

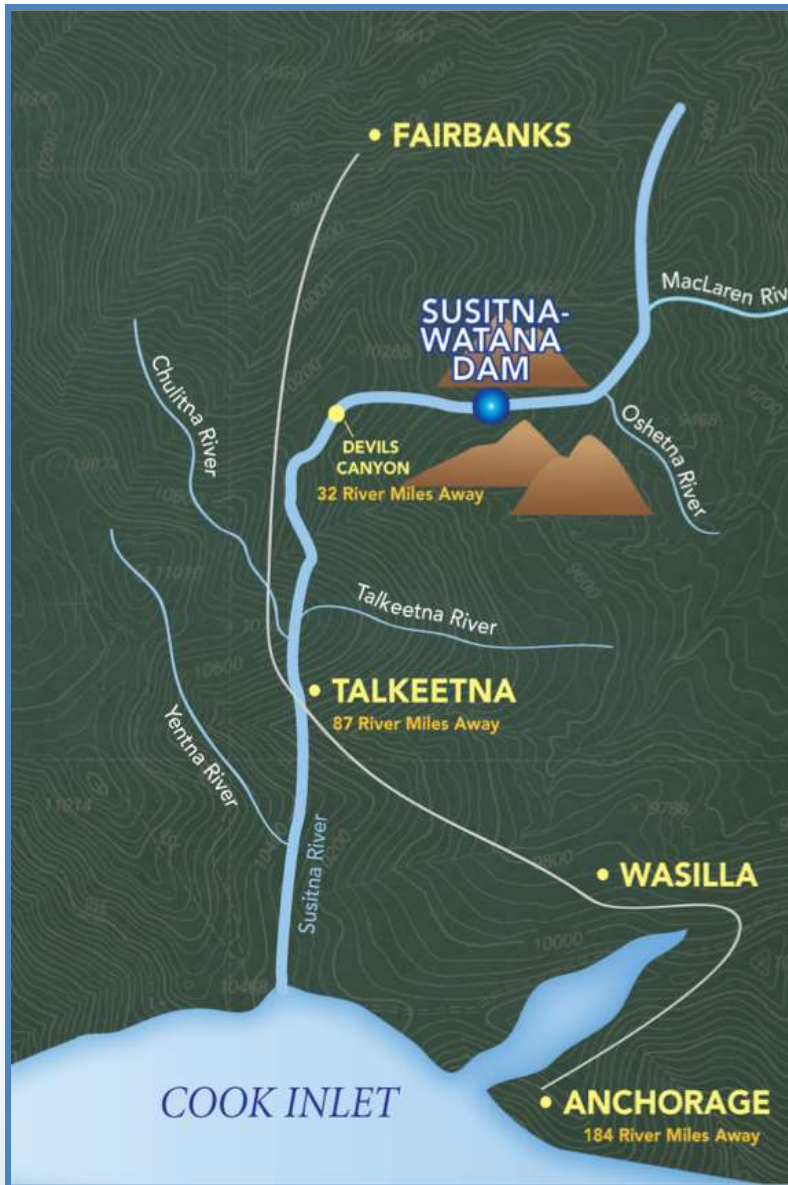
Technical Team Meeting

Riverine Modeling Proof of Concept

Spatial Extrapolation

April 15-17, 2014

Prepared by
R2 Resource Consultants

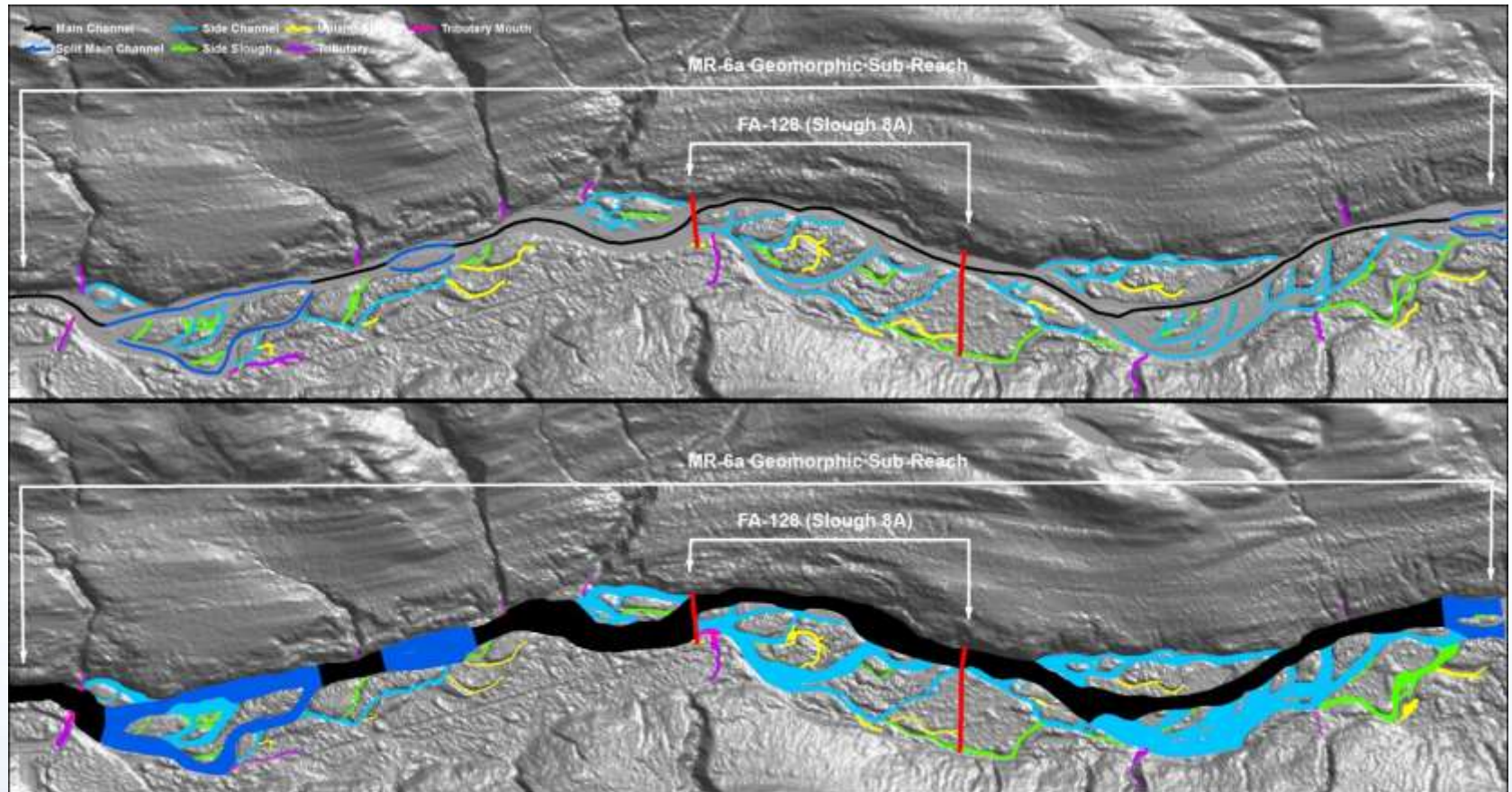


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Spatial Extrapolation

- If an evaluation metric is an absolute value for the entire Middle River, how will this value be estimated from Focus Area modeling?
- Extrapolation options:
 1. Linear distance
 2. Macrohabitat linear distance
 3. Macrohabitat area
 4. Macrohabitat weighted by fish use
- We use FA-128 (Slough 8A) and a Geomorphic Sub-Reach *MR-6a* to illustrate

Spatial Extrapolation



Spatial Extrapolation – Macrohabitat Linear



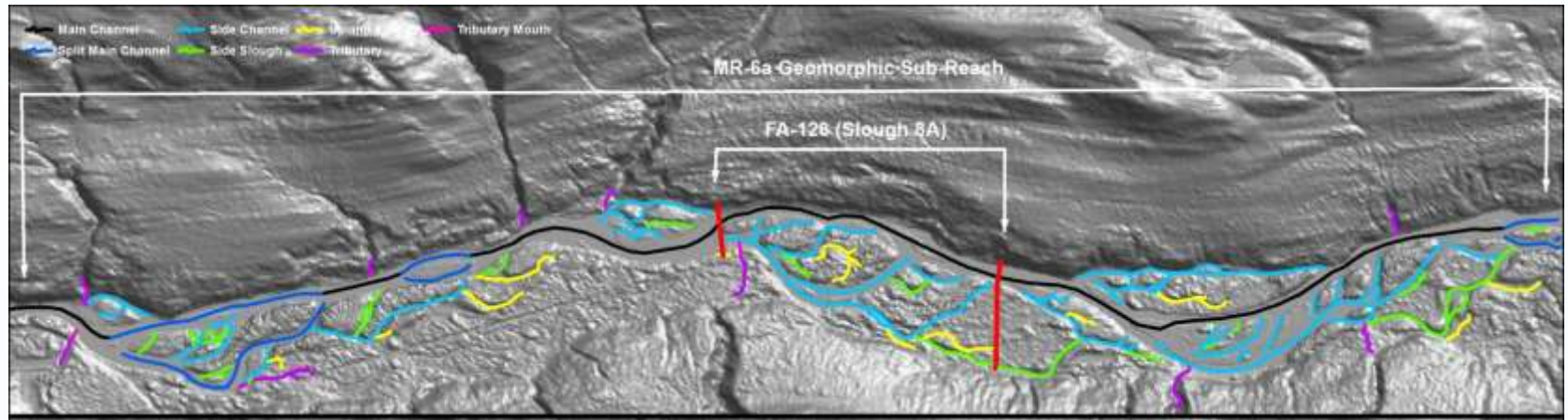
Spatial Extrapolation - Linear

- FA-128 (Slough 8A) is 1.6 miles (thalweg length)
- MR-6a Geomorphic Sub-Reach is 8.9 miles
- Multiplier is $8.9/1.6=5.5$
- Estimated WUA for Geomorphic Sub-Reach MR-6a = WUA for FA-128 x 5.5
- Middle River Segment WUA = Sum of WUA for all geomorphic reaches

Spatial Extrapolation - Linear

- Simplest method
- Assumptions and uncertainties:
 - Assumes Focus Areas are accurately mapped and are proportionally representative of all habitats in Geomorphic Reach
 - Assumes effects of flow are similar throughout reach
 - Some uncertainty in thalweg length estimates

Spatial Extrapolation – Macrohabitat Linear



Spatial Extrapolation – Macrohabitat Linear

- Multiply WUA for each macrohabitat type in FA-128 by MR-6a macro length/FA-128 macro length

	WUA for Given Species/ Lifestage	FA-128 Length (ft) ¹	MR-6a Length (ft) ¹	Ratio of Lengths	WUA for Given Species/ Lifestage
Main Channel (including Split and Multiple Split)	WUA_{128mc}	8,400	57,500	6.8	$6.8 * WUA_{128mc}$
Side Channel	WUA_{128sc}	21,100	79,000	3.7	$3.7 * WUA_{128sc}$
Side Slough	WUA_{128ss}	4,800	26,500	5.5	$5.5 * WUA_{128ss}$
Upland Slough	WUA_{128us}	6,400	17,900	2.8	$2.8 * WUA_{128us}$
Tributary (ZHI) + Trib Mouth	WUA_{128tr}	400	4,100	10	$10 * WUA_{128tr}$
					Sum of this column is WUA_{6A}

¹From 2013 field verified line mapping with 2014 additions during polygon delineations.

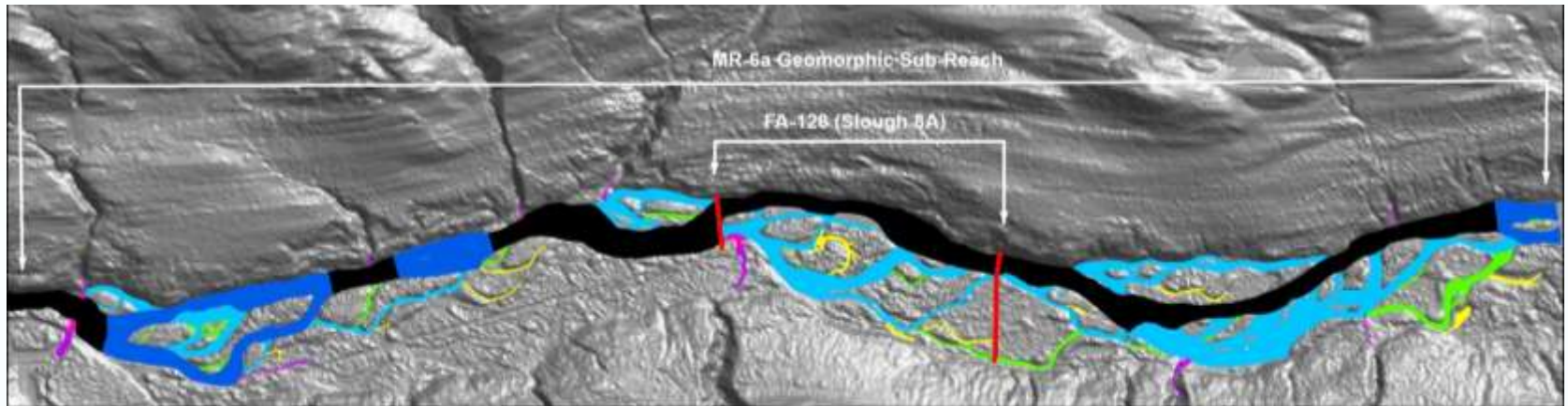


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Spatial Extrapolation – Macrohabitat Linear

- Only slightly more complex
- Assumptions and uncertainties:
 - Assume Focus Area and non-Focus Area macrohabitats are accurately mapped
 - Assume dimensions of Focus Area macrohabitats are representative of Reach
 - Assume effects of flow are similar throughout reach
 - Uncertainty in length estimates for each macrohabitat

Spatial Extrapolation – Macrohabitat Area



Spatial Extrapolation – Macrohabitat Area

- Multiply WUA for each macrohabitat type in FA-128 by MR-6a macro area/FA-128 macro area

	WUA for Given Species/ Lifestage	FA-128 Area ¹ (1000 sq ft)	MR-6a Area ¹ (1000 sq ft)	Ratio of Areas	WUA for Given Species/ Lifestage
Single, Split, and Multiple Split Main Channel	WUA_{128mc}	4,900	33,400	6.8	$6.8 * WUA_{128mc}$
Side Channel	WUA_{128sc}	4,700	19,600	4.2	$4.2 * WUA_{128sc}$
Side Slough	WUA_{128ss}	300	2,200	7.3	$7.3 * WUA_{128ss}$
Upland Slough	WUA_{128us}	300	600	2.0	$2.0 * WUA_{128us}$
Tributary (ZHI) + Trib Mouth	WUA_{128tr}	100	600	6.0	$6.0 * WUA_{128tr}$
					Sum of this column is WUA_{6A}

¹Bankfull width determined by vegetation line on 2013 Tetra Tech orthophotos (photo date 9/24/13, 11,300 cfs at Gold Creek).

Spatial Extrapolation – Macrohabitat Area

- More complex – requires detailed GIS work on entire Middle River
- Assumptions and uncertainties:
 - All macrohabitats are accurately area mapped
 - Proportionality of area is similar across different flow levels
 - Effects of flow on macrohabitats are similar throughout Geomorphic Reach
 - Uncertainty in area estimates for each habitat

Spatial Extrapolation –Fish Use Factor

- Multiply WUA for each macrohabitat in FA-128 by *fish use factor* prior to spatial expansion
 - Spatial expansion method could be either macrohabitat linear or macrohabitat area

	Fish Use ¹
Main Channel	0.04
Side Channel	0.18
Side Slough	0.30
Upland Slough	0.30
Tributary (ZHI) and Tributary Mouth	0.18

¹*Not Real Estimates!*

Spatial Extrapolation – Macrohabitat Area weighted by Fish Use Factor

- Most complex – spatial expansion + development of fish use weighting
- Assumptions and Uncertainties:
 - All assumptions and uncertainties related to the spatial expansion method
 - Assumes suitable habitat in high-use macrohabitat type is more valuable than suitable habitat in low-use macrohabitat type
- This macrohabitat “weighting” could be added to the HSC process as an alternative to this post-process factor

Spatial Extrapolation Summary

- The differences among these methods lie in the assumptions, uncertainties and complexities of estimation
- The methods are being evaluated
- The final selection has not been made