Apr 28th, 10:15 AM - 11:45 AM

Getting from one size fits all to variable width riparian buffer recommendations

Kollin Higgins

Getting from one size fits all to variable width riparian buffers

Salish Sea Conference
April 28th 2022

Kollin Higgins
King County Department of Natural Resources and Parks

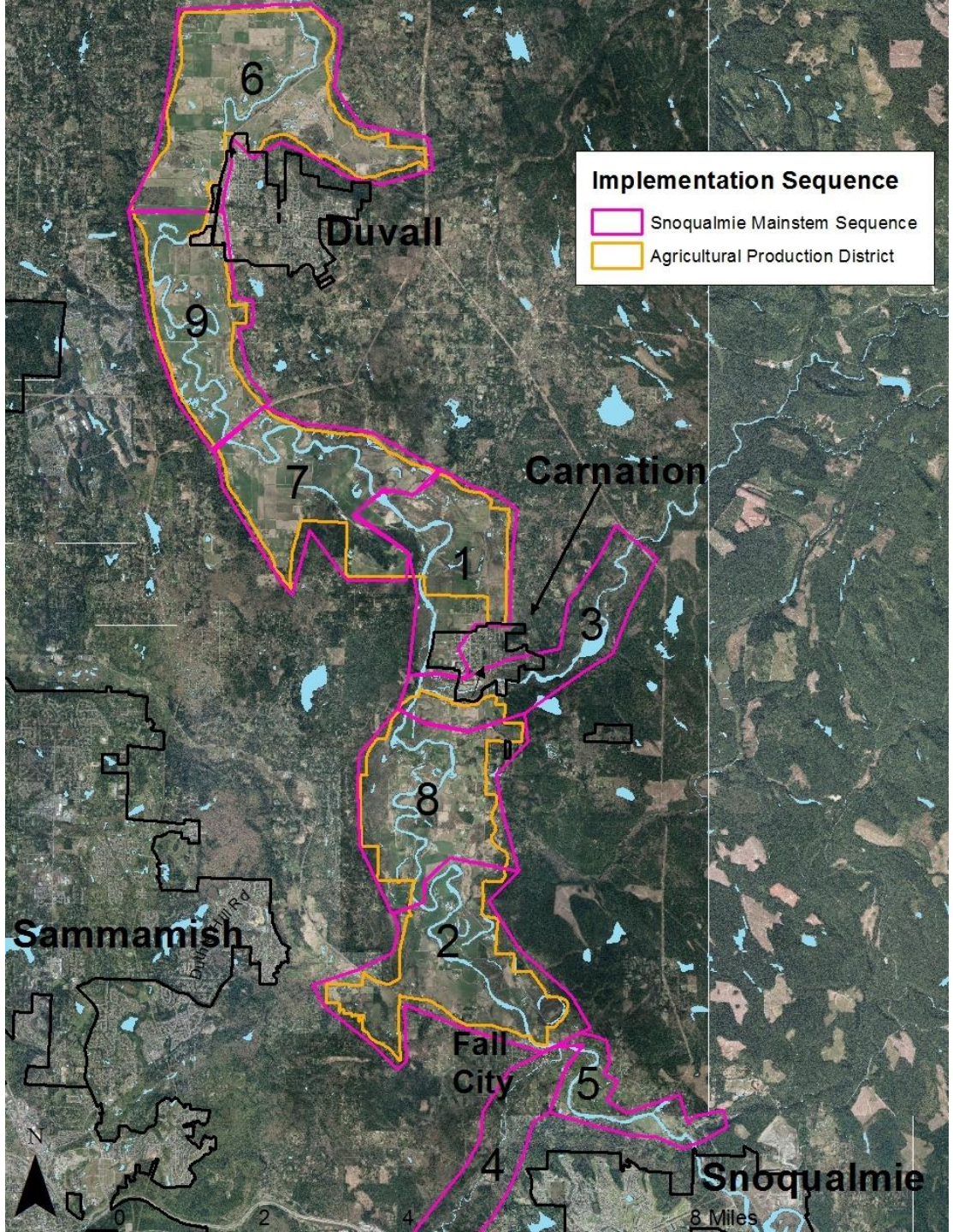
King County

WRIA 7 - Snohomish

Historical Chinook Abundance

Today


Riparian area
mostly treeless
Salmon Plan policy
recommendation: 150ft buffers
on all salmonid bearing streams



Strong overlap between agriculture and Chinook recovery

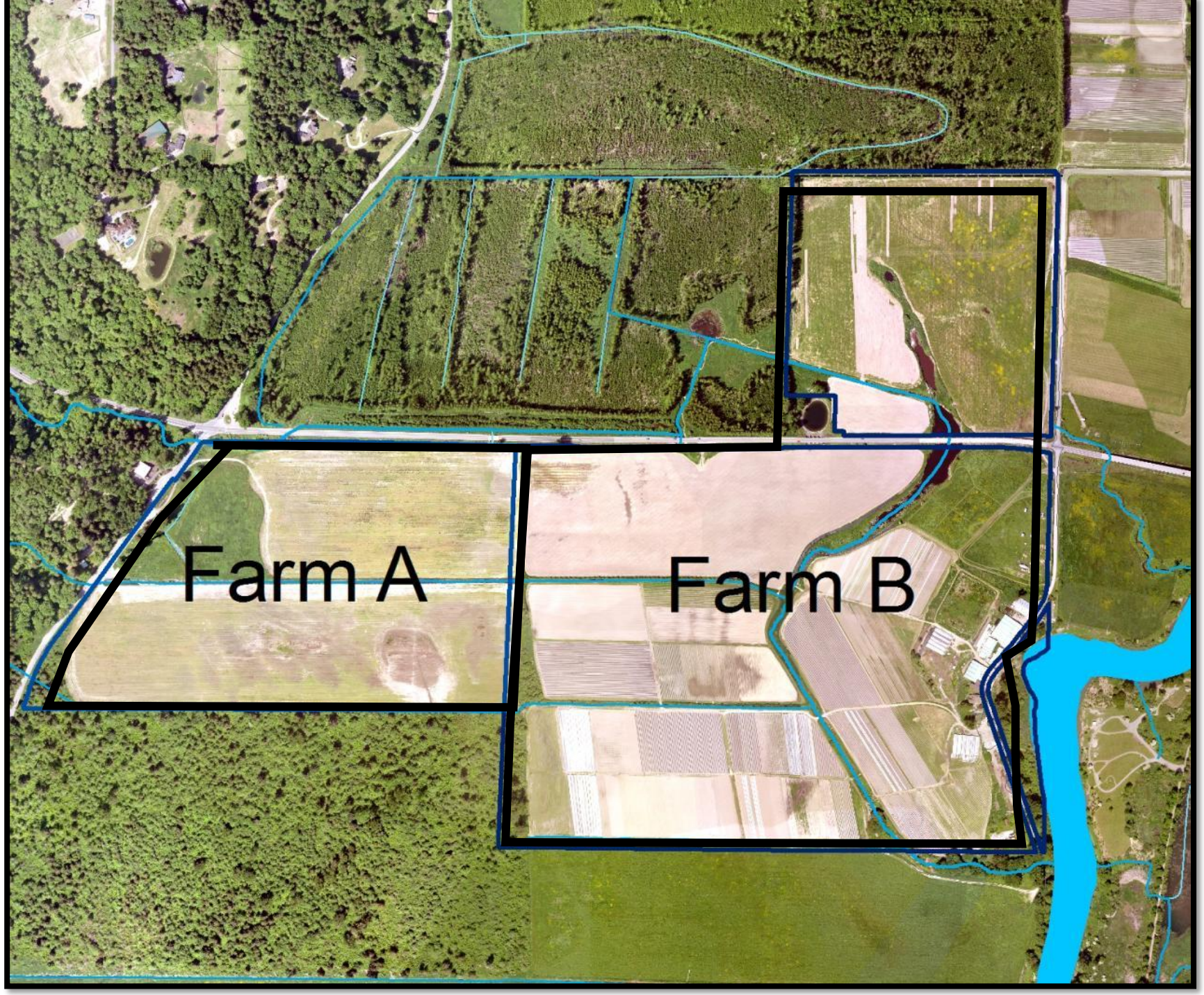
2012 County Council Policy

"…*a collaborative watershed planning process with the goal of maintaining and improving agricultural viability, improving ecological function and habitat quality, and restoring floodplains*"

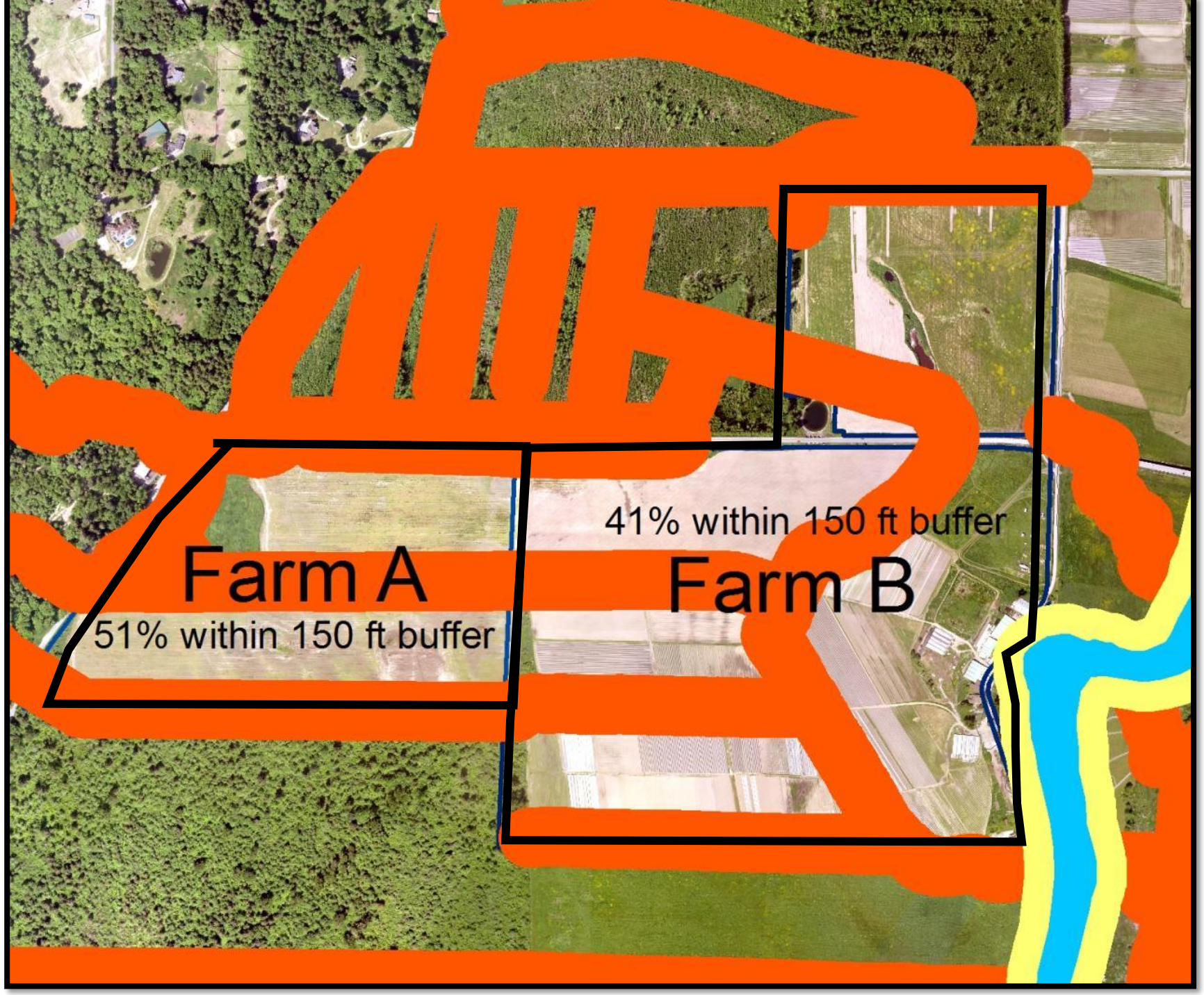
What we called

Fish Farm Flood

or FFF


Farm A
Farm B

150 foot buffers



150 foot riparian buffers would…

- Take ~ 2,600 acres out of agricultural production
- Or about 1/3 of the land currently in agricultural production

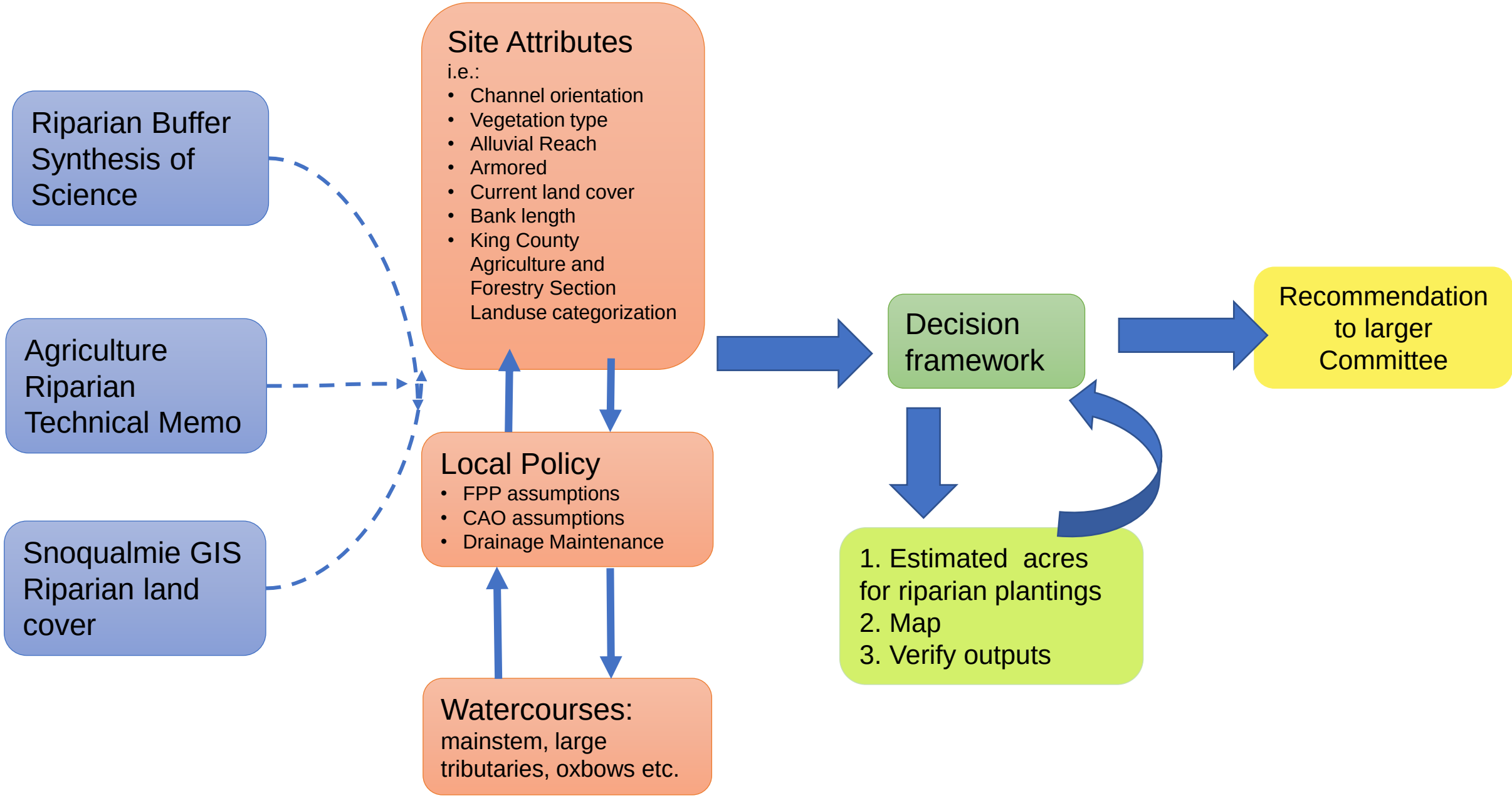
Recommendation: Buffer Task Force in phase 2 of FFF

“To provide the foundation and guidance for a scientifically credible, context-sensitive, locally derived riparian buffer strategy”

Buffer Task Force representation

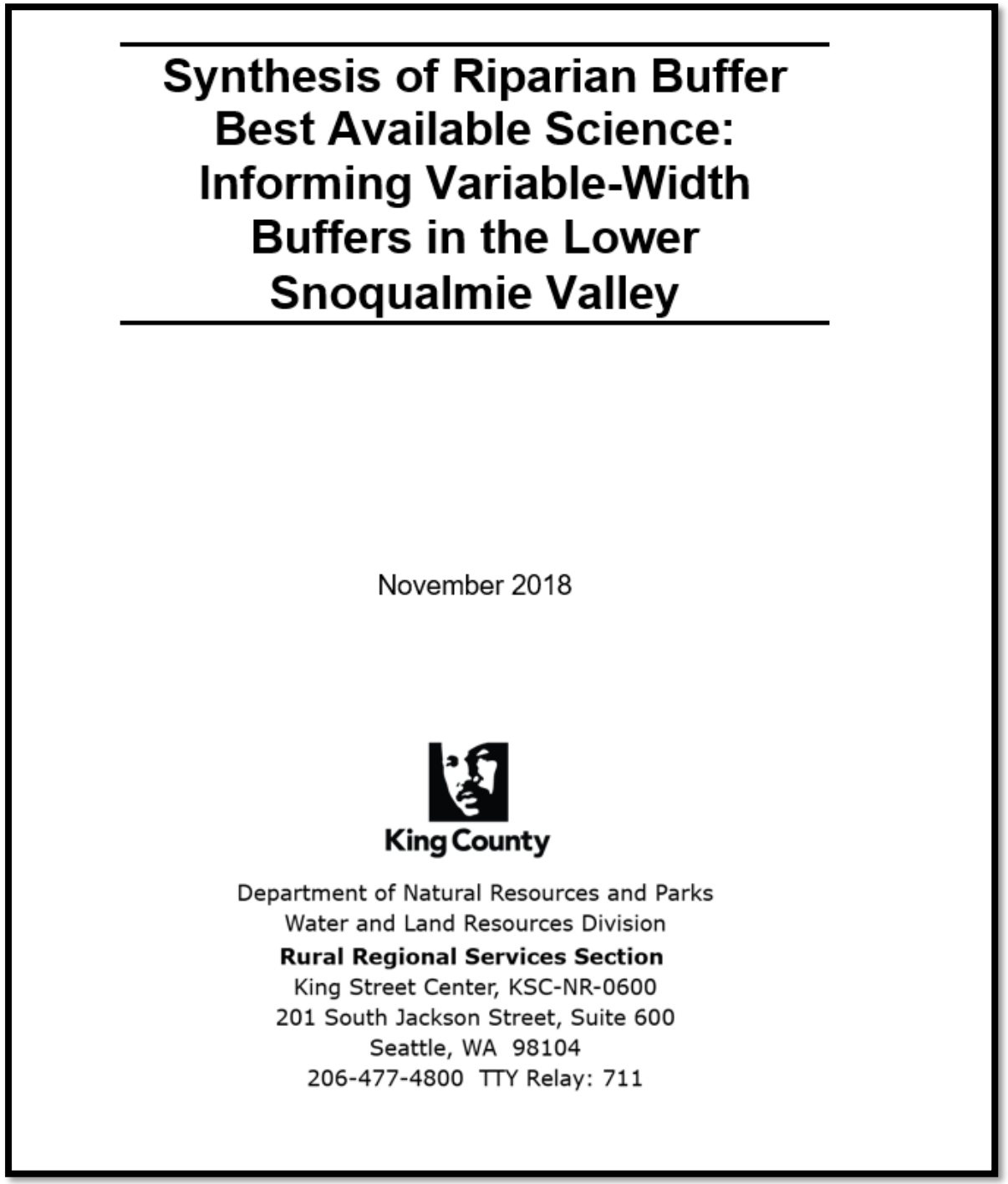
- Tribal representation
- Farmers
- Riparian restoration practitioners
- Property rights groups
- Salmon recovery staff

Technical Elements for the Buffer Task Force



Synthesis of Science

- Synthesis of best available riparian buffer science
- Focused on **low gradient floodplain conditions**
- Summarized by function
  1. WQ Nutrients, Sediment, Pesticides
  2. WQ Temperature
  3. Microclimate
  4. Large wood
  5. Erosion
  6. Prey/litter inputs



Synthesis of Riparian Buffer Best Available Science: Informing Variable-Width Buffers in the Lower Snoqualmie Valley

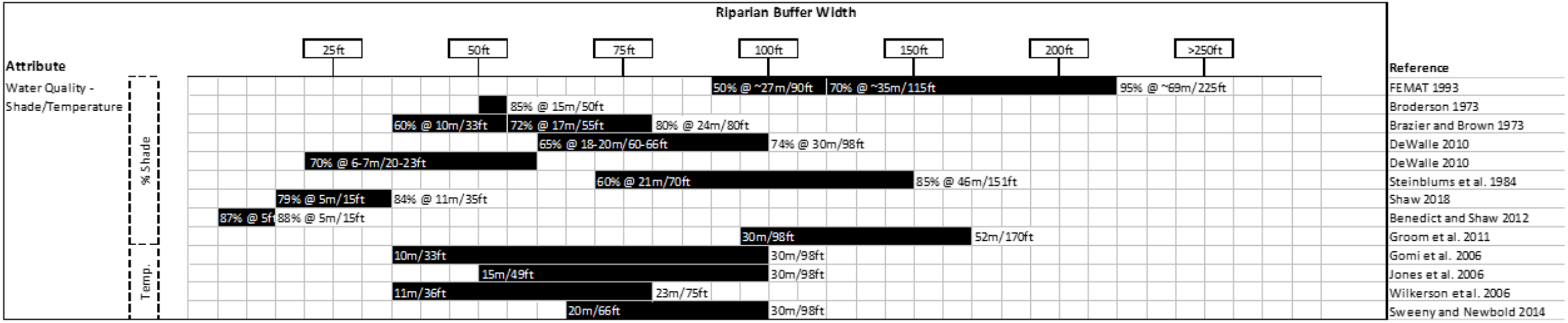
November 2018

King County

Department of Natural Resources and Parks
Water and Land Resources Division
Rural Regional Services Section
King Street Center, KSC-NR-0600
201 South Jackson Street, Suite 600
Seattle, WA 98104
206-477-4800 TTY Relay: 711

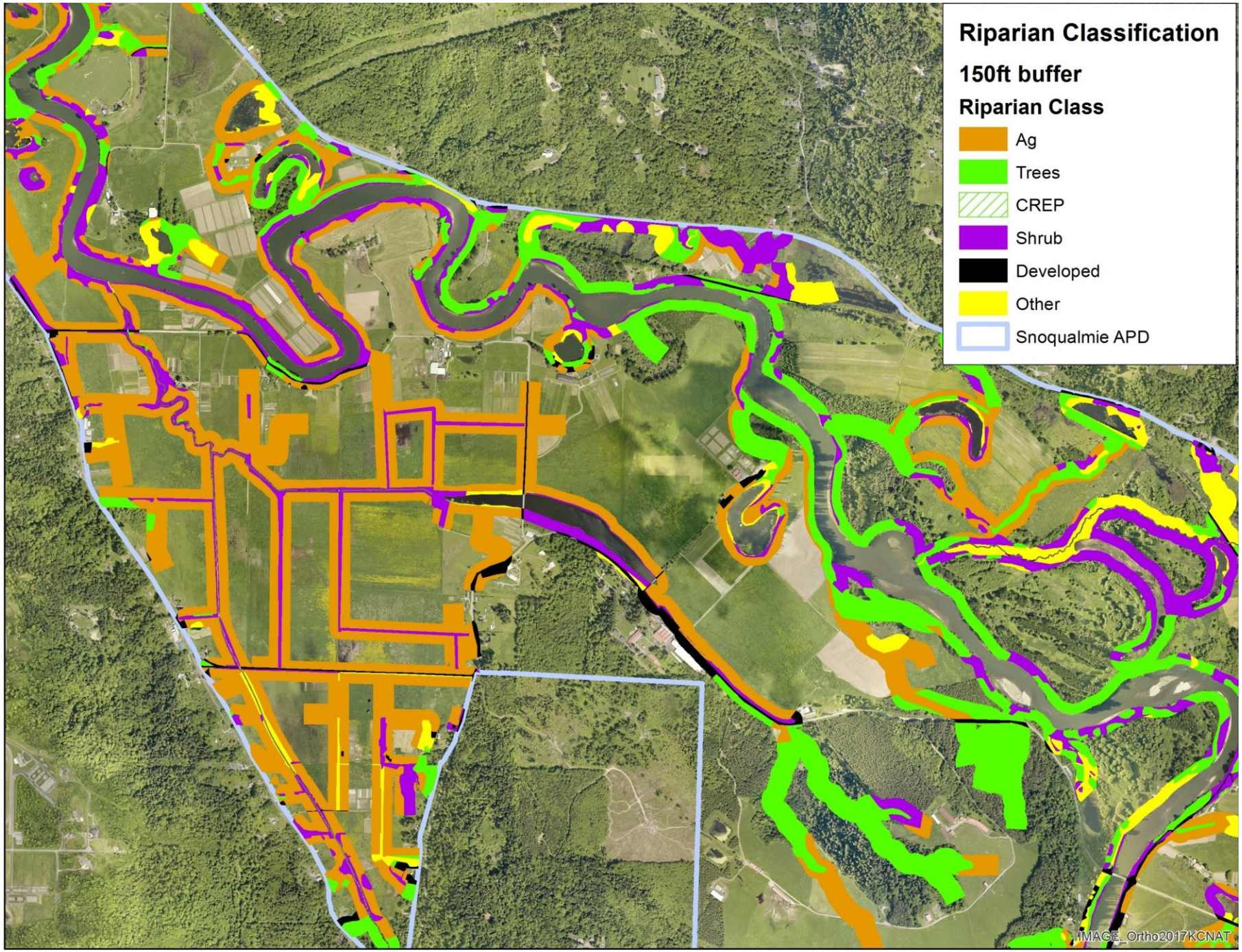
Example—Function: Large Wood

Large watercourses	• Primary wood input = erosion • Areas of channel migration require wide buffers to provide continual wood sources • Coniferous trees provide long-term habitat benefits and deciduous provides short-term benefits
Armored watercourses	• Armoring shifts wood input drivers from erosion to wind throw and mortality
Smaller watercourses	• Size of habitat-forming wood is smaller in smaller watercourses • Smaller channels receive a greater proportion of woody debris inputs from shorter source distances (closer to watercourses)
High-gradient watercourses	• Primary wood inputs = debris flows, landslides, and wind throw • High-gradient tributaries contribute to instream wood which is transported to downstream reaches



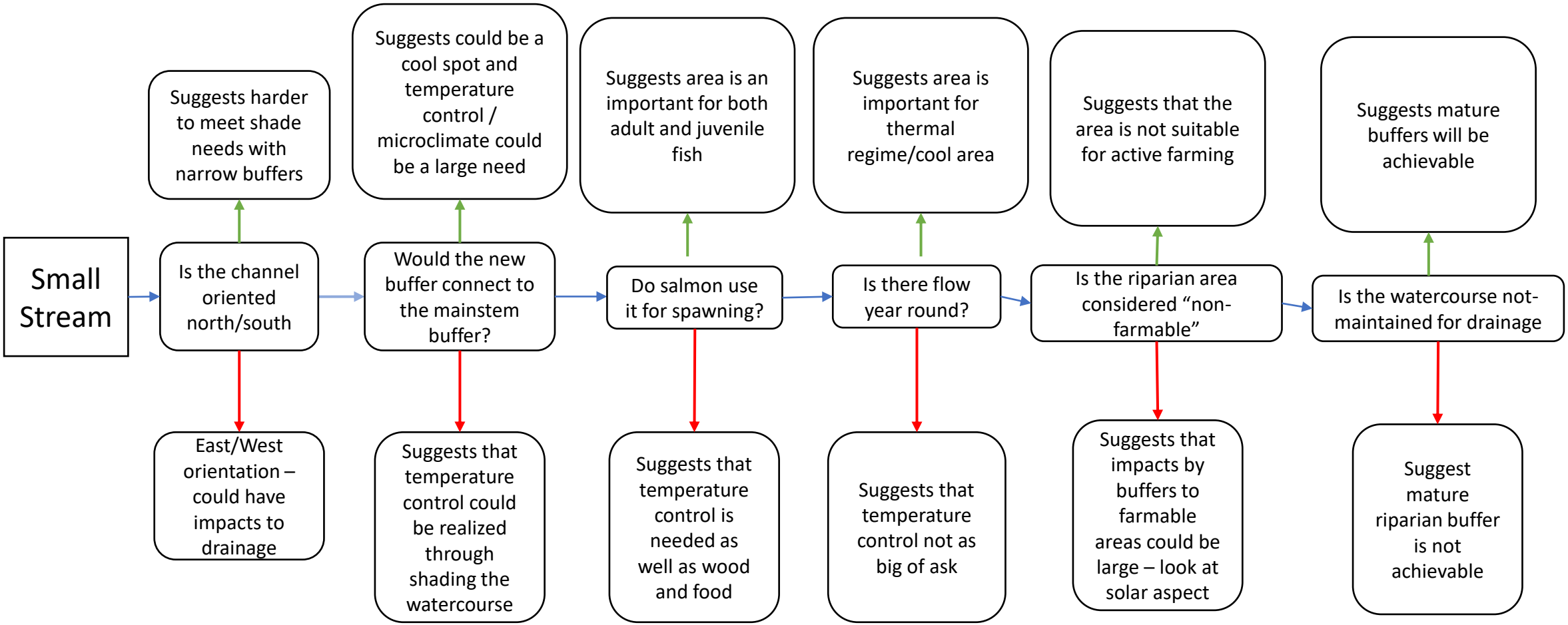
Reference	Riparian Cover Type	Stream order, Width, or Catchment Size	Gradient or Slope	Landscape	Comments	Cited in	Citation Title
FEMAT 1993						Reeves et al. 2018	Forest ecosystem management: an ecological, economic, and social assessment
Broderson 1973		Small streams with flows <5 cfs		Western Oregon and Washington	Created an equation from the literature that estimated shade based on riparian width. Found 85% of shade for "small streams" produced from a width of 50 ft.		Sizing Buffer Strips to Maintain Water Quality
Brazier and Brown 1973		"small streams"		Umpqua National Forest; Southern Cascade Mountains; Forestry	80% needed for water temp control and equivalent to full forest conditions; maximum shade at 80 ft and 90% of max at 55 ft	Beschta et al. 1987, Sweeny and Newbold 2014, Osborne and Kovacic 1993,	Buffer Strips for Stream Temperature Control
DeWalle 2010	Forest	fixed stream width = 3 m (N-S orientation)			Modeled stream shade at different buffer widths, also kept in mind stream orientation. This line is specific to N-S oriented streams, shade was maximized at widths ~30 m		Modeling Stream Shade: Riparian Buffer Height and Density as Important as Buffer Width
DeWalle 2010	Forest	fixed stream width = 3 m (E-W orientation)			Modeled stream shade at different buffer widths, also kept in mind stream orientation. This line is specific to E-W oriented streams, shade was maximized at widths ~7 m		Modeling Stream Shade: Riparian Buffer Height and Density as Important as Buffer Width

Riparian data manually delineated based on recent aerials

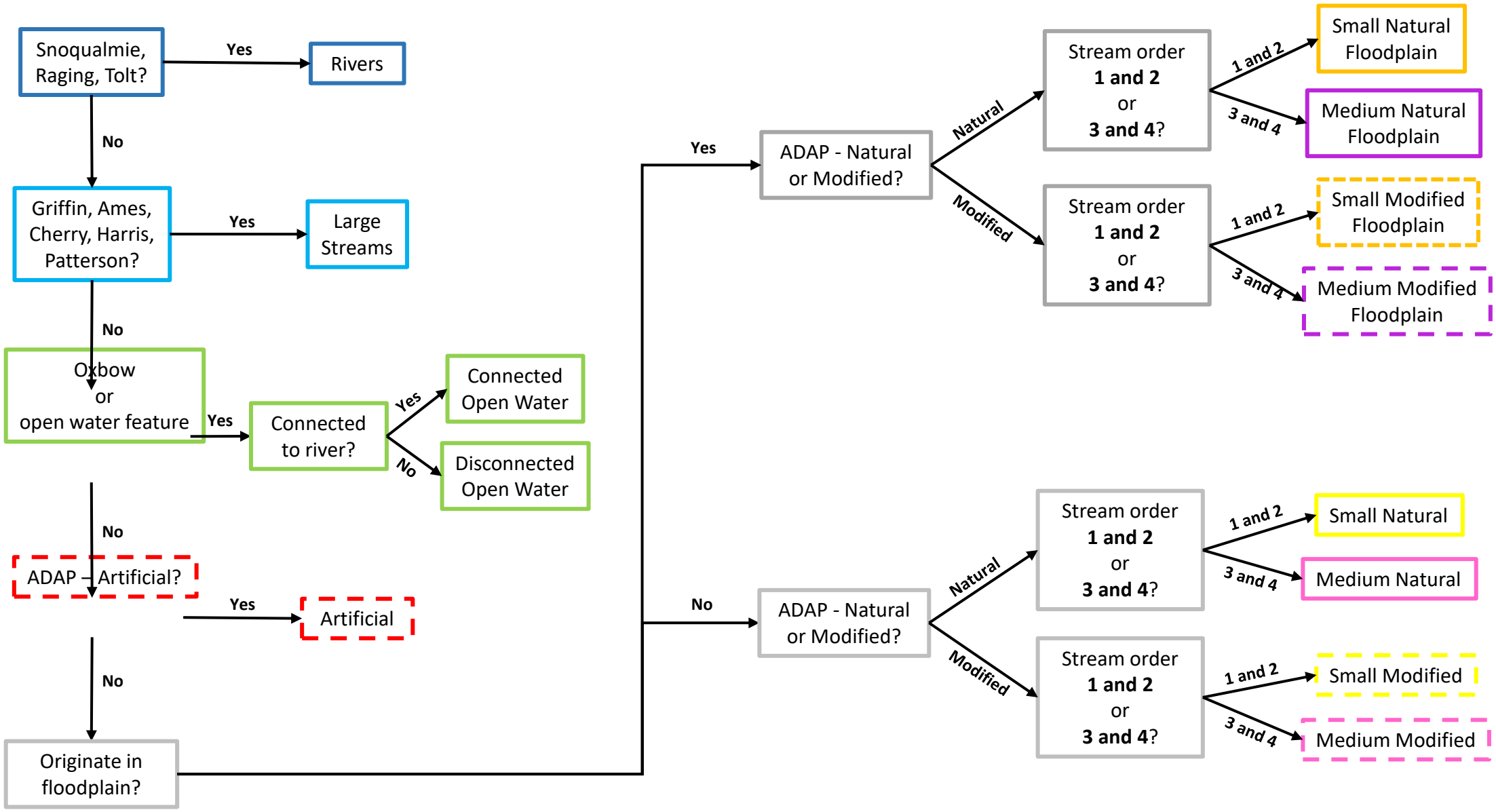


Stream Classification

Example classification

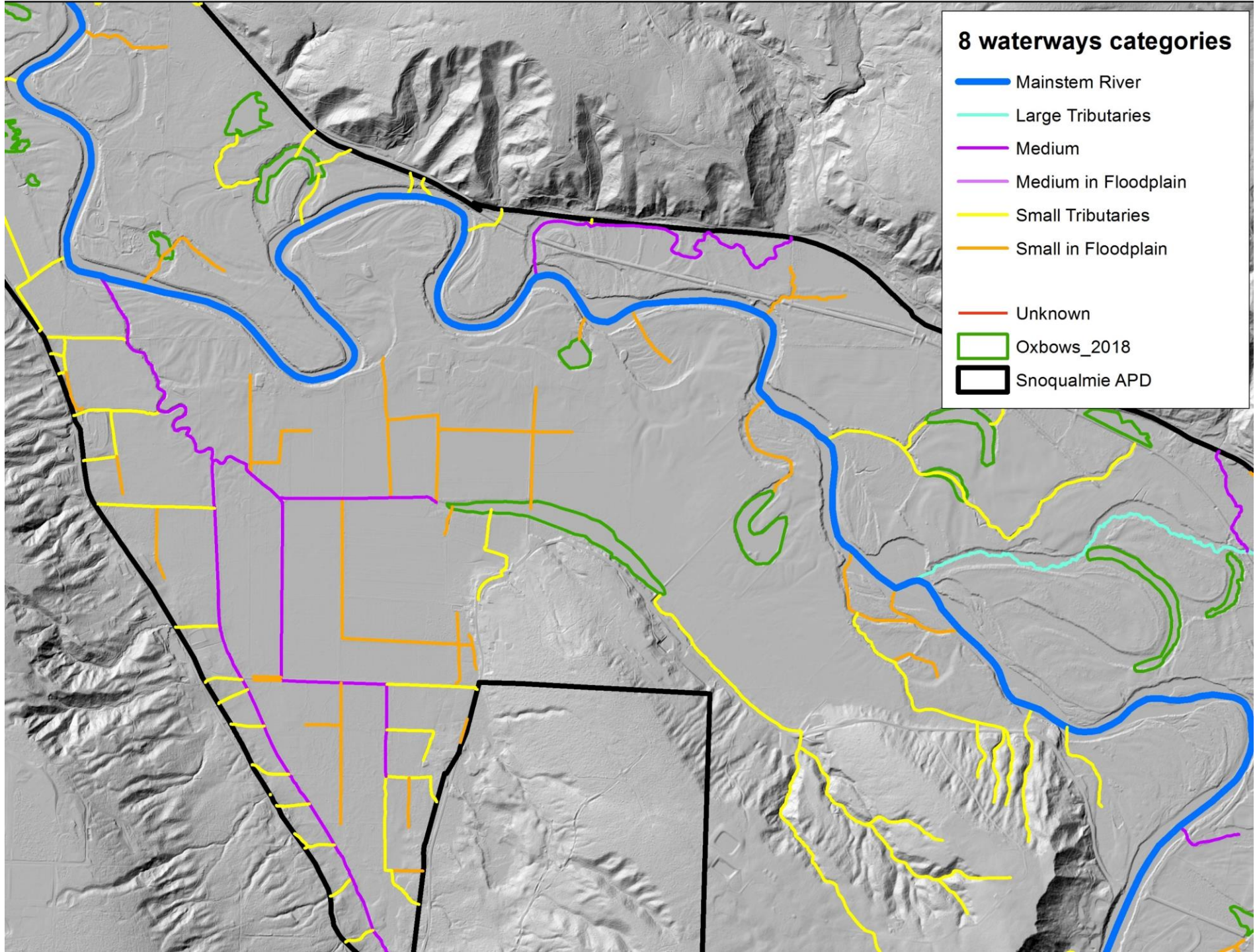


Example classification



Streams types?

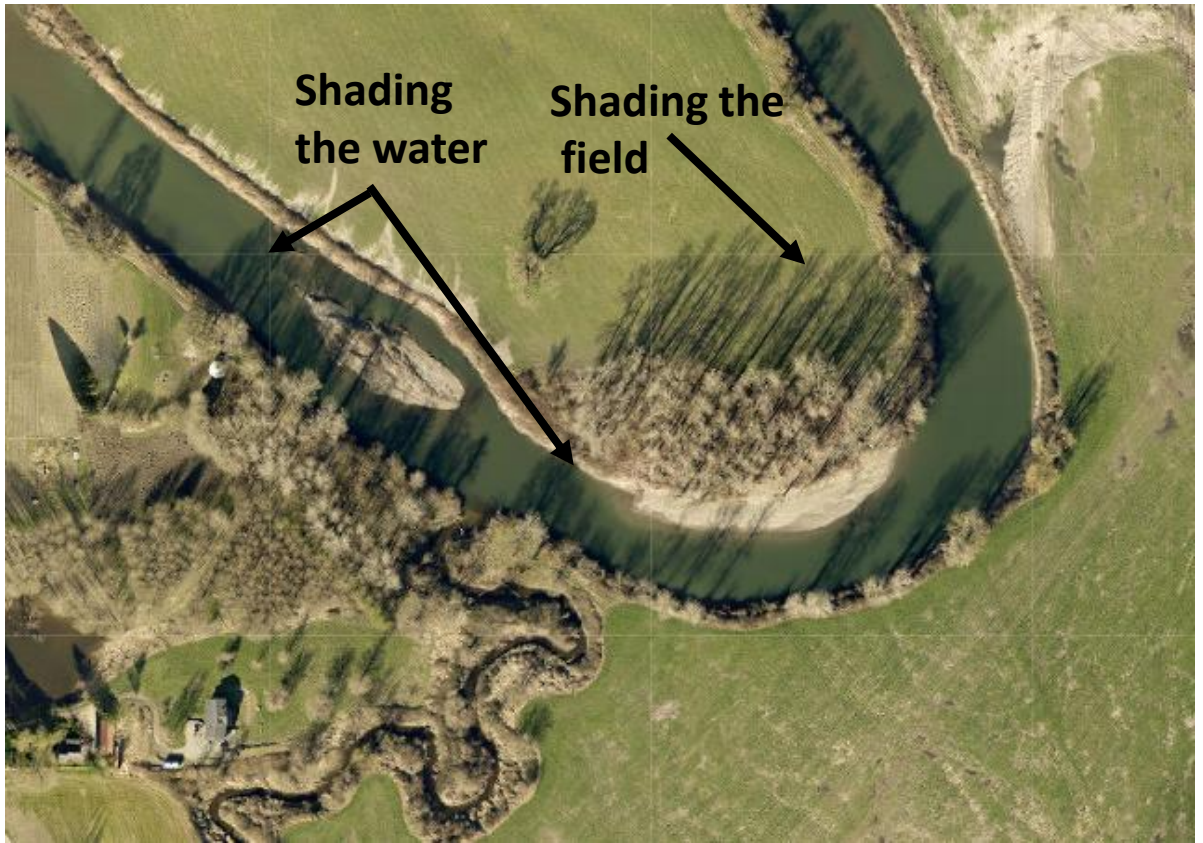
1. River
2. Large watercourses (basins larger than 8 square miles)
3. Medium watercourses (Strahler’s stream order 3 and 4)
4. Small watercourses (Strahler’s stream order 1 and 2)
5. Artificial watercourses
6. Oxbow/Ponds


8 waterways categories
Mainstem River
Large Tributaries
Medium
Medium in Floodplain
Small Tributaries
Small in Floodplain
Unknown
Oxbows_2018
Snoqualmie APD

Additional characteristics?

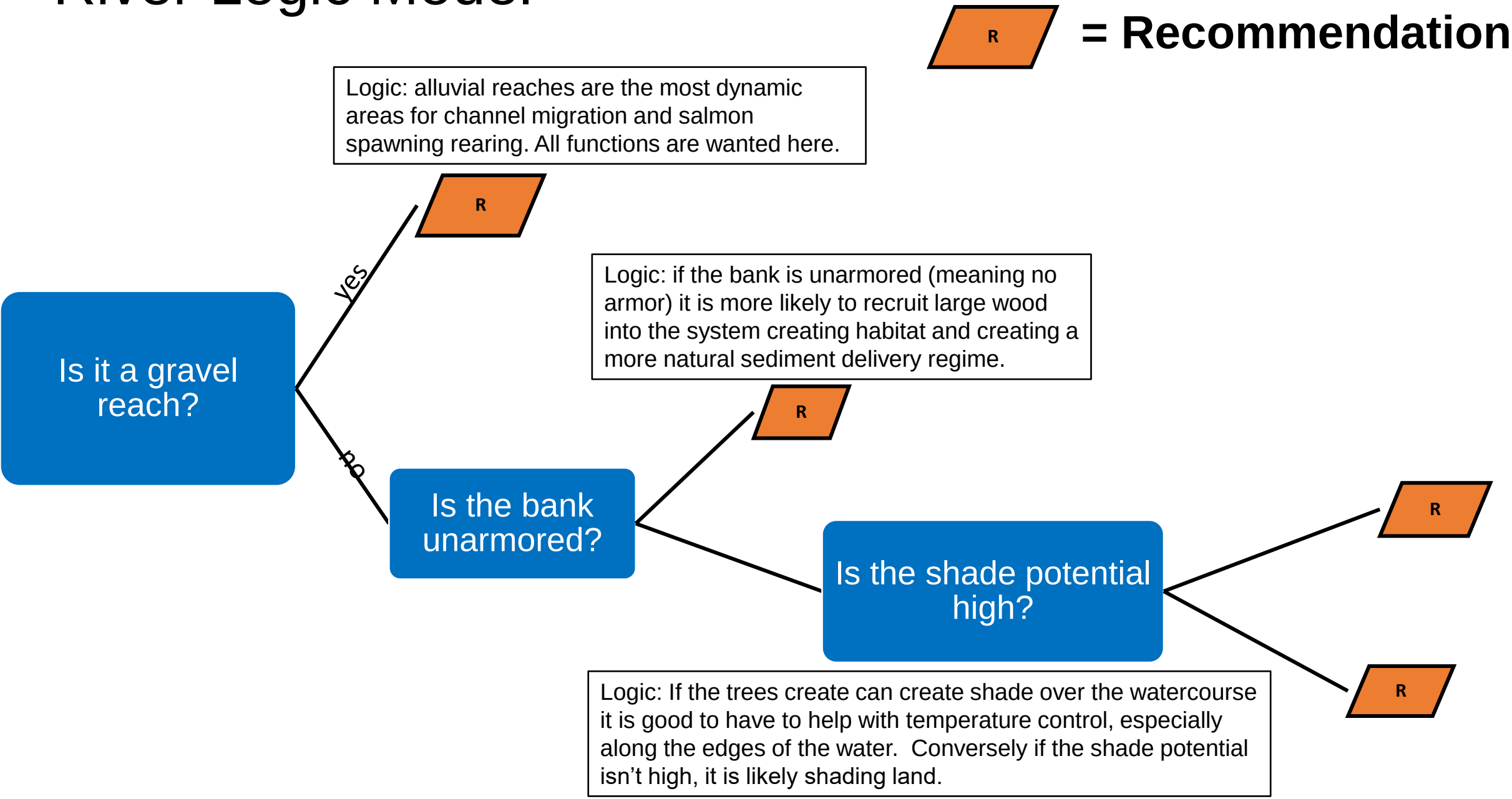
- Is the channel straightened/modified or sinuous
- Originates outside/inside the floodplain
- Bank armoring
- Solar aspect
- Gravel/spawning reach

Example of solar aspect



River Logic Model

R = **Recommendation**



River Logic Model

Is it an alluvial reach?

yes

- Existing 150 ft
- Tech Team 200 ft
- Fish Caucus 200 ft
- Farm Caucus 200 ft

Is the bank unarmored?

yes

- Existing 150 ft
- Tech Team 150 ft
- Fish Caucus 150 ft
- Farm Caucus 150 ft

Is the shade potential high?

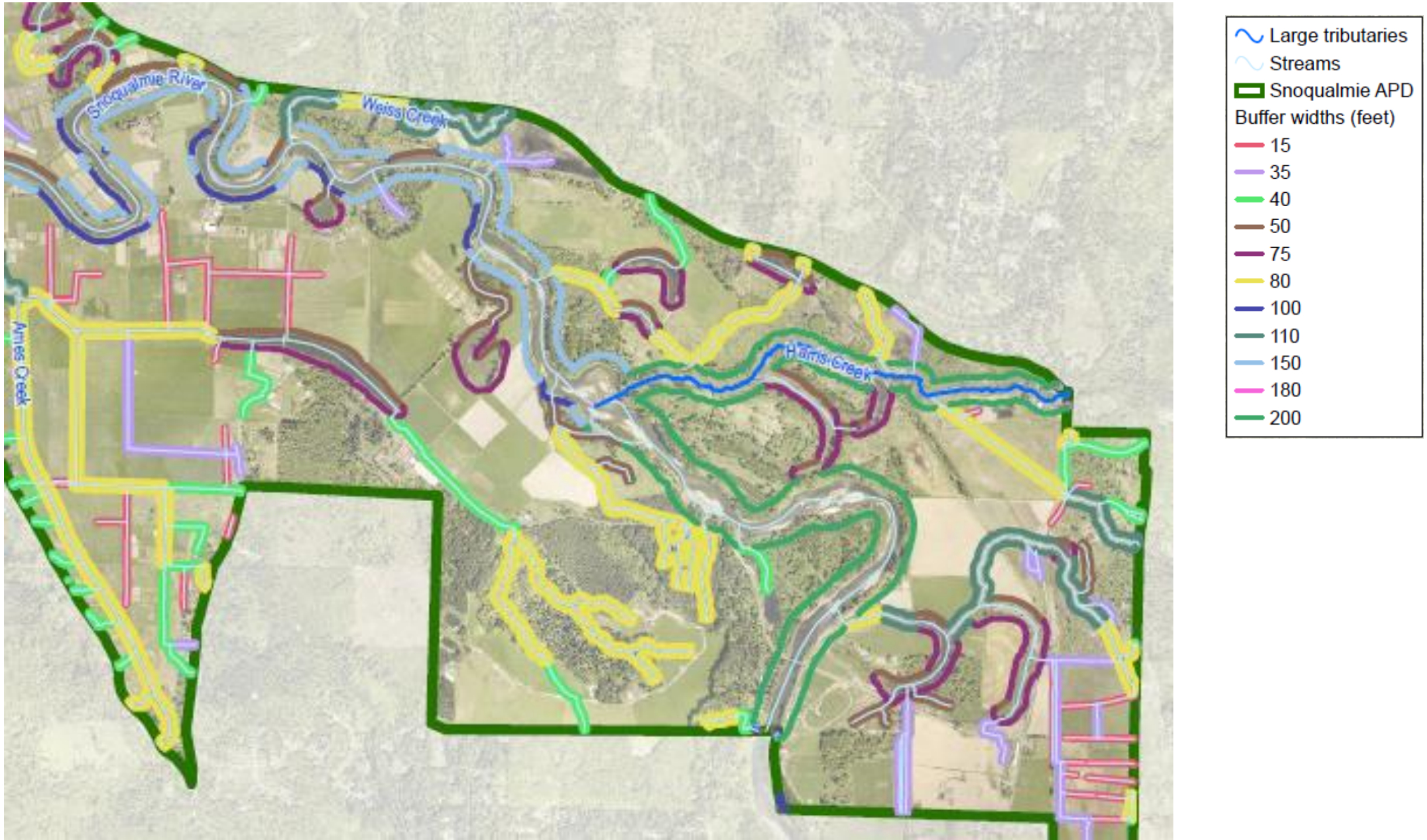
yes

- Existing 150 ft
- Tech Team 100 ft
- Fish Caucus 100 ft
- Farm Caucus 100 ft

- Existing 150 ft
- Tech Team 50 ft
- Fish Caucus 50 ft
- Farm Caucus 50 ft

	Existing		Tech Team		Fish Caucus		Farm Caucus		Revised Tech Team recommendation	
	width	Ag acres	Width	Ag Acres	Width	Ag Acres	Width	Ag Acres	Width	Ag Acres
Mainstem -Alluvial	150	65	200	101	200	101	200	101	200	101
Mainstem-Nonalluvial-no armor	150	126	150	126	150	126	150	126	150	126
Mainstem -Nonalluvial-armored high shade	150	76	100	34	100	34	100	34	100	34
Mainstem-Nonalluvial-armored low shade	150	51	50	4	50	4	50	4	50	4
Large Stream unarmored	150	77	180	97	225	126	180	97	200	112**
Large Stream armored	150	21	125	17	180	25	125	17	180	25
Medium-sinuous-originate OUTside floodplain	150	72	140	65	140	64	80	27	110	45**
Medium-sinuous-originate INside floodplain	150	6	80	2	80	2	80	2	80	2
Medium NONsinuous -originate outside floodplain	150	422	80	201	80	201	80	201	80	201
Medium NONsinuous-originate-inside floodplain-HIGH Shade	150	6	75	3	75	3	75	3	75	3
Medium NONsinuous-originate-inside floodplain-LOW shade	150	1	50	0	50	0	50	0	50	0
Small-sinuous-originate OUTside floodplain	150	95	100	57	100	57	50	22	80	41**
Small-sinuous-originate INside floodplain	150	92	65	31	50	22	50	22	50	22
Small NONsinuous-originate outside floodplain	150	421	65	168	50	121	35	76	40	96**
Small NONsinuous-originate-inside floodplain-HIGH Shade	150	288	50	87	35	57	35	57	35	57
Small NONsinuous -originate-inside floodplain-LOW shade	150	132	30	22	35	27	25	18	35	27
Oxbow-HIGH shade	150	134	75	53	75	54	75	56	75	56
Oxbow-LOW shade	150	71	50	13	50	13	50	13	50	13
Artificial-HIGH shade	150	286	50	102	35	66	15	23	15	23
Artificial-LOW shade	150	105	25	16	15	9	5	3	15	9
Unknowns*	*150*	*59*	*35*	*15*	*35*	*15*	*35*	*15*	*35*	*15*
Ag acres affected by widths		2,605		1,215		1,128		918		1,013
% reduction from existing		0%		53%		57%		65%		61%

	2005 Snohomish Basin Salmon Recovery Plan	Potential Acres Agriculture Converted	Buffer Task Force Agreement	Potential Acres Agriculture Converted
Mainstem River				
alluvial reach	150	65	200	101
non-alluvial and unarmored,	150	126	150	126
non-alluvial, armored, high shade potential	150	76	100	34
non-alluvial, armored, low shade potential	150	51	50	4
Large Watercourses				
Unarmored	150	77	200	110
Armored	150	21	180	25
Medium Watercourses				
Sinuous, originates outside floodplain	150	72	110	45
Sinous, originates inside the floodplain	150	6	80	2
Non-Sinuous, originates outside Floodplain	150	422	80	199
Non-Sinuous, originates in Floodplain, high shade	150	6	75	3
Non-Sinuous, originates in Floodplain, low shade	150	1	50	0
Small Watercourses				
Sinuous, originates outside floodplain	150	95	80	42
Sinous, originates inside the floodplain	150	92	50	22
Non-Sinuous, originates outside Floodplain	150	421	40	91
Non-Sinuous, originates in Floodplain, high shade	150	288	35	57
Non-Sinuous, originates in Floodplain, low shade	150	132	35	27
Oxbows				
High shade Potential	150	134	75	55
Low Shade Potential	150	71	50	13
Artificial Watercourses				
High shade Potential	150	286	15	23
Low Shade Potential	150	105	15	9
unknowns	150	59	35	15
TOTAL		**2,605**		**1,003**


Snoqualmie River
Weiss Creek
Ames Creek
Harris Creek
Large tributaries
Streams
Snoqualmie APD
Buffer widths (feet)
15
35
40
50
75
80
100
110
150
180
200

Wrap up—Final Agreement

- Is between the County and the agricultural community, but the hope is that all potential parties abide by the agreement
- Voluntary buffers only—these should not be used for mitigation or regulations
- Still pending: a Buffer Implementation Task Force to make revegetation happen faster

Documents available online, google “**fish farm flood riparian buffer**”

Washington Department of
FISH and WILDLIFE

EPA
United States
Environmental Protection
Agency

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Questions?

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206-477-4711

Snoqualmie Buffer Task Force documents available online, google “**fish farm flood riparian buffer**”

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