

Map Label	Project Type	Location	Area #	Description	Status - Sept. 2016	Rationale	Opportunities	Constraints	Preliminary work required	Key People	Resources
1a	Off-channel Habitat Enhancement	Puntledge Side-channel	1 Upper Ecotone (Tsolum Relic Channel, Tsolum / Puntledge Confluence)	Construct a side-channel through floodplain along right side of river across the bend between the Condensory Rd bridge and the Tsolum/Puntledge confluence.	Unchanged- some of this work could be undertaken when new two lane Condensory Rd. bridge is being constructed. Medium priority.	Potentially highly valuable rearing habitat, similar to that provided to coho along the condenser side channel.	Construct a side-channel across existing floodplain along low area where flood flows have already scoured a route and connect to river below Tsolum/Puntledge confluence.	Unknown ownership of land, likely some private land issues and negotiations required. Constructed side-channels can be difficult to maintain, and are prone to plugging with materials. A side channel of this scale would have to have major engineering and design studies completed prior to any construction. DFO may not accept liability for the future maintenance of side channels. Possible low flow problems from splitting flow. Possible stranding issues in summer.	Consultations with DFO, City of Courtenay, BC Hydro, K'omox First Nation, neighbouring landowners; clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes. Hydrological and fish habitat survey.	Fisheries and Oceans, City of Courtenay, K'omox First Nation, BC Hydro, landowners	BC Hydro gauging information
1b	Mainstem Complexing	Courtenay River Mainstem	1 Upper Ecotone (Tsolum Relic Channel, Tsolum / Puntledge Confluence)	Channel complexing along 200m of riffle/rapids in river below Tsolum/Puntledge confluence.	Unchanged. High Priority.	This is a swift section of creek that could pose a velocity barrier to upstream migrating fish, and can flush downstream fry into saline waters at high tides and flows. Sampling in an eddy just below this section of river found coho, chum and pink fry mortalities and contusions and scale loss on live fish after a storm event. Reasons unknown but possible related to high velocities and lack of velocity refuge through this section.	Create velocity refuge habitat through shoreline complexing, and benching with Carex spp.	Access to this section with machinery difficult due to private property along left bank and natural impediments along left bank. Structures placed in mainstem may pose a trapping hazard to recreational boaters and tubers.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes. Hydrological and fish habitat survey.	DFO, landowners, City of Courtenay, BC Hydro;	BC Hydro gauging information
1c	Off-channel Habitat Enhancement	Tsolum Relic Channel	1 Upper Ecotone (Tsolum Relic Channel, Tsolum / Puntledge Confluence)	Clear out current channel to accommodate lower flows	Unchanged. Low priority - see constraints.	Opportunity for creation of high value off-channel habitat	Already a channel there that is slowing infilling and heavily vegetated	<i>Constraints to this project, especially low flows in the Tsolum, make this project low priority.</i> Private land ownership, not enough flows from the Tsolum to feed this channel during low summer flows, current ecosystem is thriving, provides good chinook and coho fry rearing habitat near mouth where it meets the Courtenay River during high tides. Current aggradation processes may hinder constructed channel integrity. DFO previously considered this option and found that splitting flow of Tsolum River through this old channel may compromise mainstem Tsolum fish habitat during low flows.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes. Hydrological and fish habitat survey.	Fisheries and Oceans, Tsolum River Restoration Society, Ministry of Environment: Water Stewardship, Landowners affected by flow diversion	Jack Minard of TSSR; Mel Sheng, DFO
1d	Shoreline Rehabilitation/Bank Stabilization	Courtenay River: Left Bank	1 Upper Ecotone (Tsolum Relic Channel, Tsolum / Puntledge Confluence)	Concrete wall removal and re-contouring of channel banks, restoring them to provide greater ecological function.	Unchanged. Medium priority - lower priority only because difficult to get political will due to park facilities.	This section of river is highly channelized, providing little in the way for refuge from flows and predators.	Natural engineering options are available so that flood risk is minimized while habitat values are maximized. Public space provides opportunities for access to do the works. Opportunities to educate public while works underway.	Walkway and park facilities near the banks may be restrictive when re-grading channel banks. Downstream flooding concerns if project constricts channel beyond capacity. Concerns over bridge downstream and impacts to infrastructure from changes in channel hydraulics.		Fisheries and Oceans, City of Courtenay	
1e		Courtenay River: Right Bank	1 Upper Ecotone (Tsolum Relic Channel, Tsolum / Puntledge Confluence)	Removal of sheet piling and replacement with engineered options that provide more fish habitat.	Unchanged - City of Courtenay recently (Aug. 2016) armoured this section with rip-rap as the piling was failing.	Section along Puntledge with sheet piling creates marginal conditions for fish migration and refuge. Seals use sheet piling to trap juvenile salmonids, including Puntledge summer chinook and prey on them. Removal of sheet piling and replacement with more natural habitat feature would provide increased fish habitat.	Natural engineering options are available so that flood risk is minimized while habitat values are maximized.	Private land along this section could make access and permissions a challenge. Building occurs close to shore, limiting bank stabilization options. Softer engineering options in channel may decrease capacity of channel to convey flood flows.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Fisheries and Oceans, City of Courtenay, landowners	

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				Remove hard shorelines and replace with sloping natural shorelines.	Unchanged. High priority. There is potential to implement some of these suggestions with the new Tiger Lily seniors community development.					City of Courtenay	
2a	Shoreline Rehabilitation/Bank Stabilization	Central Builders shoreline	2	shoreline complexing and replanting	Unchanged. High priority there is potential to implement some of these suggestions with the new Tiger Lily development.	Existing shoreline habitat along this section marginal due to concrete wall and rip-rap.	Good access from Central Builders lot, opportunity to involve local business	Private property. Limited opportunity for riparian planting at top of slope. Can have high velocities from upstream shoreline hardening. Erosion a consideration.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	DFO	
2b	Off-channel Habitat Enhancement	Simms Park Pond and Finger	2	Put back the slope to create benches at elevations that marsh habitat will thrive. Remove the culverts at both ends of the pond to daylight tidal exchange areas. Lower the invert at each end to facilitate tidal exchange between the marina slough, the pond and the finger.	On-going. High Priority. Project Watershed is currently working on a restoration design for the site, but saltmarsh benches are not part of this plan.	Both the pond and the finger are currently used by fish, however habitat quality is low, and tidal flushing is restricted due to the elevations of culverts at either side of the pond. Project will improve access for salmonids, refuge from predators, improved forage potential, and improve water quality.	Opportunities for public involvement and education, and partnerships with City of Courtenay. Easy access through Simms Park.	Temporary disturbance in a public park during construction will require a strong education and community involvement component to gain public support.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	City of Courtenay, Fisheries and Oceans	As built drawings available. Fish sampling studies in area done 1998, 1999, 2000 and 2010.
2c	Saltmarsh Planting	Courtenay Marina Slough (Simms)	2	Construct saltmarsh benches along margins of slough channel	Unchanged. High Priority. Project Watershed is currently working on a restoration design for the site. If funding can be secured, the work is planned to take place the summer of 2017.	Cessation of dredging activities has likely resulted in the slow infilling of the Courtenay slough marina. Saltmarsh creation is a natural process of an aggrading channel, though slow. By constructing saltmarsh benches, this will speed this process, and help create valuable habitat.	2010 Project Watershed vegetation survey identified locations and plant assemblages of existing saltmarsh benches. Boat access to site possible, or from new Honda dealership. Possible to involve Honda dealership to help voluntarily mitigate for indirect impacts of development on estuary.	Courtenay marina slough still active with boats, though access is possible only during high tides. Must ensure that new benches do not interfere with navigation. Also, a weir built across slough channel should be considered for current usefulness and possible removal prior to benching and planting, as this may change sediment transport processes.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	City of Courtenay, Fisheries and Oceans, Comox Harbour Authority	Fish sampling studies in area done 1998, 1999, 2000 and 2010.
	Off-channel Habitat Enhancement/Riparian Planting			Expand the existing pond, possibly reconstruct as a wetland to filter contaminated runoff from storm drain. Remove blackberry, native planting.	Unchanged. Medium priority.	Current habitat for appears marginal with potential room for improvement (site assessment required). Potential contamination of estuary from storm water, wetlands will help to filter any polluted runoff. Dense growth of invasive Himalayan Blackberry preventing natural riparian vegetation establishment. Small manageable project that will address salmon issues such as refuge from predators and water quality improvement. Public lands improve chances for approval and improved access for machinery to do works.			Consultations, clear identification of goals and objectives, site survey, design options, assessment of risks of project failure and potential impacts from changes.	City of Courtenay	
2d	Saltmarsh Planting	14th Street (Standard Park)	2	Add salt marsh benches where appropriate.	Unchanged. Medium priority.	Saltmarsh habitat highly utilized by trout and juvenile salmon in this area during spring and early summer.	Partner with City, involve the community in the blackberry removal and riparian planting and saltmarsh bench planting.	Sediments may be contaminated as used historically to store bulk fuels. This ceased when it was purchased in 1985 by the City of Courtenay. Lack of baseline information on fish use and current habitat attributes.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Fisheries and Oceans, Ministry of Environment	
2e	Shoreline Complexing	Field Sawmill(a)	2	Install and anchor structures along sheet piling as a temporary measure until future of site is determined.	Unchanged. Medium priority. Preferred option is acquisition and restoration.	Approx 430m of shoreline along left bank modified with sheet piling. Major impact on habitat connectivity as fish are exposed through this section during migration. Seals have been observed using the corrugations in the pilings to trap and eat juvenile salmon.	Provides a high valued temporary measure to provide migrating salmonids with refuge from seals.	Will require permission of current owners. Anchoring can be complex- possible to use existing sheet piling. Must ensure that materials behind sheet piling, if exposed to the water from anchoring, are free from contaminants. Placement of structures in water way constrict flows, causing flooding issues.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Interfor (landowners), Fisheries and Oceans.	Design of LUNKERS (National Engineering Handbook).
2f	Shoreline Rehabilitation/Bank Stabilization	Field Sawmill(b)	2	Site rehabilitation through removal of concrete, sheet piling and rehabilitation planting.	On-going. High Priority. Project Watershed is working on acquisition of this site for the purposes of restoration and long-term conservation.	Approx 8.3 acres of riverbank with 1400 feet frontage covered in concrete and shored up by sheet piling from recently ceased sawmill operation there. Site is on Project Watershed priority list for land acquisition (see protection options)	Highly visible site with large public support for rehabilitation. High interest from multiple partners to do a joint purchase for protection. Indications from realtor that the site soils are not contaminated. Certificate of Compliance to Residential Standards is available. Price is dropping. Adjacent pristine Hollyhook flats provides a template for riparian plantings. Opportunity to cut a channel from river across site to Dyke Slough side channel to deliver water and provide refuge for fish from seal predation.	Constraints to land acquisition (see protection options): High cost to carry out rehabilitation. Though soil tests indicate site is clean, digging may reveal problems and resulting in waste disposal considerations. Area of historic fill placement, and with pump house station active next to site, there are limited opportunities to reduce elevations to historic levels characteristic for the site.	Purchase and acquire foreshore lease, and prepare detailed plans and budget for rehabilitation.	Interfor (landowners), DFO, Naturalists (Re adjacent property concerns), Ducks Unlimited & CVRD (if channel is constructed), City of Courtenay, Ministry of Environment (Re Waste Management), other purchases.	Results of preliminary consultations available through EWG meeting minutes and/or through Wayne White (EWG). Soil testing results (owner has these). Certificate of Compliance to the Residential Standards is available from owner. Vegetation assessment carried out by Naturalists.
	Water quality improvement			Expand and re-contour existing pond to create a wetland complex for filtering polluted runoff.	No longer and option, as Riverstone condo development has proceeded and filled in this wetland.	Current habitat for appears marginal with potential room for improvement (site assessment required). Potential contamination of estuary from storm water, wetlands will help to filter any polluted runoff. Small manageable project that will address salmon issues such as refuge from predators and water quality improvement.	Site is under scrutiny by Fisheries and Oceans and Ministry of Environment for water quality issues, where oil slicks regularly observed coming from storm drain, therefore should be high priority by all levels of government to implement a project that deals with this issue. Can expand wetland complex into private property south of walkway, currently (2010) unoccupied and for sale. Update - property sold and City of Courtenay approved Riverstone condo development.	Private property south of walkway. Permission to undertake project on private land or land acquisition funding constraints. History of dispute with private property owners and City of Courtenay where the trail access was blocked, therefore may create roadblocks to partnership. Consideration of enhancing habitat near an area that has water quality issues- may be attracting fish to harmful areas.	Consultations, clear identification of goals and objectives, initial survey, design options, assessment of risks of project failure and potential impacts from changes.	City of Courtenay	site history, survey may already exist.
2g	Shoreline Rehabilitation	19th Street (Below Service Canada)	2	Build saltmarsh benches near river.	Unchanged. Medium priority. Riverstone development has severely impacted the site. The site would have to be reassessed to determine feasibility of saltmarsh benches.	Saltmarsh habitat highly utilized by trout and juvenile salmon in this area during spring and early summer			Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Fisheries and Oceans, Ministry of Environment, private landowners	

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3a	Habitat Enhancement/ Saltmarsh Planting	Airport Lagoon	3	Open up top (north) end of lagoon to river flows during high tide conditions by creating a breach across the Courtenay walkway.	COMPLETED.	Past fish sampling in estuary revealed areas that received regular flushing with freshwater were more productive for coho and chinook fry, especially in the spring. By introducing freshwater at high tides to the lagoon, tidal mixing will improve water quality and fish access from the upper end, and will encourage tidal channel formation in the mudflats below the lagoon, which has been severely reduced since the lagoon and airport were constructed and blocked off flows from main river.	City park, partnership opportunities, community education, potential access from airport.	Potentially toxic materials in lagoon from active storm drain and historic use as a sewage lagoon may get flushed into estuary with increased flows. Access issues may interfere with public use during construction. Many aspects to consider- public use and access after the project, disturbance to existing habitat, funding.	Testing of lagoon sediments for contaminants, and flow/level modeling that includes sediment transport and opportunities for saltmarsh bench construction. Vegetation community survey, elevation survey. More information on fish use throughout the year, bird survey.	Fisheries and Oceans, City of Courtenay, SCRP, Airport managers, Comox Valley Naturalists Society	2010 report by Patrick Walsh: Lagoon Restoration feasibility Study.
				Construct saltmarsh benches along margins of lagoon.	COMPLETED.	Saltmarsh habitat highly utilized by juvenile salmon in this area during spring and early summer.	Refuge from seals for adults and juveniles close to areas of high impact from seals.				
3b	Restore tidal channel network in the mudflats.	Seward side of old sewage lagoon and airport.	3	Open up mudflats to more flow by breaching the blind end of a tidal channel that currently is extended to a ~5m berm that's blocking flow to the mudflats.	Unchanged. Medium priority.	This will accelerate a process that's occurring naturally. Tidal channel network density is much less than historic due to channelization and shoreline modification in the estuary. Tidal channel networks, especially through vegetated marsh areas, are important for juvenile salmon refuge and food production. Unknown, but the berm materials may be artificially placed.	Opportunities for a low-cost project with high volunteer involvement, low environmental impact and high benefit for salmon and other species. The project could potentially be accomplished using hand digging methods, therefore reducing or eliminating the need for machinery over sensitive tidal marsh. The excavated materials could be used to encourage growth of existing vegetated patches. Project can be coupled with the removal of invasive estuarine plants identified during the 2010 PW assessment.	More information is required to estimate the rate of natural erosion and thus determine project feasibility for intervention vs. allowing nature to do the work. If machinery is used, there could be some short term impact on the marsh vegetated along an access route through compaction and direct disturbance.	Assessment of rate of natural erosion. Project plan that estimates volume of materials to excavate, methods, and the best disposal/use of excavated materials (ex. saltmarsh bench design). Archaeological risk assessment.	City of Courtenay, Fisheries and Oceans, Project Watershed Mapping Centre (vegetation maps), Comox Valley Naturalists Society	Vegetation maps and landform features from 2010 Project Watershed assessment

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4a	Improve Habitat Connectivity	Dyke Slough tide gates. Located along Comox Ave 240m north of wildlife viewing area. Characterized by 2 culverts with side-hinged tide gates that restrict movement of saltwater into floodplain area, known as "Dyke Slough", and a 3rd culvert with a top-hinged tide gate provides flood relief.	4	Two options considered: 1. Install baffles that will allow for fish to move through culverts during higher velocities, and 2. To increase the height of the downstream invert so that the downstream pool backwaters the culverts, thus lowering velocities through culverts and increasing opportunities for fish migration to slough. Second option can be tied into restoration option 4b, below. Both options can be linked with restoration options LR1, 2 and 3, and FC 1 and 2.	Unchanged. High Priority. The CVRD are currently working with a metal fabrication shop to get the tide gates in better working order. They have also convened a stakeholder committee to look at changing the operation of the gates to benefit fish and wildlife.	The tide gates were constructed during the 1930's and restricted the intrusion of saltwater to farmland and marsh area above. The area is currently, and has historically been, an important rearing area for salmonids. Slough habitat above and below the gates highly valuable for food production, and has year-round flows from Glen Urquhart and Mallard creeks. The construction of the tide gates likely decreased salmon production dramatically by isolating the upstream areas. Project will improve access of juvenile and adult salmonids between the estuary, Dyke Slough and associated creeks.	There is a high interest on part of the Ministry of Environment, Ministry of Transportation and Highways, Fisheries and Oceans Canada, and the British Columbia Conservation Foundation to improve access to productive upstream habitats. Work can build on a study of fish migration potential and habitat use carried out in 2010.	Options 1 and 2: High summer temperatures above gates limit utility for salmonid use during this time. If fish access improved past gates, project should be coupled with other projects that improve habitat in lower creek systems above gates so there are suitable upstream habitats during the summer. Option 2: Increases in H2O elevations and salinities above gates may result in changes to freshwater dominated marsh ecosystem and impact cropland. Modeling of the change in elevations and migration of the saltwater wedge above the tide gates would be required to determine impact, if any.	Cost/Benefit analysis of different options. Concept plans and modelling of resulting migratory success of juvenile and adult salmonids. Model changes in H2O elevations in slough and magnitude, frequency and duration of saltwater intrusion. Consultations with upstream property owners/land managers. Archaeological risk assessment.	Ministry of Environment, Ministry of Transportation and Highways, Ducks Unlimited (Tom Reid), Nature Trust of BC, British Columbia Conservation Foundation, Esther Guimond, Fisheries and Oceans, farmers	2011 Guimond report on tide gate study, PW SHIM study on Glen Urquhart Creek (2000)
4b		Dyke Slough downstream tide gates	4	Create and enhance pool and riffle channel habitat through lower intertidal portion.	Unchanged. High Priority.	Current habitat is highly productive from introduction of flows and nutrients from Dyke Slough, but the size and structure of habitat compared to historical is highly diminished.	Opportunity to combine project with CVRD's plans to improve Dyke Road Slough Park area, and with tide Gate project (4a). Channel and pool excavations can be designed to benefit fish and be located over intertidal southern section of area.	The area has some high valued saltmarsh habitat which would require compensation if disturbed during construction. Highly visible to public, and constructed phase may be negatively perceived. Splitting flow is a concern.	Initial consultations and risk analysis. Archaeological risk assessment.	Naturalists, Comox Strathcona Regional District, K'omox First Nation, Ministry of Environment, Fisheries and Oceans	Project Watershed project results from tide gate study (water levels), and 2010 vegetation mapping.
4c	Off-channel Habitat Enhancement	Hollyhock Flats	4	Create a channel that connects the pool below the tide gates to the main river channel	Unchanged. Medium priority.	New channel will provide enhanced forage and refuge habitat for salmonids and benefits to associated food webs. Improved water quality from introduction of river flows.	Large natural area provides opportunity to create a side channel that will divert water from top end of Hollyhock flats to the pool below the tide gates and connect to an existing blind channel that extends into Hollyhock Flats from tide gate pool. Constructed channel can be made with features that benefit fish (ex pools, LWD complexing).	<i>The constraints for this project have been highlighted by the Comox Valley Naturalists Society, and therefore this project is considered to be of low priority.</i> Channel construction will impact some of the last remaining intact healthy upper intertidal ecosystem in the estuary. Highly visible to public, and construction phase may be negatively perceived. Blue listed plant Henderson's Checkered Mallow found in this area. Potentially some archaeological artefacts and ethnobotany features that could be damaged if not located and avoided. Many years of efforts by the Naturalists to remove invasives and undertake native plantings in this area, which could be disturbed with this project.	Initial consultations and risk analysis. Archaeological and ethnobotany risk assessment.	Comox Valley Naturalists Society, Comox Strathcona Regional District, K'omox First Nation, Ministry of Environment	Comox Valley Naturalists Society vegetation mapping of Hollyhock Flats

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5a	Channel complexing	Millard Creek Estuary	5	Complexing along upper ecotone	Unchanged. Medium priority. Funding has been secured for an estuary signage project this year and the site could be included for signage.	Development in the watershed has reduced the input of Large Woody Debris and resulted in high sediment loads becoming deposited in the estuary ecotone (tidal channel above the mudflats). As such, there are long stretches of uniform habitat along this section where fish are exposed to high temperatures and predation. Although Chinook do not spawn in this system, the fry utilize the estuary during the spring and early summer as fry, along with coho, chum, and pink salmon from this, and possibly adjacent, systems.	Access ecotone from pedestrian bridge crossing at Rotary walkway downstream to mudflats using the Riverway walkway, which follows adjacent to left bank of channel. Area highly used by recreationists and is also a nature viewing area for people that require alternative means of transportation (eg wheelchairs, scooters), therefore opportunity to include a public education component and to create wilderness viewing locations that are wheelchair/scooter accessible.	Highly visible to public, and constructed phase may be negatively perceived, though this can be addressed through public involvement and education as discussed in opportunities. Although access possible from public walkway, restrictive to large machinery which could damage trail system and intact riparian areas. High flood flows and tides in system would require anchoring of habitat complexing features (eg LWD)	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Millard/Piercy Watershed Stewards, City of Courtenay, Fisheries and Oceans Canada, K'omox First Nation (possible midden sites)	Millard/Piercy Watershed Management Plan, 2006 assessment notes of lower estuary (check with author)

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6a	Pond Habitat Enhancement/Salt marsh planting	Railway pond	6	Open up and enhance riparian pond of ~1000m ² as a tidal lagoon adjacent to mudflats. Divert potentially fish bearing ditch into south end of pond. Enhance saltmarsh habitat around pond.	Partially completed. Low Priority. The Royston Seaside trail has been laid and the railway dike was partially breached to reconnect the pond to the marine environment at very high tides. The railway bed continues to erode and will completely breach over time.	Pond ecosystem is in the process of change, as old railway grade that forms the seaward shoreline of the pond is eroding and threatening to breach. Pre-emptive action can potentially improve both fresh and saltwater flushing into the pond and ensure the long term integrity of the pond to hold water.	Pond has marine inflow through a small culvert under rail line, some freshwater inflow from a ditch to the north and an opportunity to introduce more freshwater from a nearby ditch to the south that is possibly fish bearing. Pond could be enhanced as a brackish lagoon with a stable tidal channel and saltmarsh benches constructed with railgrade fill material. Regional District is planning a trail system in the future therefore project partnership opportunity exists.	Access along railway grade not possible as it is degrading. Opportunities for access will have to be investigated. Introduction of freshwater ditch to the south of pond could accelerate the degradation of the rail line. <i>This project should be postponed if breaching of the wrecks (6c below) goes ahead, which may cause changes in sediment process that could affect this site.</i>	Consultations with CVRD and DFO regarding partnership and integrating with public trail plans. Clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes. Archaeological risk assessment.	Comox Valley Regional District, Fisheries and Oceans, Ministry of Environment.	Brief by Esther Guimond on project feasibility from Feb. 25, 2004 assessment.
6b	Saltmarsh Planting	Royston Beach: North of Wrecks	6	Build saltmarsh habitat along shoreline north of wrecks	COMPLETED	Saltmarsh is important habitat for juvenile salmon and other species during spring and early summer	The presence of existing saltmarsh vegetation and the landforms in the area indicate an opportunity to expand saltmarsh areas. 2010 vegetation assessment of saltmarsh areas along site 6 provides a planting template for selection of vegetation species to enhance. Possible to access from the end of Hilton Rd. Materials for building up saltmarsh benches may be provided if done in conjunction with CVRD's trail project (materials from old rail line), or with the Royston Wrecks jetty breaching project (Project # 6c).	Abundant materials required to build up elevations suitable for saltmarsh planting. May be some access issues, and ecological impacts with the delivery of materials to beach areas. <i>This project should be postponed if breaching of the wrecks (6c below) goes ahead, which may cause changes in sediment process that could affect this site.</i>	Delineation of existing and potential saltmarsh vegetation and scoping of project area. Elevation survey. Consultations with CVRD and DFO. Archaeological risk assessment.	Comox Valley Regional District, Fisheries and Oceans, Ministry of Environment.	2010 Project Watershed vegetation mapping for site 6.
6c	Improve Habitat Connectivity	Royston Wrecks	6	Open up tidal flow to lower estuary by breaching riprap jetty in one or more locations.	Low priority. The wrecks are a listed archaeological site, so removal of the jetty and reusing the rock to create a reef would require working through a lot of red tape. The wrecks are also breaching on their own over time as they erode.	of the estuary except at higher tides, where a breach (~80m) in the intertidal allows some movement. Above the jetty are the remains of an old booming ground, where bark debris has accumulated in the sediments creating anoxic benthic conditions. The seaward side of the jetty is deeper and highly productive, with healthy eelgrass beds utilized by large and diverse schools of fish. Breaching the jetty will help to improve circulation in the southwest side of the estuary, oxygenate anoxic sediments, and possibly allow for expansion of the eelgrass beds further along the shoreline.	Using both a barge and truck, remove rock from jetty and use it to create a shallow subtidal reef adjacent to existing eelgrass beds to the south (see project # 52). Finer materials can be used to construct saltmarsh benches nearby (see project # 6b). Historic wrecks may be left in situ. Once project is done and a sediment transport processes have reached an acceptable state of equilibrium, new areas on the estuary side of the jetty can be assessed for eelgrass restoration (see Project 51). Possibility to partner with Interfor and/or the BC government as part of remediation requirements for Interfor lease.	lease for the jetty itself. Pentstitch seafood's has a license for the area to the south of the wrecks, and Interfor holds the now inactive lease for the booming ground to the north of the wrecks. Therefore project implementation would require involvement from multiple stakeholders and possibly varying interests in the project. A change in circulation patterns may impact part of the existing eelgrass bed to the south of the wrecks. Bark contaminants in the sediments may have harmful effects if increased circulation cause transport of contaminants beyond current extent.	Identify interest from all land managers/leaseholders on project implementation, arrange for meeting of those who would be responsible for funding and implementing it to develop goals and scope. Cost/benefit analysis and initial concept plan. Initial surveying of site, sediment sampling. Archaeological risk assessment.	K'omox First Nation, Comox Valley Regional District, Interfor, Fisheries and Oceans, Ministry of Environment	Project Watershed eelgrass mapping study (to be completed in 2011). Historic surveys of jetty. Information from Interfor on potential sediment contaminants from booming grounds.

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9a	Channel complexing	Restoration at the mouth of Brooklyn Creek	9	complexing of upper ecotone	Unknown - Brooklyn Creek Watershed Society may have taken on some of this work. Low priority.	Development in the watershed has reduced the input of Large Woody Debris and resulted in high sediment loads becoming deposited in the estuary ecotone (tidal channel above the mudflats). As such, there are long stretches of uniform habitat along this section where fish are exposed to high temperatures and predation.	Opportunity to partner with Town of Comox as there are plans to build a new boardwalk in area. Also, area will soon be park and land protected by the Town of Comox. Opportunity to include a public education component.	Highly visible to public, and construction phase may be negatively perceived, though this can be addressed through public involvement and education as discussed in opportunities. Access issues.	Consultations, clear identification of goals and objectives, design options, assessment of risks of project failure and potential impacts from changes.	Brooklyn Creek Watershed Society, Town of Comox, Fisheries and Oceans Canada, K'omox First Nation, Rupert Wong.	

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LR1		Glen Urquhart creek ponds	n/a	Reconfigure and complex these constructed ponds to improve on current fish habitat	On-going. High Priority. Preliminary detailed survey work to take place this year in order to identify potential restoration opportunities.	Unchanged. High Priority. Ducks Unlimited on board.	Current fish habitat appears to be highly marginal, though apparently utilized by fish. As previously constructed habitat, it is not highly naturalized and provides a low-impact opportunity to improve on fish habitat, especially if fish access through downstream tide gates is improved (Project 4a).	Habitat improvement that increases the complexity of this area for fish will be a large improvement over existing conditions. Easy access (behind Superstore), and public lands make logistics for this project manageable.	Current habitat condition analysis anecdotal-though past reports such as the Project Watershed SHIM or consultant's monitoring of the ponds may provide information on this. Site receives stormwater runoff from urban area-possible pollution concerns.	Some basic assessment required to determine if current habitat is indeed marginal for fish. Water quality monitoring during extreme low flows and after first flush events also required to ensure potential pollution concerns area addressed in habitat design.	Fisheries and Oceans, City of Courtenay, landowners	PW SHIM survey report on Gul Creek (2000); Ken Bond Consulting - monitoring reports.
LR2	Fish Habitat Enhancement, lower rivers and Creeks	Lower Mallard Creek	n/a	In-stream habitat enhancement projects	On-going. High Priority. Preliminary detailed survey work to take place this year in order to identify potential restoration opportunities.	Unchanged. High Priority. Ducks Unlimited and Nature Trust on board.	Mallard Creek has a combination of cool, reliable water flows, and impacts from headwater development and channelization. Restoring salmon habitat along lower section accessible to salmon can help mitigate impacts.	At least 1 landowner has expressed interest in having a stream enhancement project on his property (for details check with author). Can integrate with a landowner contact program that helps to educate landowners on stream protection.	Development in headwaters (urbanized area along Valley View Drive, Comox) has resulted in altered hydrology and sediment introduction to lower sections. New development also has the potential to cause problems. If not addressed, may compromise habitat enhancement projects.	Identification of potential areas for improvement, landowner contact, stream assessment, and concept plan for approval.	landowners, stewardship groups, Town of Comox (for ensuring headwater protection and necessary permits). Fisheries and Oceans, Ministry of Environment.	results from PW's lower river sampling in 2010
LR3		Dyke Slough above tide gates	n/a	Enhance Slough habitat above tide gates	On-going. High Priority. Stakeholder group has been brought together by the CVRD to determine options.	Unchanged. High Priority.	Some fish currently migrate past the tide gates, and more may do so if the tide-gates are modified (Project 4a) therefore important to ensure good quality habitat available above the gates.	Complex the pond and channelized section above the gates to provide habitat for fish during spring and fall and possibly winter. Deepen the pond above the gates to provide refuge from high summer temperatures similar to that provided by the pool below the gates.	Must find a balance in the trade-off between creating fish-specific habitat and altering existing wetland habitat that has many benefits to both fish and wildlife. Extreme warm temperatures in summer in Slough despite sections with abundant riparian cover, difficult to mitigate for.	Riparian and wetland mapping of area targeted for habitat enhancement. Concept plans for improving habitat for fish. Risk analysis of impacts to other species and farmland.	Ministry of Environment, Ducks Unlimited (Tom Reid), Nature Trust of BC, Esther Guimond, Fisheries and Oceans (Mel Sheng), CVRD - maintenance of tide gates	Chatwin Engineering Ltd. 1989. Courtenay Flats Drainage Operation and Maintenance Manual (CVRD)
S1		Lower intertidal/supper subtidal areas in estuary with suitable substrate and conditions	n/a	Eelgrass restoration	COMPLETED. A follow-up monitoring assessment of all the eelgrass transplant projects undertaken by Project Watershed is currently underway; this will determine whether or not more transplanting is necessary.	On-going.	Eelgrass is a high valued habitat for salmonids as well as other species. It provides food, refuge from predators, and is a crucial habitat link between the estuarine and adjacent marine habitats. Its presence in the estuary indicates it can survive here. Update historical eelgrass habitat maps with current eelgrass bed locations, and identify areas that are suitable for planting. Carry out a pilot transplant project using methods known to have high success. Potential to use seeding as a low-cost method of restoration in areas of low exposure to currents on a trial basis.	Need to ensure that eelgrass beds used as donor stock for transplant projects are sufficient in size and density so they will not be impacted in process. Cost of eelgrass transplant can be high in subtidal areas where scuba divers are required. Seeding has not met with much success in other areas along the BC coast, and projects of this type should be done on a small scale, experimental basis. Newly planted areas can be disturbed by high recreational boat use in the area.	Continue mapping eelgrass habitats in estuary to identify potential areas for transplanting. Identify a suitable area to transplant eelgrass on a pilot project basis that will increase local capacity to undertake this type of project.	Project Watershed has historical eelgrass maps of the estuary from 1995 imagery collected during the Baynes Sound Fish Habitat Atlas. A 2010-11 PW study is underway that will use aerial images to map existing eelgrass bed extent, including groundtruthing, and identify gaps between historical and current coverage. The Squamish River Watershed Society and Seachange carried out a similar project that was successful (contact - Edith Tope)		
S2	Outer estuary habitat connectors	Subtidal area adjacent to eelgrass beds near Royston	n/a	Subtidal reef construction	Unchanged. Low Priority.	Unchanged. Low Priority.	invertebrate and marine plant growth, and provide cover and forage habitat for a variety of fish species. Where reefs are located close to nearshore habitats, such as eelgrass beds, they can provide important linkages for migratory species.	Possible to integrate with breaching Royston Wrecks and utilizing those materials.	Large volumes of clean materials required. High costs associated with marine transportation of these materials and deployment. Criticism of artificial reefs includes making fish more vulnerable to human predation.	Consultations with Fisheries and Oceans and Environment Canada to identify reef design opportunities to achieve habitat linkages. Concept designs and risk analysis.	Fisheries and Oceans, Interfor	Past research that investigates ecological opportunities and impacts of artificial reef construction.
S3		Comox Bar	n/a	Kelp bed restoration	Underway. High Priority. Kelp research and restoration is being undertaken by Bill Heath for Project Watershed in partnership with the Nyle Creek Stewardship Group.	Unchanged.	According to local knowledge, Bull Kelp growth along the Comox Bar was extensive until an experiment harvest that nearly decimated it. It has slowly been coming back, but could be helped along using kelp restoration techniques.	Techniques include dropping netted bags of spores weighted with rocks at suitable depths. Opportunities for volunteer involvement and education component.	Bull Kelp requires hard substrate, therefore sandy sections of the Comox Bar may not be suitable, or rock would have to be introduced. Growth of the invasive Japanese Wireweed may result in competition with Bull Kelp establishment, therefore work should be done on a pilot project basis to start. Some ecological concerns with the use of outside spore stock that may not be genetically adapted to this area.	Survey during summer growth season that identifies current extent of Bull Kelp on the Comox bar or rock would have to be introduced. Identification of suitable areas for reestablishment. Community composition in both established areas and areas proposed for restoration, including potential predators. Identification of pilot project area and research into propagation techniques.	Project Watershed Mapping Centre, Fisheries and Oceans, Cynthia Durance (eelgrass expert)	Nile Creek Enhancement Society has carried out similar projects nearby. Louis Drouil expert in marine plants helped with Nile Creek projects. Local Hornby resident has also done research on restoring kelp beds around Hornby Island (check with author)
FC1	Flood control	Lewis Park-Highway 19a ditch	n/a	Regrade roadway so that floodwaters that flow across Lewis Park are directed under Old Island highway and across the natural floodplain on other side.	Unchanged. High Priority. Benefit to community for flood relief and for fish and wildlife habitat.	Unchanged. High Priority.	This project would provide flood protection to the property owners in the Tsolum and Puntledge Roads area. Hydraulic relief on downstream fish habitats, private property will be better protected due to minimized flood route through urban areas, less polluted surface runoff will enter the estuary, and natural flooding processes will be returned to floodplain ecosystems on east side of Highway 19A.	Flood protection for the property owners, a return of natural flood flows to the water channels which flow into Dyke Slough and reconnect sediment delivery processes to the estuary floodplain.	Alteration of urban landscape can be expensive and will require a public education component to gain support for project. While many areas will benefit from flood relief, risk to those adjacent to the proposed water route should be identified.			
FC2		Lewis Park-Simms Park-Farmland across from Highway 19a	n/a	Opportunity to reconnect some of the river water to the floodplain through a pipeline or creating a channel along low lying areas across Lewis Park to farmland on other side of Highway 19a, possible utilizing Marina Slough at Simms	Unchanged. High Priority (see above)	Unchanged. High Priority.	This project will have multiple benefits to people, infrastructure and the environment. It will provide flood relief, water to farmland, reconnect fish passage to the estuary floodplain (around the main seal predation areas), and improve water quality and flows for fish through Dyke Slough. If fish access is included in the plan, more habitat for fish higher up in the estuary will also be possible.	Use the newly updated City or Courtenay Floodplain map to identify low lying areas and opportunities for connections between the river and the Dyke Slough/Lower Glen Urquhart area. Involve local farmers and explain benefits of floodplain connection to their activities and gain support. Option to use a pipe (restricting fish passage) or open channel- both will provide benefits to varying degrees with different associated costs.	Requires support from a variety of stakeholders to implement including different municipalities, farmers, businesses, harbour authority, non-profits. High costs associated, likely public dollars, therefore will require educational component that identifies ecosystem values of project - a concept not well understood by the public.	Complete floodplain mapping (CoC), concept plan based on floodplain maps, consultations with landowners/managers, cost/benefit analysis (taking into account ecosystem values), investigation of opportunities to fund project.	CVRD (Area B), CoC, farmers, Ducks Unlimited, affected private landowners (ex Old Courtenay house), Fisheries and Oceans, Ministry of Environment	new Floodplain mapping currently underway by CoC.
M1	Garbage/refuse removal from seabed	Seabed under Courtenay Slough marinas (Simms)	2		Unchanged. Low Priority.	Unchanged. Low Priority.		Hire a dive team to manually remove debris, with the help of surface support equipped with a line. This type of work is fairly easy, quick and of relatively low cost, with great environmental benefits. Where it occurs in highly visible areas, it has an educational component where people observe how much refuse can accumulate on the seabed. Possible to partner with the Comox Harbour Expansion Project as habitat compensation.	Some of the materials removed from the seabed may be regulated under the BC's Environmental Management Act, which has standards for the transportation and disposal of harmful wastes with associated permitting requirements. Safety issues with diving in high boat use areas.	Consultations with public/private marina managers/owners, budgeting and implementation plan, including waste disposal considerations. Funding applications and implementation.	Comox Harbour Authority, private marina operators, Coast Guard (if divers in water), Ministry of Environment, Environmental Protection Division (Re Waste Management)	
M2		seabed under Airpark marinas (government)	2		Unchanged. Low Priority.	Unchanged. Low Priority.	Marinas typically accumulate large amounts of garbage that has been purposefully or inadvertently tossed into the water. This refuse could cause harm through smothering habitat and leaching harmful chemicals into the water.					
M3		seabed under Comox Marina	7		Unchanged. Low Priority.	Unchanged. Low Priority.						
M4		seabed under Goose Spit lagoon	8	Removal and proper disposal of refuse from the seabed under marinas	Unchanged. Low Priority.	Unchanged. Low Priority.						Local boat owners that can provide boats to do the work.
R1		Right bank* of river from Airpark to Tsolum/Puntledge Confluence	3, 2, 1		Unchanged. Medium Priority.	Unchanged. Medium Priority.		Document the width and composition of estuarine riparian habitats in this area, as well as important areas where it contributed to forage fish habitat. Involve landowners in restoring the riparian areas along their private shorelines. Vegetation mapping in 2010 provides species lists that can be used for restoring specific areas, including invasive species for removal. The Comox Valley Naturalists have already been involved in invasive removal and riparian planting in the airport for over 20 years, and may be a good resource for similar projects.	More information on status of riparian habitat in the area required. Requires landowner involvement and permissions to achieve tangible results. Many facets to the program: data gathering, community involvement strategy, funding acquisition. Possible to simplify with a pilot project for a small area.	Preparation of a riparian restoration plan that includes goals and objectives for planting, funding sources, landowners to contact, & information needs (i.e. locations of invasives, high priority areas, etc), and seasonal schedule for restoration and monitoring activities.	Project Watershed Mapping Centre, local stewardship groups, Komox First Nation, private landowners, public lands management staff	2010 vegetation mapping data from Project Watershed for certain areas in the watershed, local stewardship groups (landowner contact databases, volunteers. Invasive plants in the estuary map available online through the Community Mapping Network. The Comox Valley Naturalists have already been involved in invasive removal and riparian planting in the airport for over 20 years, and may be a good resource for similar project
R2	Riparian Mapping and Restoration	South-west shoreline of estuary from Trent River estuary to Airpark	6, 5, 3		Unchanged. Medium Priority.	Unchanged. Medium Priority.						
R3		Northern shoreline from inside of Goose Spit Lagoon to Dyke Slough	9, 7, 4	Invasive species removal and riparian planting	Unchanged. Medium Priority.	Unchanged. Medium Priority.	Healthy estuarine habitat contributes dramatically to shoreline habitat stability, food production, and is supportive of forage fish habitat					

*when facing downstream