which is one of the main tender hosting sites for the Vancouver Island Construction Association. CVPWS also emailed the information on the upcoming tender to other local contractors that the Society had previously worked with as well as the K'ómoks Economic Development Council joint venture partner, Leighton Construction. A mandatory tenders' site meeting was help at the site on May 6th, 2021 and representatives from five different construction companies (Parksville Heavy Equipment, Upland Excavating Ltd., Edgett Excavating Ltd, Copcan Civil Ltd, and Far North Contracting Ltd.) attended this meeting and had an opportunity to walk the site and ask questions of NHC and CVPWS. Once the tender closed on Thursday May 20th at 14:00, a total of four tenders were received and Copcan Civil Ltd. submitted the lowest price qualified tender, and a formal contract was executed by CVPWS with Copcan Civil Ltd. for a fixed lump sum amount to complete the work (see Appendix D).

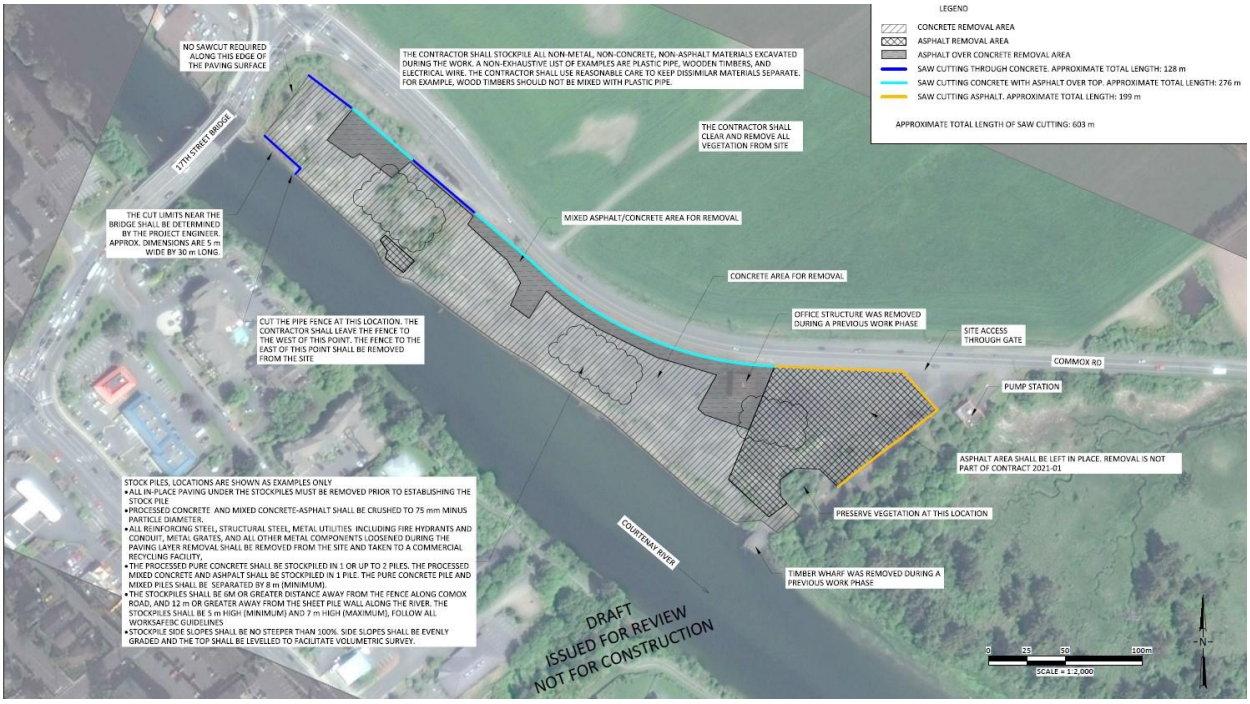

Figure 5- Overview of site work from construction tender (see original document for high resolution copy).

Figure 6 - Construction company representatives at mandatory site meeting.

HARD SURFACING REMOVAL

To start the hard surfacing removal a project kick-off meeting was held at the Kus-kus-sum site on June 21, 2021, and representatives from the project team including NHC, Copcan Civil, CVPWS and KFN attended. Agenda items included project scope/overview, environmental management, archeological values, safety, and site security. Throughout the project the team met weekly initially and then bi-weekly to discuss the progress of the work and any issues that came up during the construction (see attached weekly site meeting minutes Appendix E). The Copcan construction crew also held weekly mandatory site safety meetings which CVPWS attended.

The first day of work consisted of the start of the work to grub and clear out the vegetation that was in the way of the concrete removal. A subcontractor hired by Copcan was also on site to undertake saw cutting of the concrete along the entire fence line to facilitate its removal. Both tasks were completed in the first couple of weeks of work. The vegetation was placed in bins and taken to the local waste disposal facility to be chipped and converted to compost.

Once these tasks were completed, Copcan mobilized a second excavator to the site to start the task of breaking up the concrete. Copcan used a special device, called an elephant's foot, attached to the breaker on a 350 excavator to break the concrete in place. The elephant's foot is a specialized $10,000.00 piece of equipment that Copcan purchased specifically for this job. The elephants foot spreads out the weight of the impact from the breaker to break the concrete in place. This technique prevented concrete debris from flying off, and potentially ending up in the adjacent watercourse and/or injuring someone. There was a wait time before the elephant's foot arrived at the job site, and in the interim and a large rubber tire from a loader was placed around the breaker drill bit to help prevent the concrete debris from flying around. However, this method was found to be cumbersome and time consuming, as the tire had to constantly be repositioned. It was also not great for getting up tight at the concrete that was right next to the steel sheet piling.

The exposed rebar was extracted out with the machine and/or by hand using a labourer when the machine could not get it out and piled up around the site. The excavator then placed the piles of rebar as well as wire mesh that were separated from the concrete into 40-yard metal bins, which were brought on site two at a time. Once full the bins were removed and replaced

with empty bins and the metal was sent to a local recycling facility. All together 43 bins of metal were removed from the site. This work continued throughout the summer, which was extremely hot and dry. The generation of cement dust from the concrete breaking on site was a hazard that had to be managed on site, cement dust contains silica, which is a known human health hazard, so dust suppression was employed in the form of watering down of the concrete piles (see Figure 7). Care was also taken to make sure that any cement slurry that was created through this process did not enter the Courtenay River. Crushed cement can have high alkalinity and can raise pH thereby impacting water quality.

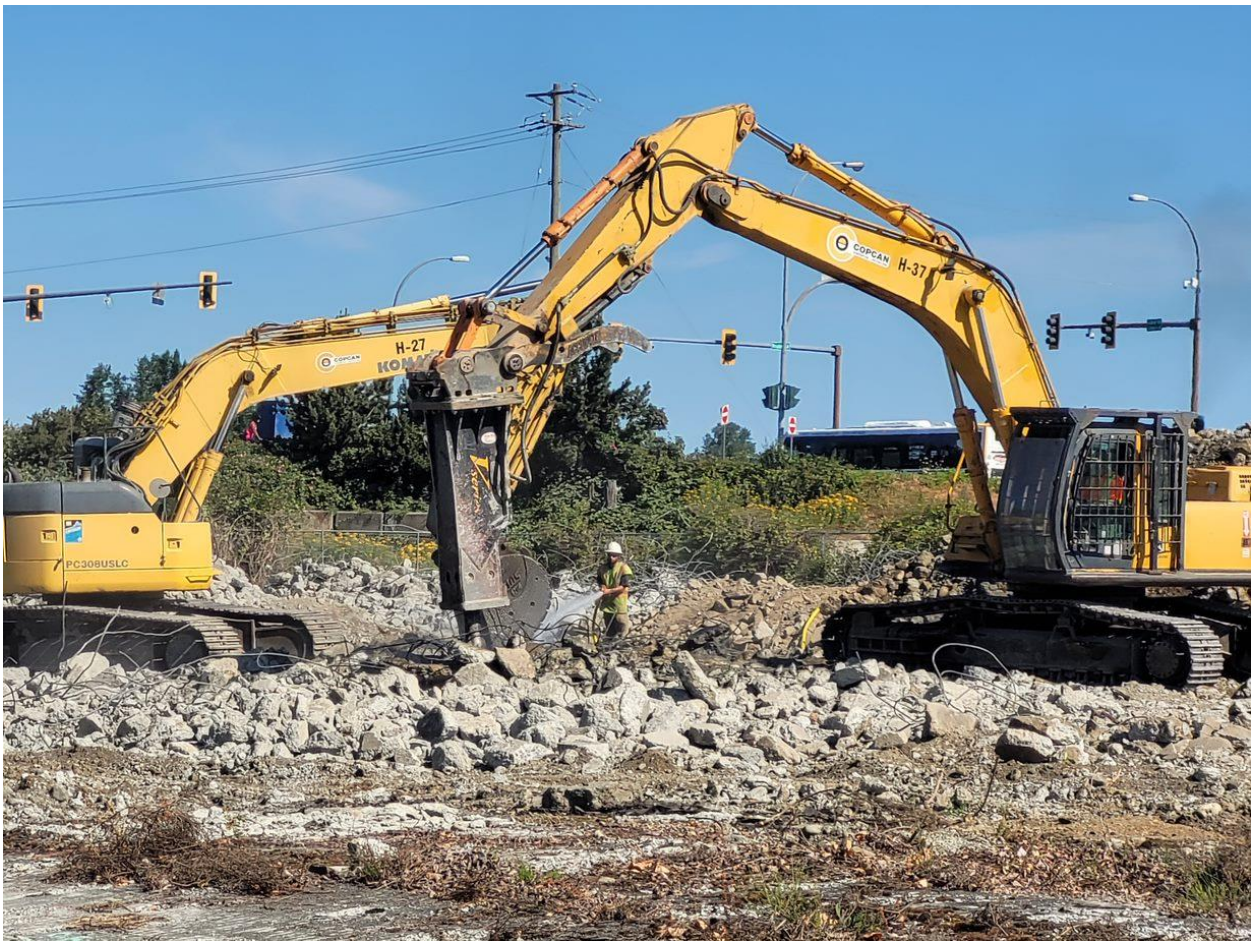

Figure 7- Excavators working to break concrete and removal metal, while a construction worker sprays the material to keep dust down.

Towards the end of summer construction season, most of the concrete had been broken and piled up on the site, at which point a rock crusher was brought in to crush all the concrete into the 3”-minus size. The crushing of the material took just over three weeks and large windrows

of the crushed concrete were generated (see Figure 8). Lewkowich Engineering Associates Ltd. came out four times, took samples of the material, graded these samples and certified that they met the standard for reuse as structural fill. Lewkowich generously provided these services pro-bono to the project. The windrows were also surveyed as part of the construction contract with Copcan, which stipulated that they were to be paid $56.51 per m^3 of crush produced. The total volume of material generated was 8,875 m^3. This was almost 50% more than the 6,000 m^3 that NHC estimated would be taken off the site. The 3”-minus material is a very desirable material for construction and CVPWS advertised that the material would be available for re-use offsite. CVPWS organized to remove the material off the site starting Sept 22, 2021. The recipients had to organize and pay for the trucking of the material and CVPWS paid for the loading and flagging services. The removal of the material went extremely efficiently with an average of 12 trucks hauling per day, and 750 double truckloads of material were removed from the site in five and a half days (see Figure 9).

Figure 8- Rock crusher generating windrow piles of crushed concrete.

Figure 9 - Trucks being loaded with crushed concrete for distribution to various projects throughout the Comox Valley.

One unanticipated issue that came up during the concrete removal was that the contract language indicated that Copcan was responsible for excavating out all the “surface concrete”. However, more concrete was discovered below the surface of the site in the form of cement pilings, septic and holding tanks, and pads and footings. Therefore, any time an excavator had to dig out dirt or gravel to excavate out a footing or reach another layer of concrete, that work had to be paid for separately from the original tender bid. The Project Manager (the CVPWS Senior Staff Biologist) created a daily construction log, which tracked who was on the site and when, what equipment was being operated, construction tasks undertaken, any problems or issues that came up, all of which was referenced to time of day. This daily log became extremely useful when tracking and reviewing invoices from Copcan, and double-checking charges. The original scope of work for removal of all the surface concrete and asphalt, as defined in the tender, was completed by Copcan at the end of the summer.

However, through the course of the work during the summer it was determined that there was a significant amount of concrete remaining on the site subsurface, especially in the footprint of the original mill (in the 1980s a newer mill was built on the northwest end of site, right next to

the 17th St. bridge). Over the decades, as the mill operated, the ground continued to be unstable and sink, so new gravel pads would be laid down and new slabs of concrete poured over top. This led to a myriad of concrete and/or asphalt slabs and footings with layers of gravel in between. Therefore, as there was funding remaining in the budget, it was determined to continue working with Copcan to remove the remaining concrete. A change order was added to their original contract to continue the work. However, Copcan would be charging time and materials for the remaining work, hence the tracking of time and tasks undertaken on site via a daily construction log once again proved very useful. Copcan did have scheduling conflicts as they needed their equipment and operators on another job in October, so they worked until Oct. 7th on the site and did not come back until Oct 26th. They then worked until November 15th, at which point CVPWS decided to shut down the site for the winter, as the CEMP specified that we were not to work the site during heavy rains. CVPWS installed silt fencing and a curtain to prevent against erosion and off-site release of any turbid water.

Work did not resume back on the site until Feb. 03, 2022. The process for the spring work was much the same, digging out and breaking up concrete, extracting the metal from it, digging out asphalt and sorting all the various materials into piles. The one exception was that work in the fall had uncovered a subsurface, reinforced cement wall running parallel to the steel sheet piling wall that was between around 3.6 – 4.8 m deep and ran for 170 m of the site (see Figure 10). This wall was not a known factor when the concrete removal work had been planned. Care had to be taken when removing this wall as we were breaking concrete right next to the river and did not want flying debris or dirty water to enter the river. Furthermore, we had to excavate down to find the base of the wall and this work had to be timed with the low tide. Even so, the water table is high on the site so the excavated areas would start to fill with water at a certain depth. This water had to be pumped out of the area so that the machines could work. The wall had been built using wood forms and had creosote pilings as part of the structure. This woody debris was removed and piled on the site, and the pieces that were contaminated with creosote had to be separate out and handled separately for disposal. Overall, the wall removal was a significant logistical challenge that added an additional two and half weeks onto the project work.

Figure 10 - Cement wall running parallel to the steel sheet piling in the process of being removed.

Once the remaining concrete was unearthed and piled, the rock crusher was mobilized to the site and the material crushed and certified in the same manner as previously and CVPWS organized to have the material hauled away by those who wanted it. An additional two days of hauling of the material occurred on March 14 and 15th and Copcan wrapped up all their work on March 16th. In total, 12,100 m^3 of crushed concrete was removed from the site, double the original estimate. This phase of the project lived up to its title of “un-paving paradise”!

At the same time the concrete removal was taking place, asphalt was removed from in amongst the concrete on the site as well as a small section near the entryway to the property. This was loaded into trucks and was sent to the Tayco Paving for repurposing. However, the decision was made to keep most of the asphalt in place near the entryway to the site to facilitate parking, mobilizing and demobilizing of equipment, and hauling of all the crushed concrete off the property. This asphalt was left to be dealt with until the very end of the project. Another

rationale for leaving it was to ensure that there would be enough funding remaining to deal with it. It was expensive to haul the initial rounds of asphalt off site. In addition to the trucking fees, Tayco Paving charged a tipping and handling fee for each load that was sent to them. The asphalt has all now been broken up and piled near the gate ready for removal. Another possibility to deal with the remaining asphalt is to get a cone crusher on site to crush it, which would make it a much more desirable product, and have those interested in receiving it pay to haul it away, similar to what was done for the concrete.

Surface and Sub-surface Utilities Removal

Surface Utilities Removal

As previously mentioned, a file was started with BC Hydro in the spring of 2021 to have the power pole on the site disconnected from their circuit and removed. It did take some time for BC Hydro to action this request as their crews were quite busy, and this was not a high priority nor emergency task that needed addressing. Luckily, the Copcan crew was able to work around the power pole until it was removed by the BC Hydro crew on August 11th (see Figure 11).

Figure 11 - BC Hydro Crew disconnecting lines to power pole at KKS site in preparation for removing it.

Sub-Surface Utilities Removal

A previous survey done by GeoScan in the spring of 2021 utilized ground penetrating radar to map out all the sub-surface utilities and pipes. Water lines were located on site at varied depths between 0.8m and 1.2m. Some of these lines are suspected to be Asbestos Concrete. Storm and sanitary lines were also found between 0.3 and 2.8m depths. One known sewage line to a neighbouring pump station was also located and mapped. In addition, a couple of cement sceptic tanks and other cement storage tanks associated with the historic industrial infrastructure that used to be on site, were shown on engineered drawings that CVPWS procured as part of the initial baseline project work. Any subsurface excavation work that was to be undertaken to remove the sub-surface utilities had to have the archeological oversight of the KFN Guardians (see Figure 12).

Figure 12 - K'ómoks Frist Nation Guardian Candace Newman observes excavation work for any signs of cultural artifacts.

During the excavation of the subsurface utilities asbestos concrete pipe was encountered. As asbestos is a known human carcinogen, once unearthed, the area around the pipe was marked off with caution tape and left until Copcan was able to have the appropriately trained staff come remove and dispose of it as per their asbestos safety plan. Fortunately, most of the asbestos concrete plumping pipe that was shown of the engineered drawings had been upgraded and replaced at some point with poly-vinyl chloride (PVC) piping. Therefore, most of the pipe that was exposed was non-hazardous PVC which was much easier to deal with.

Underground electrical conduits and their associated wiring were removed, and these were piled on site for disposal and/or recycling. As part of this removal, some copper wiring was uncovered which was sent for recycling and the salvage fees were applied back to the restoration budget. However, towards the end of the project in February a large amount of copper wire was uncovered at the end of the day on a Friday. CVPWS was working on getting a trailer to move the wire to a local metal salvage company. However, before those

arrangements could be made, and the same day the copper was excavated, the site was broken into in the middle of the night (chain link fencing was cut to allow access) and the copper was stolen.

The removal of the underground utilities did generate some waste and bins were brought on site to be loaded with the waste material and sent to the local disposal facility. In all two 20-yard bins of garbage and one 40-yard bins of creosote timbers were sent to the landfill.

Re-purposing and Recycling

Efforts to reduce waste and to repurpose and recycle as much material as possible from the site were extremely successful. The 12,100 m^3 of crushed concrete generated were utilized in various construction projects throughout the Comox Valley. All the metal rebar and mesh extracted from this concrete was sent for recycling and the asphalt that was hauled off site was reused for RAP.

Finally, the PVC plumbing pipe extracted from the project was advertised on CVPWS's social media channels and several interested parties came forward to salvage the pipe for drainage projects. Most of the salvaged pipe went to the United Riders of Cumberland (UROC), a registered non-profit mountain biking association, and they reused the pipe for drainage on various local mountain biking trails (see Figures 13 and 14).

Figure 13 - Gord Nettleton, from United Riders of Cumberland, salvaging PVC pipes from the work site.

Figure 14 - PVC pipe from the work site installed for drainage in a local mountain biking trail.

Discussion & Recommendations

The Kus-kus-sum project continues to galvanize the attention and interest of the Comox Valley Community as well as other restoration professionals and interested parties. Several news articles and stories that featuring the progress of the project[1,2,3,4,5,6,7] were released throughout the course of the project over the past year. In addition, DFO staff have toured the project, as have staff members from Ocean Wise and the Healthy Watersheds Initiative. The head of the provincial green party Sonia Furstenau requested a tour of the project (from a personal interest perspective, rather than for political endorsement purposes) and the BC Wildlife Federation also featured the project for participants in their Wetland Institute held in the fall of 2021. A site tour was also done with our local MLA, Rona Ray-Leonard, who has advocated for this project in the assembly on several occasions. A documentary of the restoration of the site, including time-lapse video, was undertaken in the past year and it is recommended that this videography continue throughout the restoration to fully showcase all the intricacies of the restoration process as well as the various stakeholders involved in bringing the KKS project to fruition. The project has been enrolled by CVPWS in the Green Shores for Shoreline Development program. The project has been proposed for gold level accreditation and use as a demonstration project for other coastal restoration practitioners. It is recommended that the project continue to work towards receiving accreditation under this program, as this will bring further attention and credibility to this unique project.

One issue that came up during the project was the excessive cost to have Tayco Paving recycle the asphalt. Therefore, it is recommended that CVPWS investigate the possibility of getting a cone crusher and crushing up the remaining asphalt on site, as this would make it a much more desirable product and improve the likelihood of it being hauled away for free for use in other

[1] Island First Nation, city collaborating on restoration of former sawmill site - CTV Vancouver Island News
[2] Kus-kus-sum project forges forward in unpaving the parking lot – Comox Valley Record
[3] Restoration of Kus-kus-sum area in Courtenay to begin June 21 – Comox Valley Record
[4] How Project Watershed's dream of turning an abandoned sawmill into a thriving wetland became reality – The Globe and Mail
[5] Micah Messent legacy fund created to support Kus-kus-sum project – Comox Valley Record
[6] Removal of concrete wall at Courtenay's Kus-kus-sum site requires a low tide – Comox Valley Record
[7] Work resumes on Courtenay's Kus-kus-sum project – Comox Valley Record

projects. Depending on the cost of the cone crusher, this may end up being a more cost-effective option than paying to have Tayco recycle it.

Another project challenge that had to be addressed was the grey area of the contract language that Copcan utilized to their benefit in that the tender indicated that they were responsible for removing all the 'surface concrete'. Any time an excavator had to dig out dirt or gravel to reach another layer of concrete that work had to be paid for separate from and on top of the tender bid. This challenge was overcome using a daily construction log to carefully track time and effort, which was used to double-check invoices from the Contractor. It is recommended that such a system be once again employed for the next phase of the restoration work, especially if the contract is awarded on a time and materials basis rather than as a lump sum. As well, careful effort should be made to scrutinize the next contract to avoid such grey areas in the language.

Twice as much concrete was removed from the site as originally anticipated for, which increased the construction budget considerably. However, these costs were able to be absorbed because CVPWS pursued a strategy of applying to multiple funding agencies (the FWCP contribution was able to leveraged 10-fold) and continuing community fundraising efforts to build a healthy contingency into the project budget. It is recommended that this strategy continue to be utilized for the next phase the earthworks phase of the project, which is expected to be the most expensive phase of the project.

Acknowledgements

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- BC Salmon Restoration and Innovation Fund
- Healthy Watershed Initiative
- Habitat Conservation Trust Foundation

- World Wildlife Fund

In addition, we would like to thank all our giving community supporters who have donated or worked to fund raise for the restoration of the site.

We would also like to acknowledge the hard work, commitment of all our board members: Pat Sloan, Bill Heidrick, Brian Storey, Kathy Haigh, Dan Bowen, Don Castleden, Alisha Drinkwater and Bill Heath. A special thank goes out to all our volunteers who have given their time and energy to support this endeavour, and our CVPWS Executive Director Caitlin Pierzchalski and staff who continue to work hard to make this project a reality.

An incredibly special post-houmous acknowledgement to Board member and former Vice - Chair of CVPWS Bill (William) Heidrick – who passed away February 01, 2022. Bill was a dedicated champion of the KKS project and a member of the CVPWS negotiating team that worked to purchase the property from Interfor. Bill lived across the Courtenay River from the site, and keenly observed the undergoing restoration this past year from his home and would often send almost daily emails on the progress. With Bill's passing we lost a friend, mentor and key member of our project team. We could not have gotten the KKS project to where it is today without Bill's tireless efforts. His wife Kathie will be planting a special tree on the site in memory of Bill.

References

Beechie, T.J., E.M. Beamer, and L. Wassermann. 1994. Estimating coho salmon rearing habitat and smolt production losses in a large river basin, and implications for habitat restoration. North American Journal of Fisheries Management 14: 797-811

Bellmore, J.R., C.V. Baxter, A.M. Ray, L. Denny, K. Tardy, and E. Galloway. 2012. Assessing the potential for salmon recovery via floodplain restoration: a multitrophic level comparison of dredge-minded reference segments. Environmental Management 49: 734-750.

Burns, T. 1977. Comox Harbour – A Plan for Conservation. Province of British Columbia – Department of the Environment.

Ebersole, J.L., W.J. Liss, and C.A. Frissell. 2003. Thermal heterogeneity, stream channel morphology, and salmonid abundance in northeastern Oregon streams. Canadian Journal of Fisheries and Aquatic Sciences 20: 1266-128.

Jeffres, C.A., J.J. Opperman, and P.O.B. Moyle. 2008. Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California River. Environmental Biology of Fishes 83: 449-458.

Morin, J., personal communication, 2016.

Richards, C., P.J. Cernera, M.P. Ramey, and D.W. Reiser. 1992. Development of Off-Channel Habitats for Use by Juvenile Chinook Salmon. North American Journal of Fisheries Management 12(4): 721-727.

Sommer, T.R., M.L. Nobriga, W.C. Harrel, W. Batham and W.J. Kim 2001. Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences 58(2): 325-333.

Tyron, L. 2011. Investigation of Restoration and Protection Options for Juvenile Salmonids in the Courtenay River Estuary. Prepared for the Comox Valley Project Watershed Society.

Appendices (Attached Separately)

Appendix A – Interim Construction Environmental Management Plan

Appendix B – Final Construction Environmental Management Plan

Appendix C – Kus-kus-sum Tender Package

Appendix D – Copcan Civil Ltd. Construction Contract

Appendix E – Project Team Meeting Minutes