

Application of Natural Channel Design Principles in Interior Alaska

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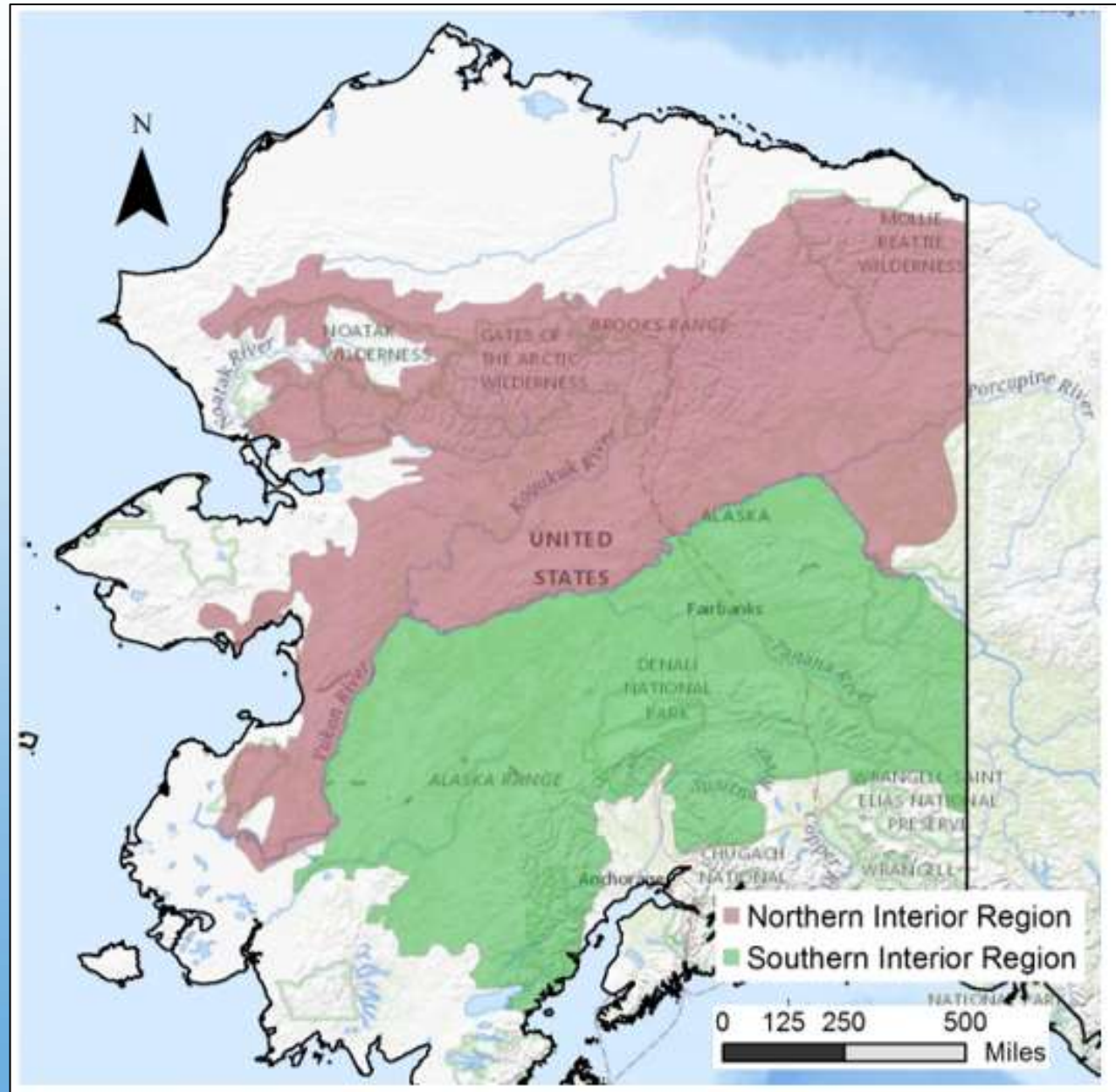


Overview of Presentation

- Introduction to Interior Alaska and needs for reclamation/restoration.
- Bankfull Regional Curves
- Reference Reach Data
- Design Guide
- On to the Arctic



Interior Alaska



Welcome to Alaska





Placer Mining



Twenty years after reclamation...



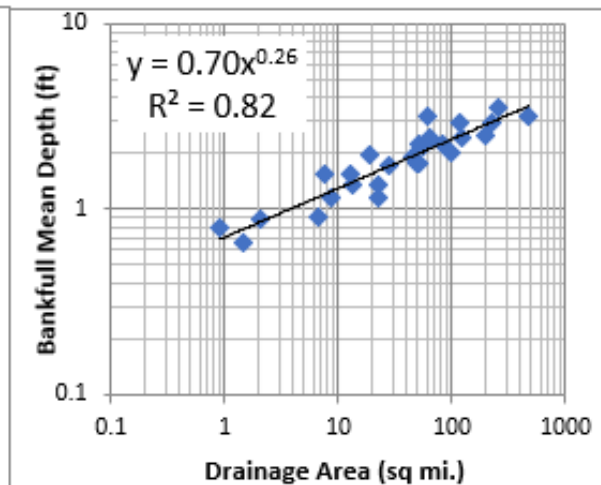
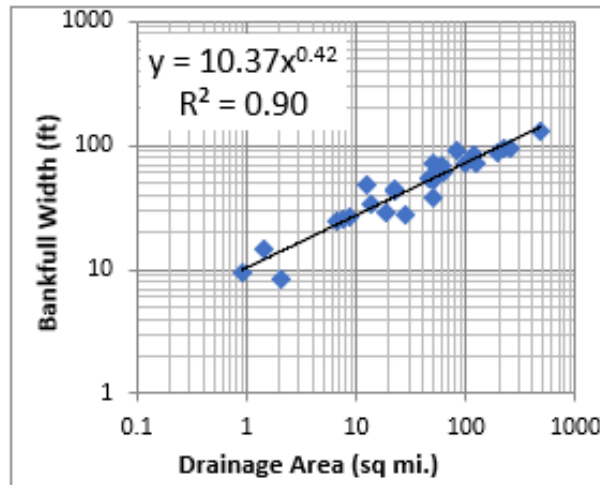
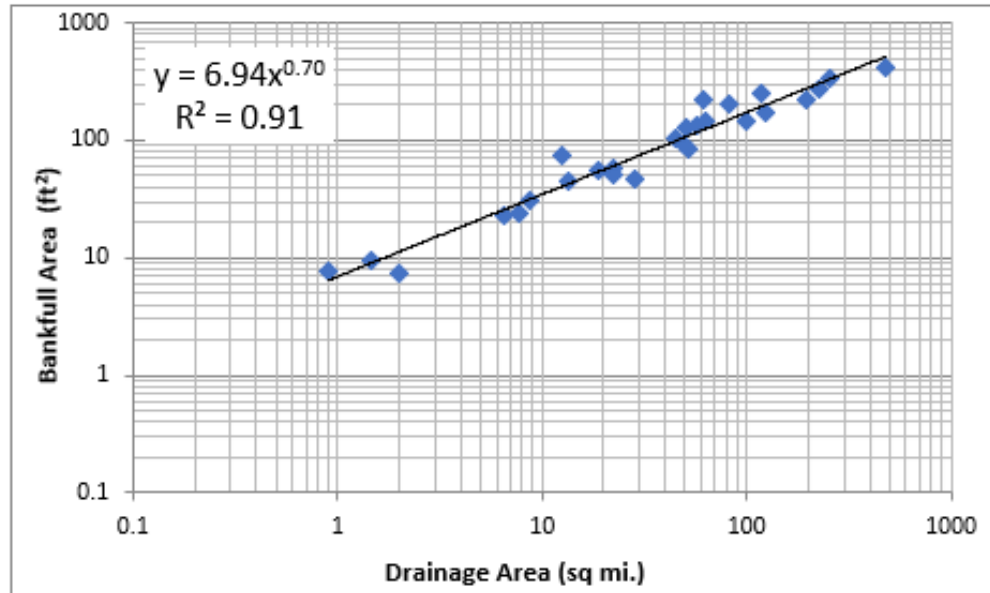
Bankfull Regional Curves

- Improve channel sizing method for placer-mine reclamation.
- Assist with culvert replacement projects.
- Stream mitigation.
- Stream Quantification Tool
 - Interior
 - North Slope



Northern Interior Regional Curves

Physiographic Division:	Intermontane Plateau, Rocky Mountain System	Stream Types:	B3, B3a, B3c, B4, B4c
Physiographic Province:	Northern Plateau, Arctic Mountains	Sample size:	27
Physiographic Section:	Kokrine-Hodanza Highlands, Ambler-Chandalar Ridge and Lowland Section		



Southern Interior Regional Curves

Physiographic Division:	Intermontane Plateaus, Pacific Mountain System, Pacific Mountain	Stream Types:	Aa+, B3, B3a, B4a, B4c, C3b, C4, C4b,
Physiographic Province:	Western Alaska, Alaska-Aleutian, Northern Plateaus, Coastal Trough	Sample size:	32
Physiographic Section:	Alaska Range, Northern Foothills, Tanana-Kuskokwim Lowland, Yukon-Tanana Upland, Broad Pass Depression, Clearwater Mountains, Talkeetna Mountains		

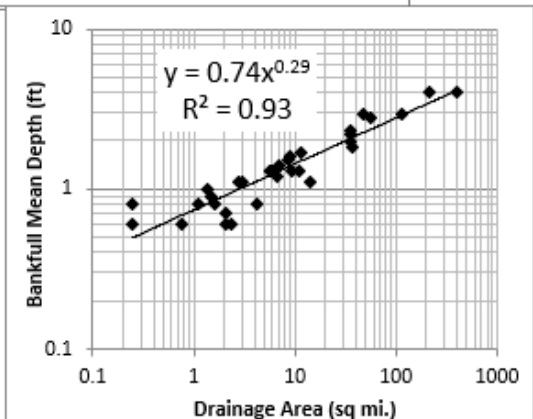
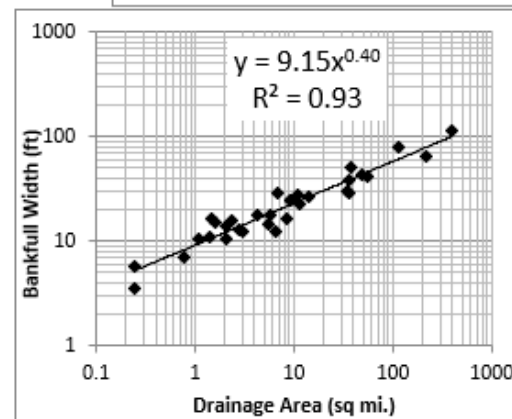
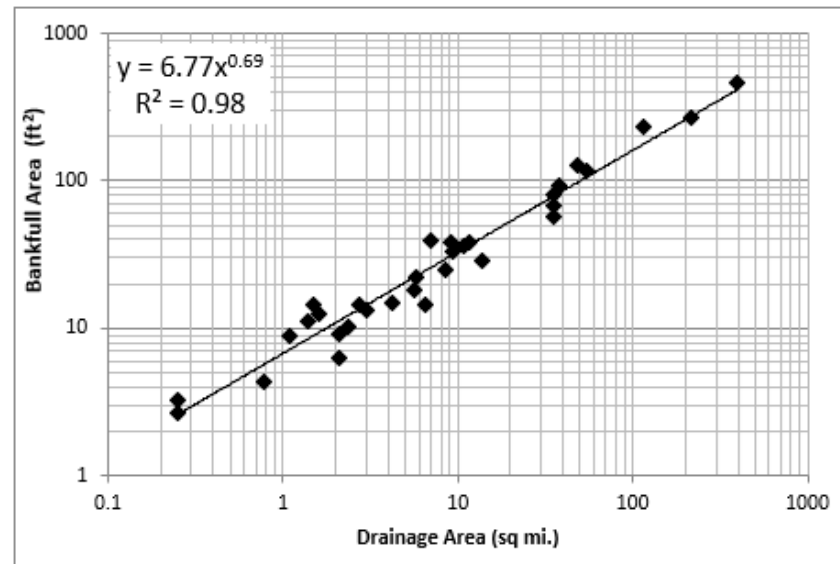
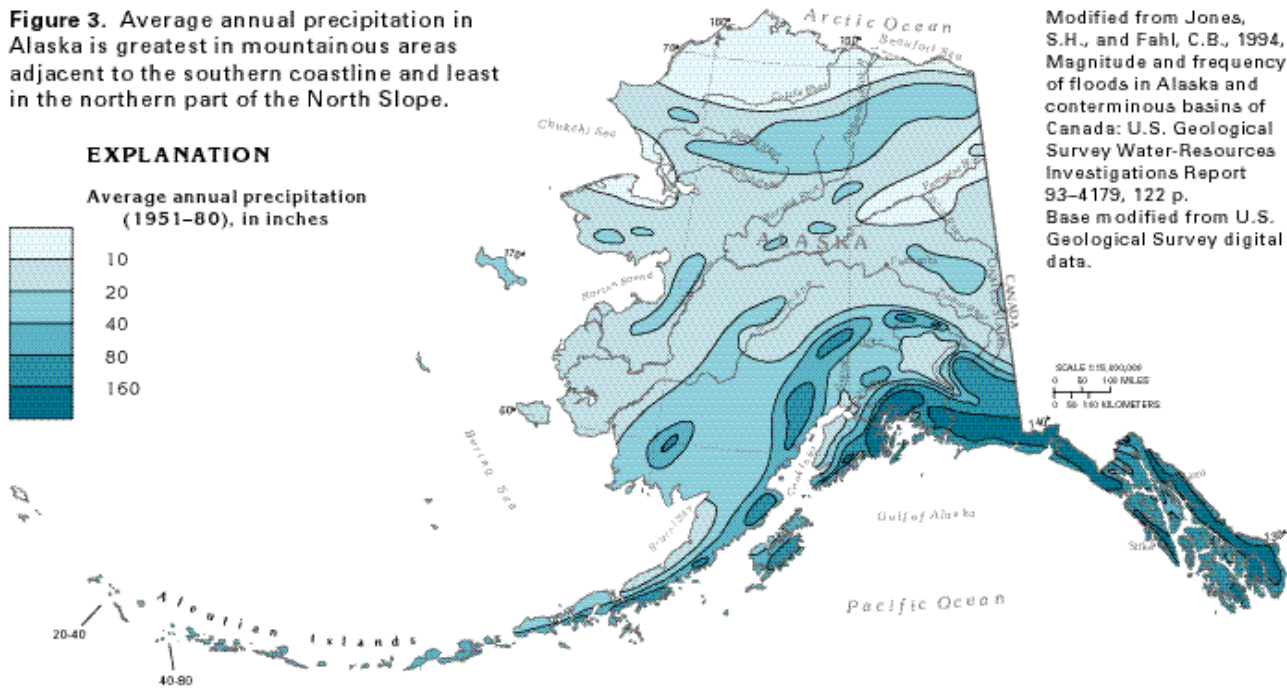
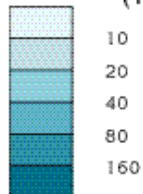


Figure 3. Average annual precipitation in Alaska is greatest in mountainous areas adjacent to the southern coastline and least in the northern part of the North Slope.

EXPLANATION

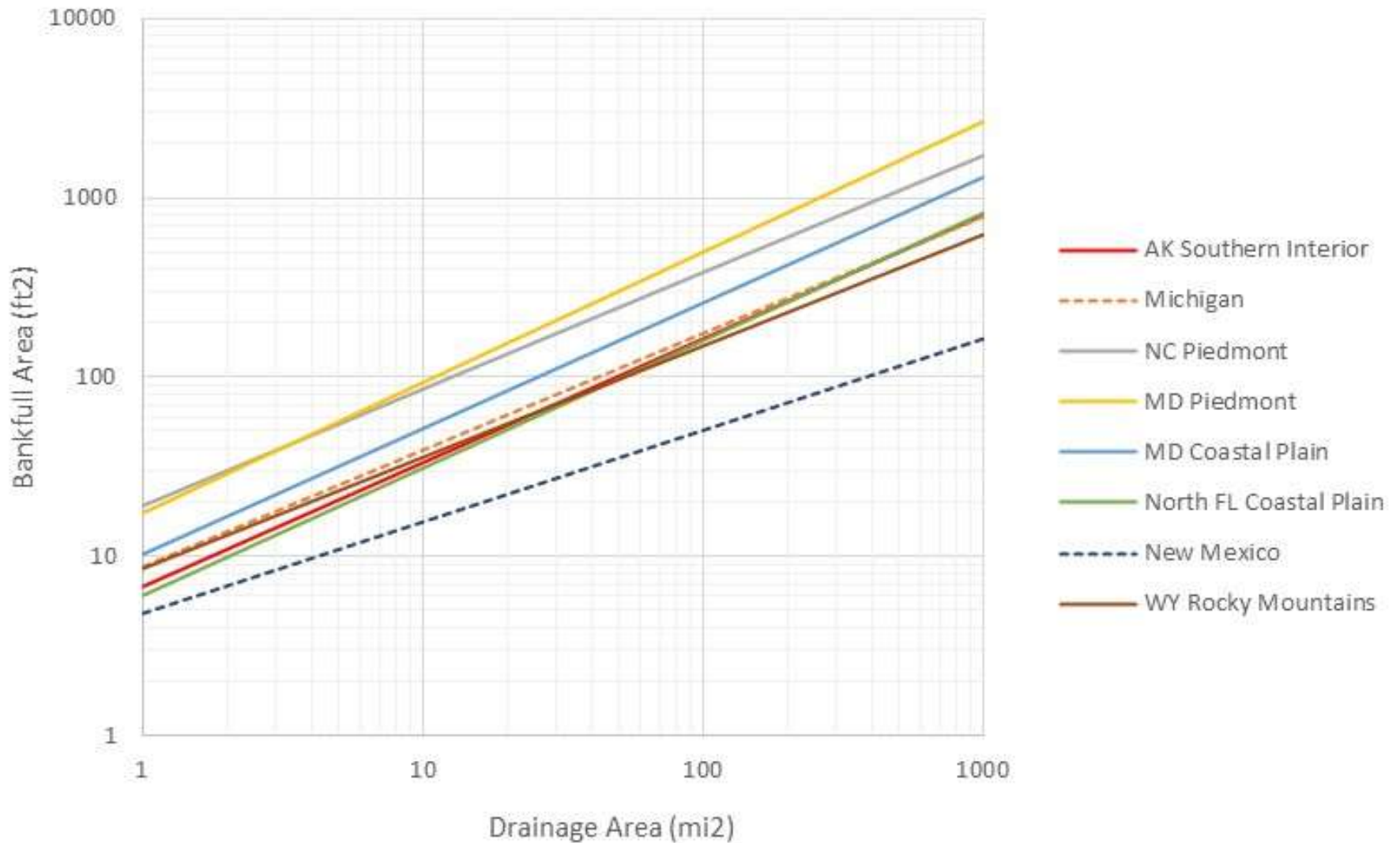
Average annual precipitation (1951-80), in inches



Modified from Jones, S.H., and Fahl, C.B., 1994, Magnitude and frequency of floods in Alaska and conterminous basins of Canada: U.S. Geological Survey Water-Resources Investigations Report 93-4179, 122 p. Base modified from U.S. Geological Survey digital data.



Bankfull Area Regional Curve Comparison



Reference Reach Surveys

WATERSHED	SAMPLE SIZE (n)	STREAM TYPES (Rosgen)	SLOPE RANGE (%)	D ₅₀ RANGE (mm)	DRAINAGE AREA RANGE (mi ²)
Nome	3	B3, B3, B3a	2.7 to 6.3	100 to 160	1.59 to 6.92
Valdez	4	B3a, B4a, B3a, B3a	5.4 to 8.1	51 to 87	1.09 to 5.8
Eldorado	4	B4, C3b, B3, B3a	2.5 to 10.1	29 to 130	0.77 to 11.58



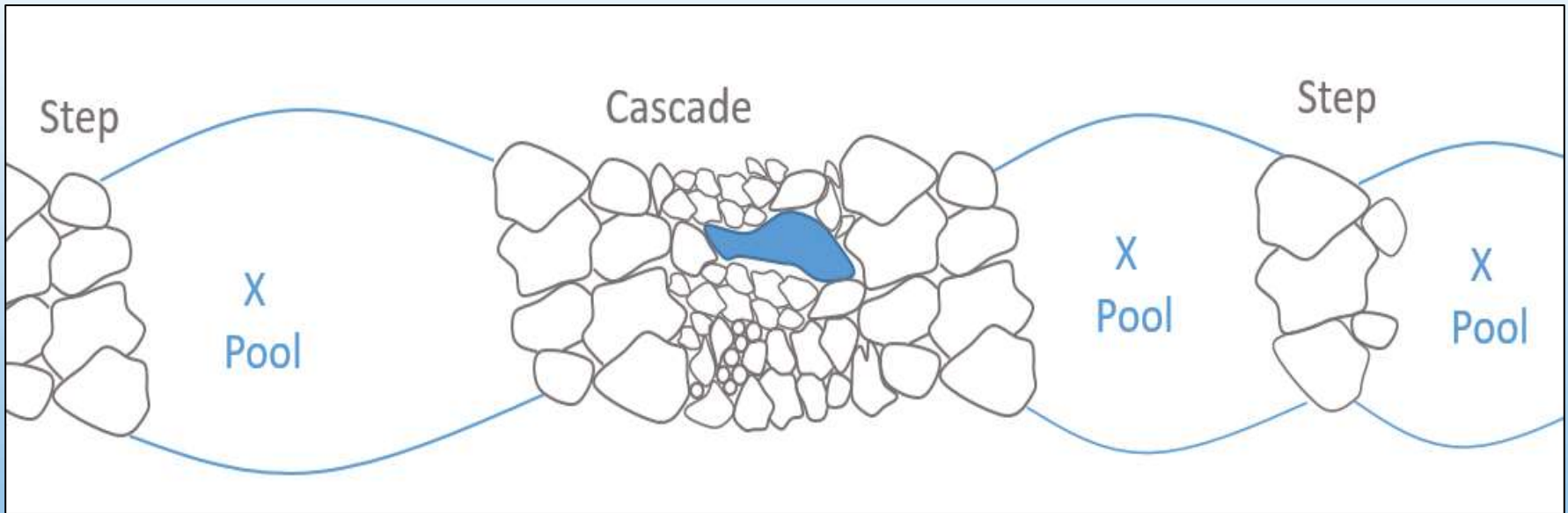
Profile Focus

- Pool Spacing Ratio
- Pool Depth Ratio
- Feature Lengths
- Step Heights



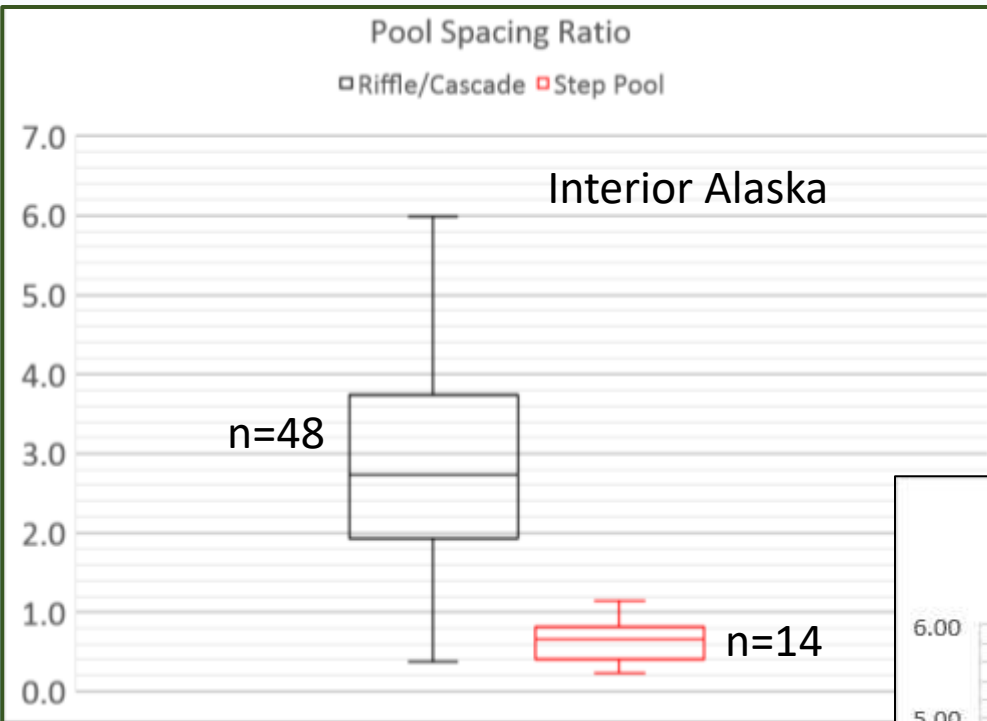
Pool Spacing Notes

← Pool-Cascade-Pool →

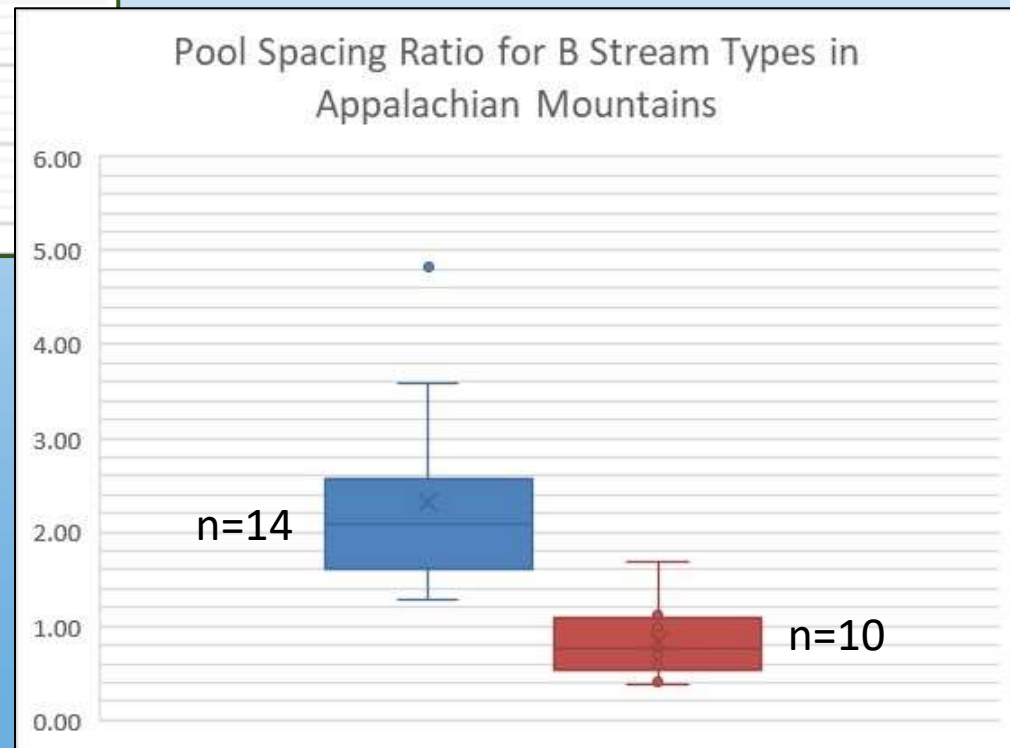


← Pool-Step-Pool →

Pool Spacing Ratio



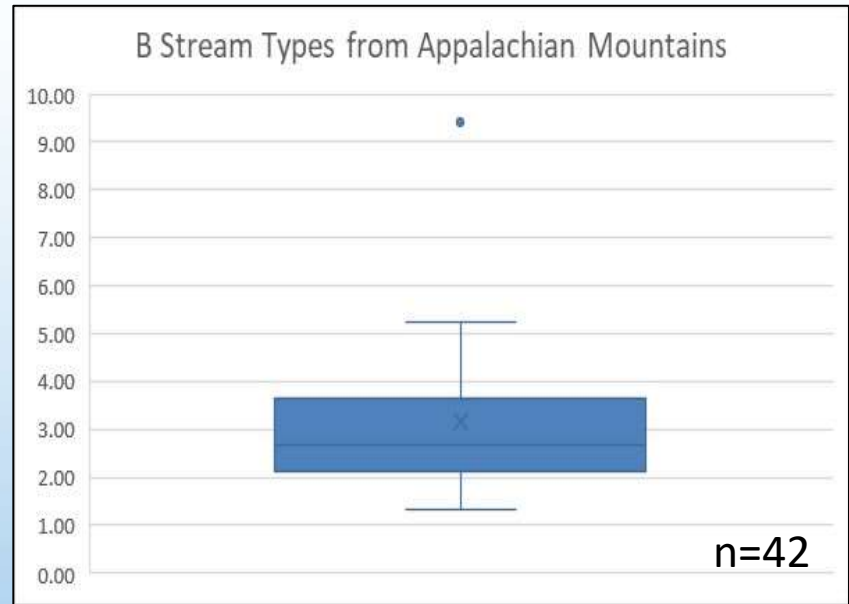
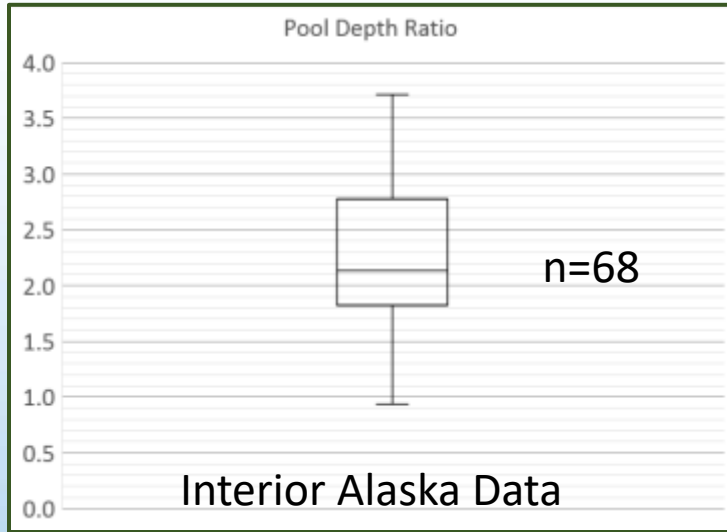
Cascade Data	Median	25 th Percentile	75 th Percentile
Alaska	2.7	1.9	3.8
App.	2.2	1.6	2.6



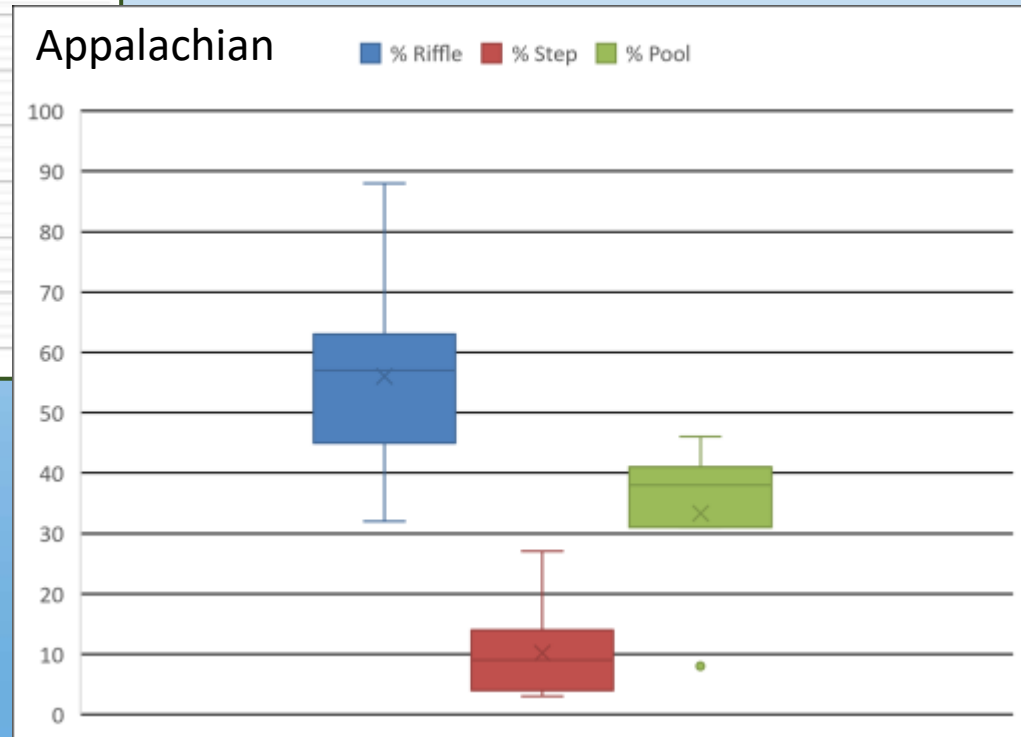
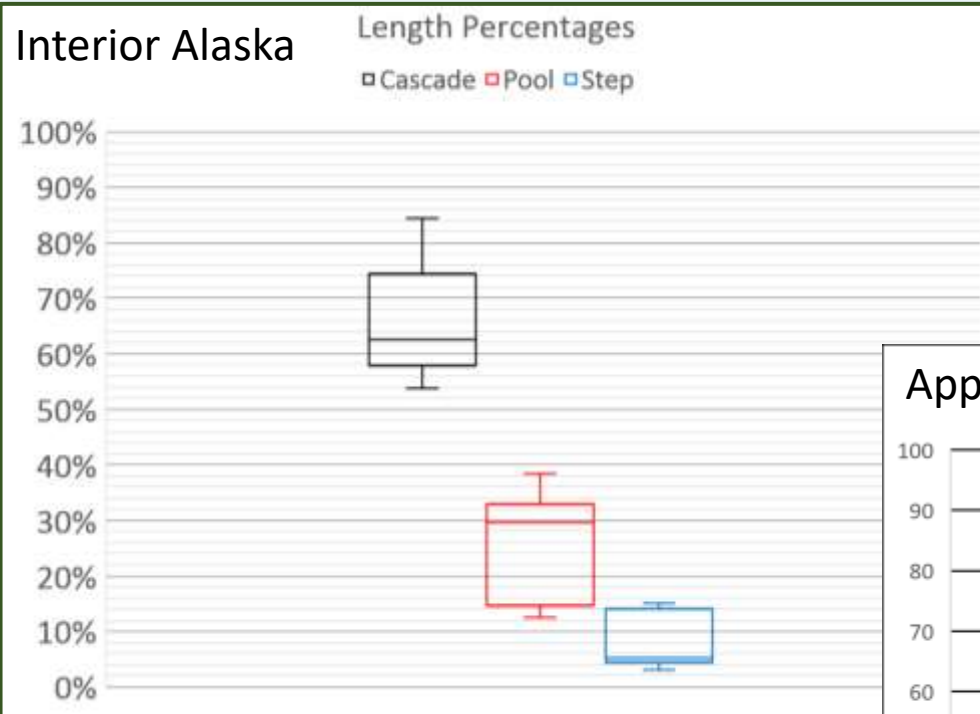
- Literature = 0.5 to 4.0
- Zink et al. (2012) = 0.1 to 7.1

Reference Reach Data from four sites in Appalachian Mountains. Two B4's, B3a, and a B3.

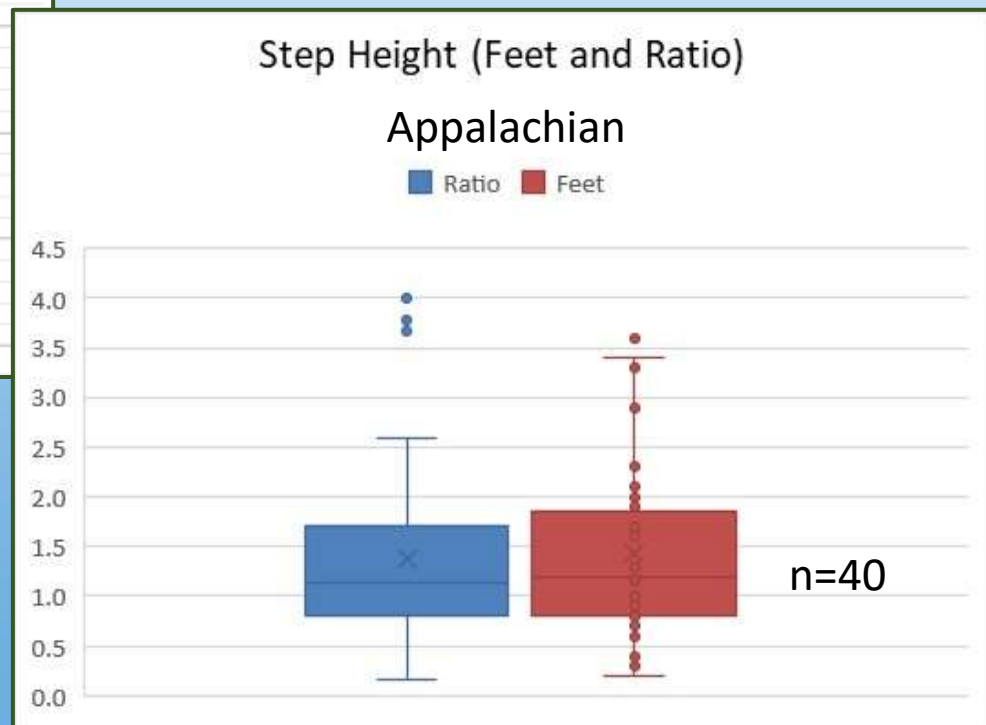
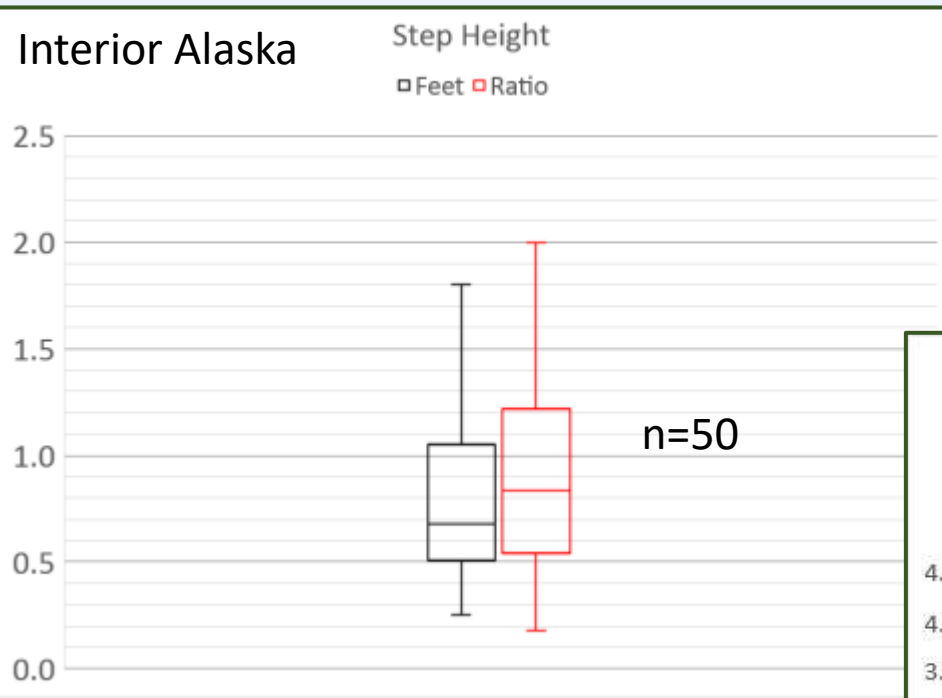
Pool Depth Ratios



Length Percentages



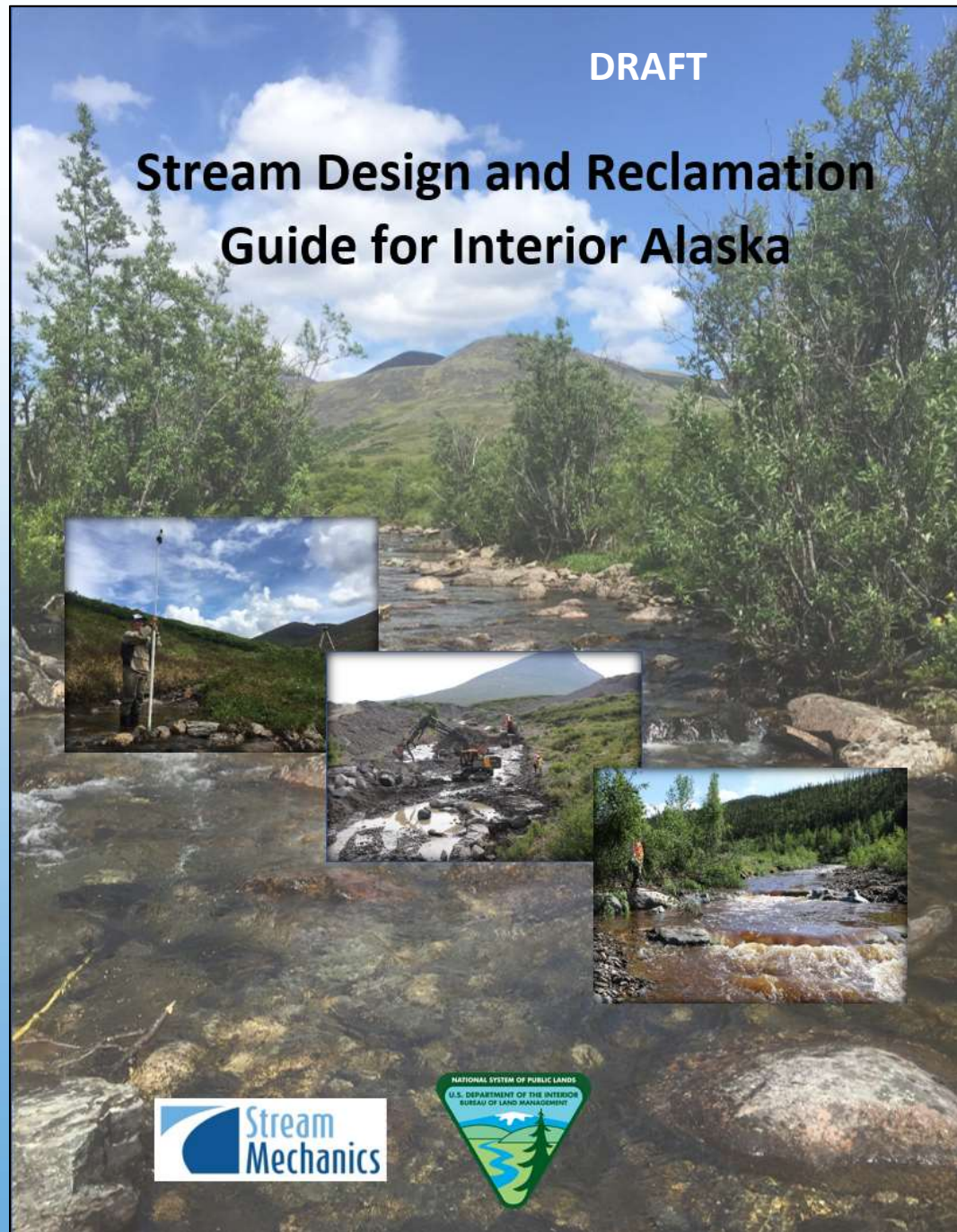
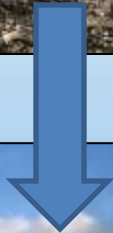
Step Heights and Ratio



Application of Natural Channel Design Techniques in Sub-Arctic Alaska



Stream Design and Reclamation Guide for Interior Alaska



North Slope

