

Single CU/Watershed Cost Analysis, August 6, 2008

#	Indicator(s)	Project	Total 1 st year Cost (K)	1 st year Effort (Days)	Subs. Year's Cost (K) in same or diff. wtrshd	Subs.Year's Effort (Days) in same or diff. wtrshd	Comments
1	Stream and Lake Pressure -Watershed: Total land cover alterations -Riparian disturbance -Watershed: Road Density		Range 7- 25	10			-This type of project would be done every 5 years If existing, may be able to mine available information (7K estimate) or alternatively generate new watershed statistics (25K estimate) Used 7K in total cost estimate
2		Streams and Lakes To enable weighting of different land-use types, do probability analysis of different types of land use impacts.					Project being undertaken by Science Branch 08-09
3		Streams and Lakes Develop correlation between road density, road network (via spatial analysis), stream network (S1, S2, etc.), fish distribution and crossing type e.g. culvert, bridge, etc.	0	0			Not costed out
4	Stream Pressure Water extraction		2.25	7	1.75	5	Efficiencies gained in continued monitoring as wouldn't have to repeat creation of meta-data (2days x 0.25)= 0.5K Recommend do entire province at one time for 8.5K plus additional costs for Yukon.

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							May run again in 10? years if L'eau model captures climate change effects.
5	Stream, Lake and Estuary Pressure Permitted Discharges		-	-		-	TBD once data is more readily available in a couple of years
6	Stream Pressure Sediment		22.83	30.5	11.58	12.5	-One near and one remote site per CU/Watershed - Efficiencies gained in continued monitoring as wouldn't have to repeat creation of meta-datas (3 days x 0.25K), development of spreadsheet (15 days x 0.7K)
7		Stream Develop correlation curve of Turbidity Units to TSS	8.1	3	2.1	2.1	-Install one sampling station per initial watershed, increasing efficiency by installing at same time as sediment sampler (5 above)therefore requiring 1 additional field day = 1 x \$700=0.7K -re-use 6K sampling unit in different watershed saving 6K costs in subsequent watersheds -5 th year probably have to replace equipment so costs increase 6K
8	Stream Status Water Quality		1.5	6	0.25	1	6 days to ensure links in web-mapping application working throughout Region for first year only, then maintenance, total cost 1.5K For efficiency, recommend do entire Region instead of just one CU/watershed
9	Stream Status -Temperature, Coho juvenile rearing -Temperature, Migration Spawning		7.75	13	5.15	8	Collaborate with Province and their Temp. Sens. Stream work to ID priority monitoring sites -In first year 10 days effort to collect and process temperature data which includes increasing excel

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	all species						spreadsheet to filter Temperature exceedances of benchmarks for the different life histories 10 x \$700=7.0K, future years only 7 days x 0.7 due to efficiencies in mining data -For one CU/Watershed estimate 3 days for metadata development, input into web-mapping and linking to information 3x\$250=0.75K (efficiencies gained in continued monitoring as wouldn't have to develop metadata, and would become more efficient in providing linkages to web-mapping application therefore future years 1 day effort x 0.25)
10		Stream Augment Temperature Sensitive streams database, Yukon water Temperature Data, WATEMP Database where needed with Mean Weekly Average temperature.	TBD				Didn't cost out
11	Stream Status Stream discharge		4.0	7	3.0	5	-For one watershed/CU 5 days x \$700= 3.5K -Putting into web-mapping, creating meta-data and possible links 2 days x \$250=0.5K (future years efficiency as wouldn't need to do metadata) -Total 3.5K +0.5K=4.0K -Recommend doing entire Province at one time for 19.4K
11a.		Stream					Not much data on Yukon stream discharge, so this

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		Audit Yukon flow modeling in sensitive rearing areas.					Project needed to address data gap
12		Stream Review Ron Ptolemy water data and where gaps for data exist, examine augmenting and updating with current information	TBD				Didn't cost this out For Yukon, the literature not available, project 11b recommended. Didn't cost this out
13		Stream Predicted/Potential fish distribution of juveniles and adults-Investigate if Yukon Habitat Suitability or Provincial FSW models could work for WSP.					Didn't cost this out, province working on this model and delivery time uncertain
14	Stream Status Benthic Invertebrates		0.5	2	0.125	0.5	-Linking to Environment Canada's CABIN data-base - GIS support required to include data layer into web-mapping application 2 days x 250= 0.5 K (efficiencies would be gained as exercise would not need to be repeated, but links maintained e.g. ½ day /year)
15	Stream Quantity Accessible stream length, barriers		1.25	5			-audit of FISS data-base with LEK approach, 4 days x \$250=1K -Very rough estimate for GIS support to input audited obstacles into web-mapping application and FISS 1 day x 250= 0.25K -Total = 1.0K + 0.25K=1.25K

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							-Subsequent audit in 5 th year should have less new entries to review -efficiencies would be gained as wouldn't have to recreate meta-data for other sites
16	Stream Quantity Key Spawning Areas		1.1	4			Estimate based on data-base (FISS) audit alone with LEK; -Note, audit should be undertaken at the same time as the fish distribution audit of FISS -very rough estimate of doing GIS support work, 2 days x \$250= 0.5K -Total cost= 0.6K + 0.5K=1.1K -This indicator not recommended in the Yukon due to great extent of spawner distribution
17	Lake Quantity Lake Productive Capacity		1.4	4.5			
18	Lake Quantity Coldwater refuge zone		0.9	5	0.75	2	Adding this work to Sockeye Lakes Group's field work -Science undertaking paper analysis on this indicator this fiscal, so WSP costs would be related to develop meta-data and input into web-mapping application – (meta-data 1/2 day x 0.25K) and input into web-mapping application 3 days x \$250= .750K Total cost= 0.75 + 0.15= 0.9K Efficiencies in the future would be gained as would not have to re-do the meta-data. Also, the initial work could guide which lakes would need more monitoring on this indicator.

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19	Lake Quantity Shore spawning area		0.325	1.5			(Stock assessment currently doing the field work in many areas e.g. Shuswap 2/4 years escapement-8 key locations, 5 days x 2 crew x \$700=7K) -GIS time= 1 day to manage data and put info. into Mapster and Web-mapping application 1 x 250= 0.25K -1/2 day metadata development 0.5 x 250= 0.125K WSP additional costs are meta-data development and loading into the web-application. (Efficiencies for further sites gained as won't have to recreate meta-data) Not recommended for the Yukon
20		Lake Recommend Sockeye Lakes study group also capture shoreline temperatures.					Highly risky project, didn't cost out
21		Lake Create a model to ID land conversion on deltas in lakes utilizing Watershed Statistics data.	TBD				Didn't cost out
22	Estuary Pressure Marine vessel traffic		0.625	2.5	.5	2	-1 day to process and report x \$500=\$500 -1.5 days for meta-data development and to present in web-application 2.5 x \$250= 0.375K - recommend undertaking entire project first time around

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							as many CUs funnel through similar estuaries with a total cost of 3.0
23		Estuary Model for coarse particulate matter in estuaries-use estuarine gradient from CHS data and lease information for log-storage. May be able to use deposition model from Scotland for log- storage.	TBD				Didn't cost out
24	Estuary Pressure Disturbance of riparian, intertidal (e.g. Carex and Typha) and sub-tidal (e.g. eel-grass) habitats		0.675	1.5			-We are reporting out on Rate of Increase in Estuarine Tenures as a proxy to the actual habitat using Environment Canada's and Ducks Unlimited's roll-up every five years (efficiency in future as wouldn't have to create meta- data again) -Total-0.675K -recommend doing all in first year, valued at 2.7K with 5.5 days
25	Estuary Status Chemistry e.g. N, P, N:P and Contaminants e.g. Metals, PAHs and		0.25	1			-further costs related to maintaining links -recommend doing all sites first time around with total cost and effort of 3 days- x \$250=0.75K

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	PCBs						
26	Estuary Status Indicator and Project Dissolved Oxygen		TBD	7			Didn't cost out
27	Estuarine Quantity Estuarine Quantity (Riparian, sedge, eelgrass and mudflat)		1.0K	3	0.5	2.5	-Riparian to be captured by Province on a 5 year basis in more developed estuaries through the Provincial CRIS program so can track this, other habitat types of insufficient resolution to report out on habitat quantity with the exception of FREMP area -Effort to pull riparian information from Province, 1 day x \$500=0.5K, including load into web-mapping application and create meta-data 2 days x 250= 0.5K (efficiencies will be gained as won't have to create metadata again) -FREMP costs uncertain
28		Estuary and Stream Predictive model for stream and estuarine off- channel habitat.	TBD				Didn't cost out
29		Estuary Develop sampling program for presence/absence of key indicator species of invertebrates in the estuary as an alternative to RCA or IBI	TBD				Didn't cost out
		Overall GIS Update Process and Publishing	0.275	1	0.275	1	Overall project update is specific to posting (publishing) links in the application to reports such as Overview

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		and Overall GIS Project management internal					reports, Habitat Status reports, population status reports, integrated planning documents; not individual indicators as noted above. It is relative to the volume of new information coming in.
Total			54.83	116	25.98	41.6	
							@40 days of initial year's effort is GIS related e.g. posting to web-mapping, meta-data creation