

Where and Why

Things to consider when choosing to do
active stream restoration

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What are characteristics of a Properly Functioning Watershed?

- high degree of biotic integrity
- resilient when disturbed
- high connectivity of all parts
- provides ecosystem services

2

What are characteristics of a Properly Functioning Stream?

- high degree of biotic integrity
 - bugs, fish, algae, plants, trees
- resilient when disturbed
 - recovers from flooding
 - habitat available during low flows
 - one jam breaks another captures
- high connectivity of all parts
 - floodplain
 - side channels
 - off-channel habitats
- provides ecosystem services
 - provides clean water
 - promotes healthy habitats
 - produces salmon

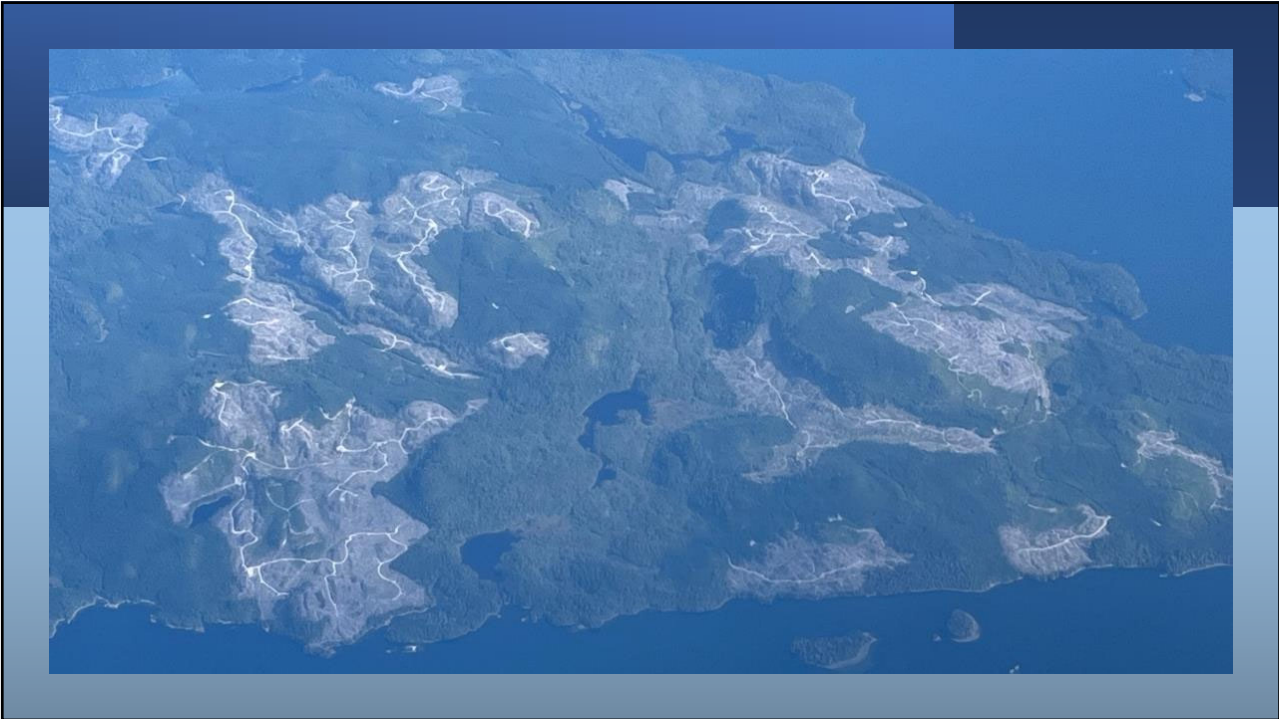
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How Do We Tell its NOT Functioning?

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How Do We know it needs Restoration?

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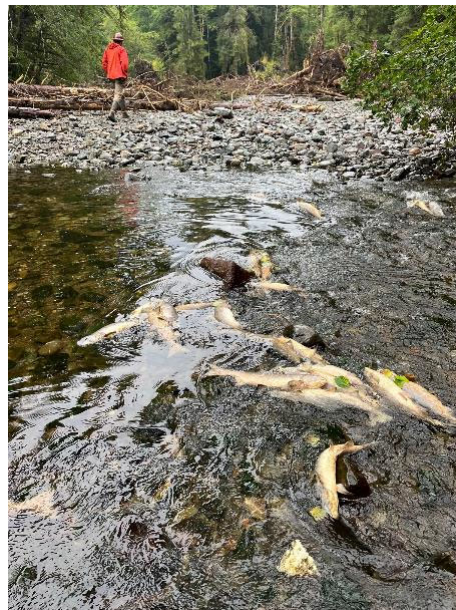
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Has there been Streamside Harvest?

- Most of the disturbance in this area is harvest. Landslides will also remove large wood from a stream, but at a significantly smaller scale in AF, MM, and AF channels.
- Is there regeneration at a similar density as the original stand? Look at the spacing between stumps.
- Is there species and size diversity in the riparian area?

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Are there Fish?



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Is there Key and Large Wood in the Stream?

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Is there a Diversity of Bedload?
(leading to/resulting from diverse geomorphology and Habitats)



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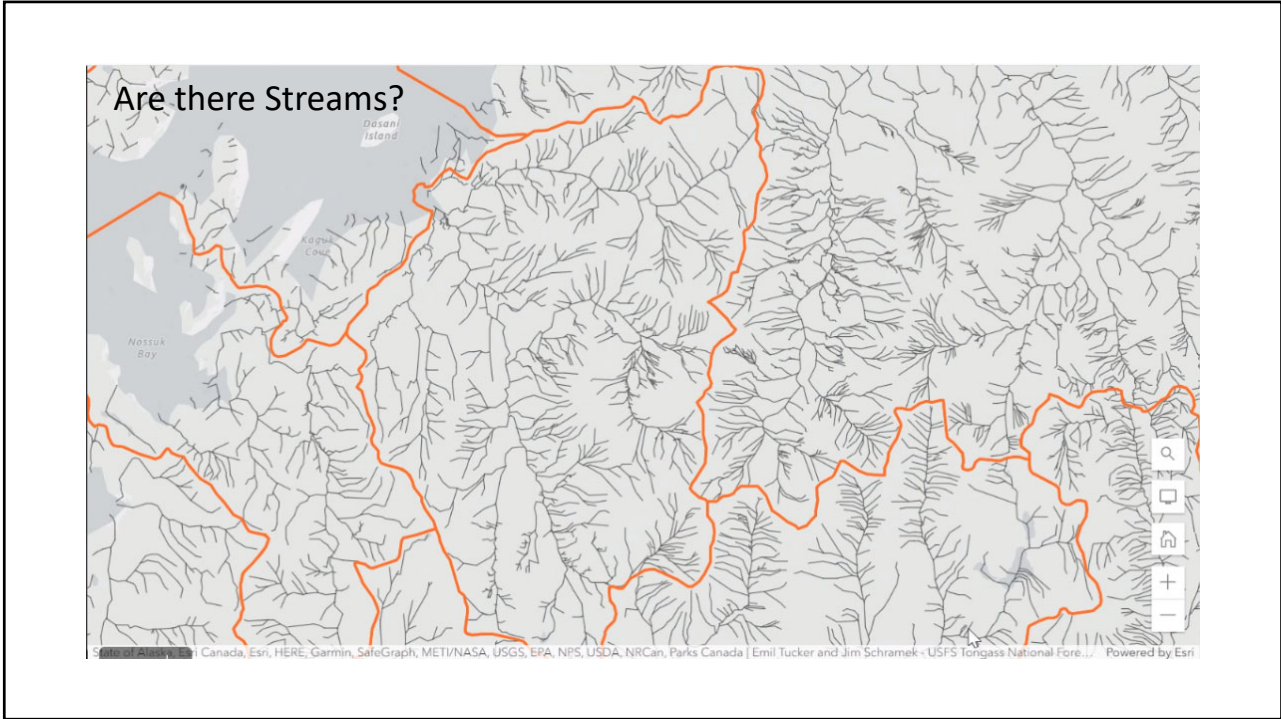
Is the Riparian Area Regenerating?

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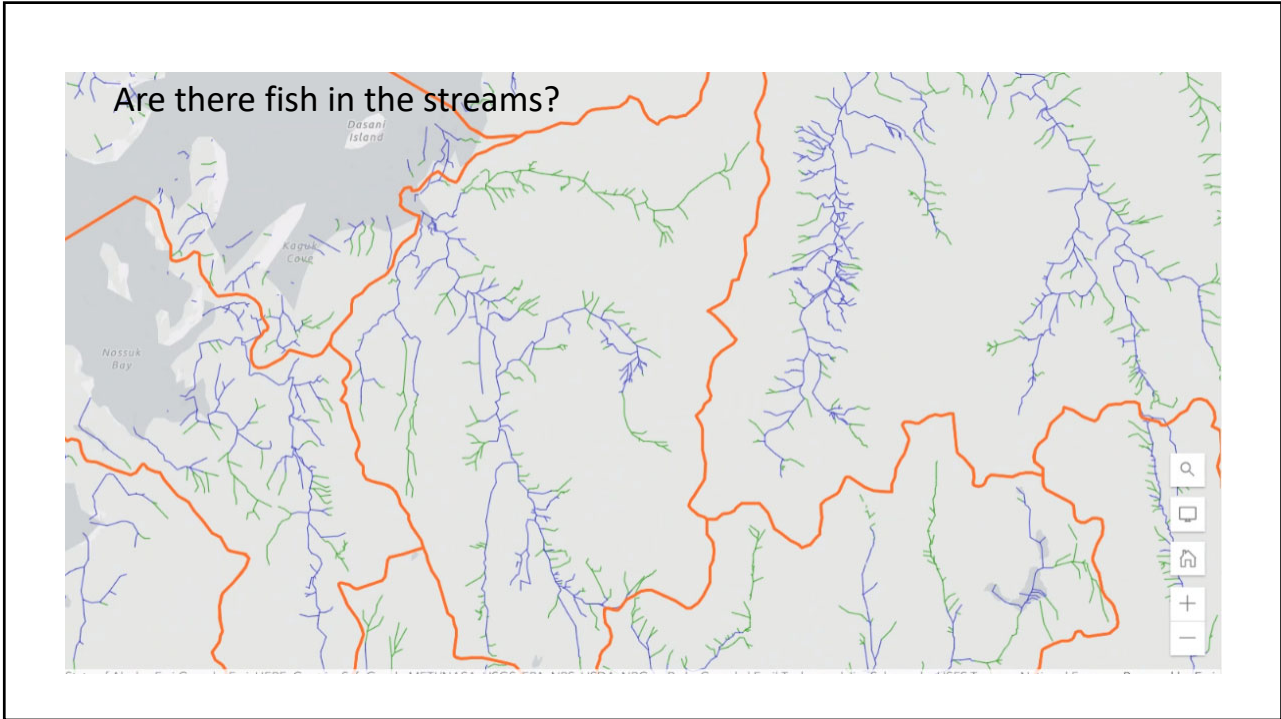
Methods

- Map or Aerial Photo Interpretation of harvest area
 - One or both sides of the stream with riparian area harvest
- Channel Type and Process Group ID (GIS or other mapping)
 - AF, MM, and FP Channels
 - Anadromous, resident, or other
- Proper Function Condition Assessment (field survey)
- Go/No Go Decision with justification (dialog)

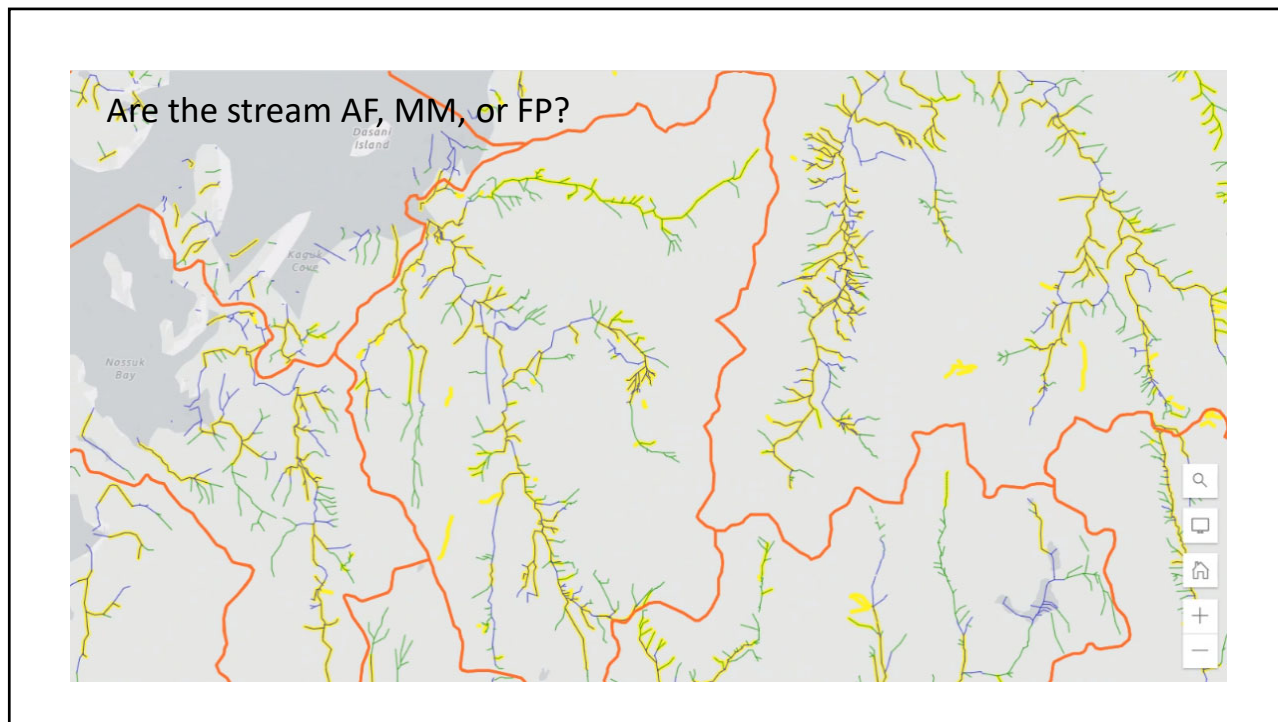
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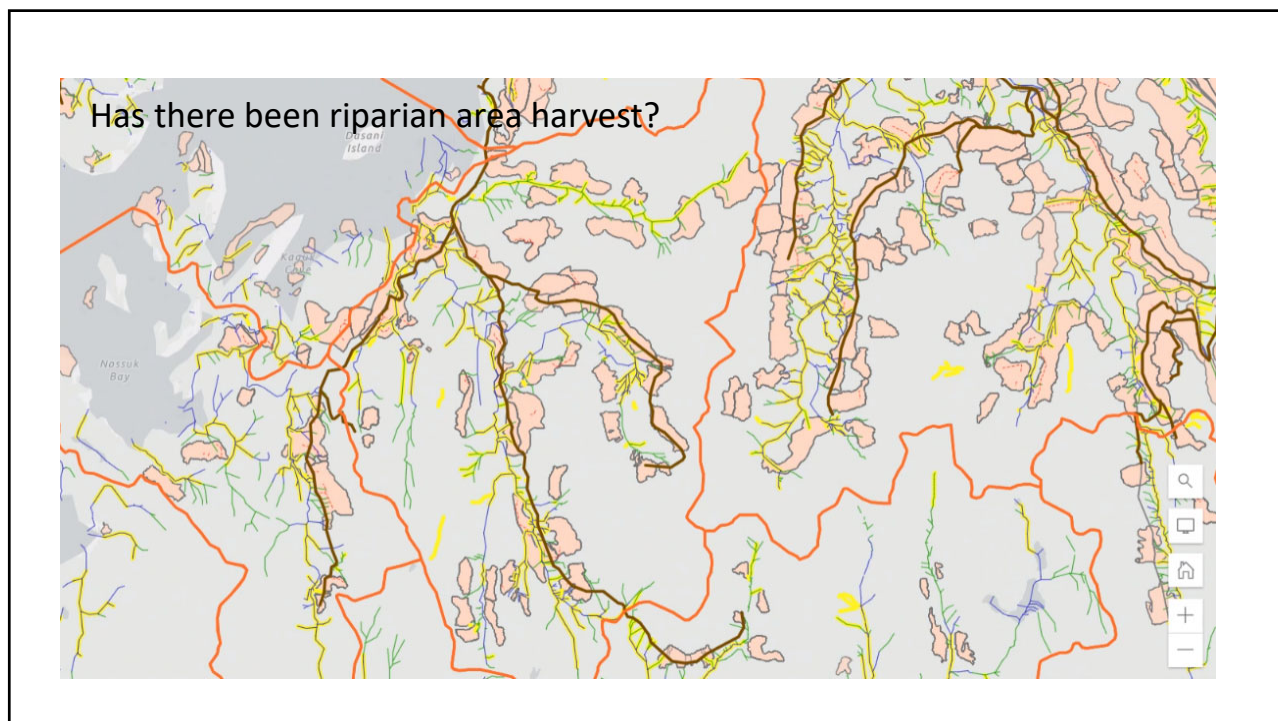
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Proper Function Condition Assessments

- Series of questions leading to a qualitative assessment
- Point in time (temporal aspect)
- Particular reach (spatial aspect)
- Interdisciplinary approach – seeing through many eyes
- Channel function and (habitat) condition
- Platform for collaborative dialog regarding condition and function
- Provides a consistent mechanism for capturing data and determining go-no go

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Standard Checklist (Lotic)			
Name of Riparian-Wetland Area: _____			
Date: _____ Area/Segment ID: _____			
Location: _____			
ID Team Observers: _____			
Yes	No	N/A	HYDROLOGIC
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1) Floodplain above bankfull inundated in "relatively frequent" events
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2) Where beaver dams are present they are active and stable
Rationale: _____			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4) Riparian-wetland area is widening or has achieved potential extent
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5) Upland watershed is not contributing to riparian degradation
Rationale: _____			
Yes	No	N/A	VEGETATIVE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery)
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8) Species present indicate maintenance of riparian soil moisture characteristics
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10) Riparian-wetland plants exhibit high vigor
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows
Rationale: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12) Plant Communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)
Rationale: _____			

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SUMMARY DETERMINATION	
Functioning Rating	Condition within the functional rating
Proper Functioning Condition _____	High
Functional-at- Risk _____	↕
Nonfunctional _____	Low
Rationale:	
Apparent Trend for Functional — At Risk	
Upward _____	
Downward _____	
Not Apparent _____	
Rationale:	
Are factors contributing to unacceptable conditions outside the manager's control or management?	
Yes ___ No ___ If yes, what are those factors?	
_____ Flow Regulation	_____ Mining Activities
_____ Upstream channel conditions	_____ Channelization
_____ Road encroachment	_____ Augmentation flows
_____ Recreational Activities	_____ Agricultural Activities
_____ Other (specify)	
Remarks:	

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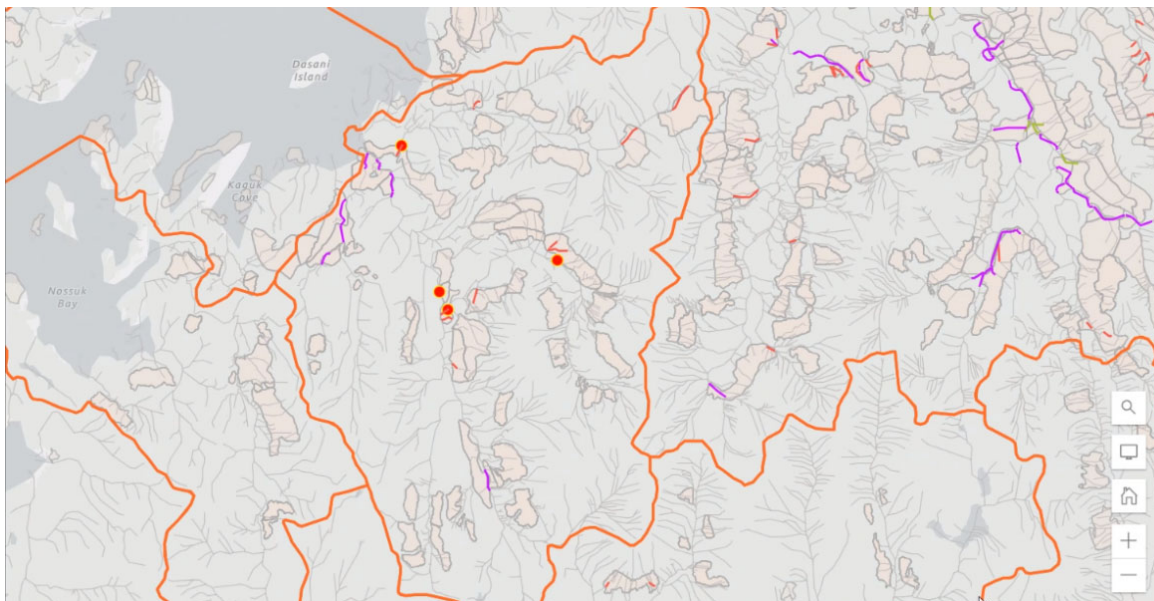
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Stream Condition Surveys - PFC

Reach Name	PFC	Trend	Tier II
Game 1	PFC	NA	n
Game 2	PFC	NA	n
Game 3	PFC	NA	n
Game 4	PFC	NA	n
Humpback 1	FAR	downward	n
Humpback2	FAR	downward	y(2 reaches)
Spasski 1	FAR	downward	y
Spasski 2	FAR	downward	y(2 reaches)
Spasski 3	FAR	downward	n
Spasski 4	NA	NA	y



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Tier Surveys and Analysis

Parameter/Metric	Method
Width-to-depth ratio (WD)	Bankfull width / mean bankfull depth
Total Large Wood pieces / meter (TLWD/M)	Total Pieces / meters surveyed
Total Key pieces Large Wood/meter (TKWD/M)	Total Key pieces / meters surveyed
Pool/Km (POOL/KM)	Total number of Pools / meters surveyed * 1000
Pool Spacing (PL SPC)	Length of stream surveyed / channel bed width / total number of pools
Residual Pool Depth/Channel Bed width (RPD/CBW)	Average of all pool residual depth / average channel bed width
Pool Length/meter (PLNGTH/M)	Total pool length / total length of stream surveyed

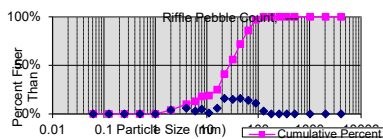
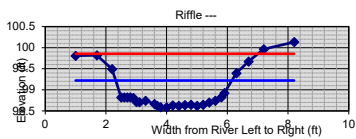
FNO Quartiles for stream reach samples in undisturbed watersheds.

Habitat Attribute	Percentiles	Process Group#	Process Group#	Process Group#	Process Group#	Channel Type#	Channel Type#	Channel Type#	Channel Type#
	25	50	75	90	95	3	4	5	M
WD	25	15.5	10.4	9.2	8.3	10.9	18.5	23.1	10.2
	50	19.2	15.3	14.5	11.1	14.9	20.2	27.2	14.2
	75	26.7	22.4	21.0	13.0	19.0	32.8	43.6	22.0
	90	29.5	22.7	20.0	12.3	22.4	31.1	41.5	22.7
	95	32.5	23.8	20.8	13.4	24.0	37.7	47.1	23.8
TLWD/M	25	0.50	0.50	0.42	0.48	0.55	0.50	0.46	0.51
	50	0.04	0.05	0.05	0.07	0.10	0.08	0.02	0.06
	75	0.10	0.12	0.07	0.08	0.17	0.11	0.03	0.12
	90	0.15	0.14	0.09	0.27	0.25	0.15	0.08	0.14
	95	0.20	0.14	0.09	0.27	0.25	0.15	0.08	0.14
TKWD/M	25	30	40	30	50	30	30	10	50
	50	45	60	50	60	40	40	20	60
	75	70	70	60	100	70	60	25	70
	90	70	70	60	100	70	60	25	70
	95	70	70	60	100	70	60	25	70
POOL/KM	25	1.4	2.8	2.2	2.4	2.2	1.3	1.7	2.8
	50	2.2	4.0	3.7	3.4	3.2	1.8	2.7	4.0
	75	3.5	5.8	4.8	5.7	5.1	2.2	3.2	5.8
	90	4.5	6.5	5.5	6.5	5.5	2.5	3.5	6.5
	95	5.5	7.5	6.5	7.5	6.5	2.5	3.5	7.5
POOL SPACE	25	0.04	0.05	0.04	0.05	0.05	0.04	0.03	0.07
	50	0.05	0.05	0.07	0.05	0.07	0.04	0.03	0.08
	75	0.05	0.10	0.08	0.09	0.09	0.05	0.03	0.10
	90	0.05	0.10	0.08	0.09	0.09	0.05	0.03	0.10
	95	0.05	0.10	0.08	0.09	0.09	0.05	0.03	0.10
RPD/CBW	25	17	27	33	35	22	15	17	25
	50	24	35	38	39	27	19	20	35
	75	39	55	108	135	39	34	53	53
	90	45	60	108	135	39	34	53	53
	95	45	60	108	135	39	34	53	53
D50	25	0.34	0.28	0.20	0.17	0.35	0.38	0.18	0.38
	50	0.51	0.42	0.32	0.28	0.58	0.54	0.42	0.54
	75	0.69	0.47	0.51	0.44	0.69	0.70	0.44	0.70
	90	1.20	0.50	0.42	0.33	1.05	0.55	0.42	0.55
	95	1.42	0.50	0.42	0.33	1.05	0.55	0.42	0.55
REL. SUBM. RD	25	24.2	7.5	8.1	4.8	14.0	26.8	25.8	7.1
	50	27.5	13.5	20.7	11.4	23.1	39.4	52.2	12.4
	75	37.5	13.5	20.7	11.4	23.1	39.4	52.2	12.4
	90	40.5	13.5	20.7	11.4	23.1	39.4	52.2	12.4
	95	40.5	13.5	20.7	11.4	23.1	39.4	52.2	12.4
POOL_SIZE	25	0.69	0.93	0.49	0.43	0.97	0.68	0.58	0.93
	50	0.94	1.16	0.72	0.59	1.14	0.84	0.65	1.25
	75	1.23	1.78	0.92	1.02	1.58	0.94	0.95	1.91

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Stream Condition Surveys – Tier II and LW Count

Parameter/Metric
Width-to-depth ratio (WD)
Total Large Wood pieces / meter (TLWD/M)
Total Key pieces Large Wood/meter (TKWD/M)
Pool/Km (POOL/KM)
Pool Spacing (PL SPC)
Residual Pool Depth/Channel Bed width (RPD/CBW)
Pool Length/meter (PLNGTH/M)



LW Pieces in Spasski Mainstem								
Stream	Year	Reach Length(km)	10-30	30-60	>60	Total	LWtotal/100m	LW>60/100m
Spasski Mainstem	2000	8.9	974	471	134	1583	17.79	1.51
Spasski Mainstem	2016	8.3	1178	985	146	2309	27.82	1.75

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Its important to know
Where, Why, and How
you're planning restoration

Do the homework, follow a
process, document, and
monitor for success of
objectives