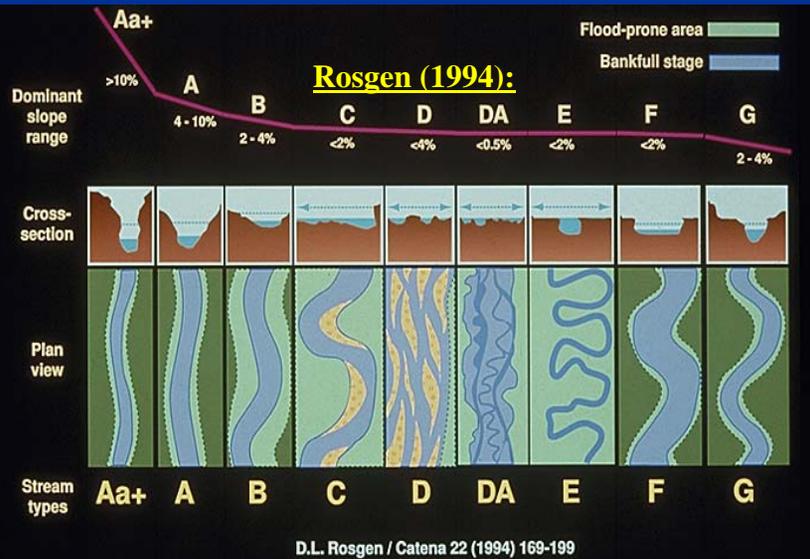
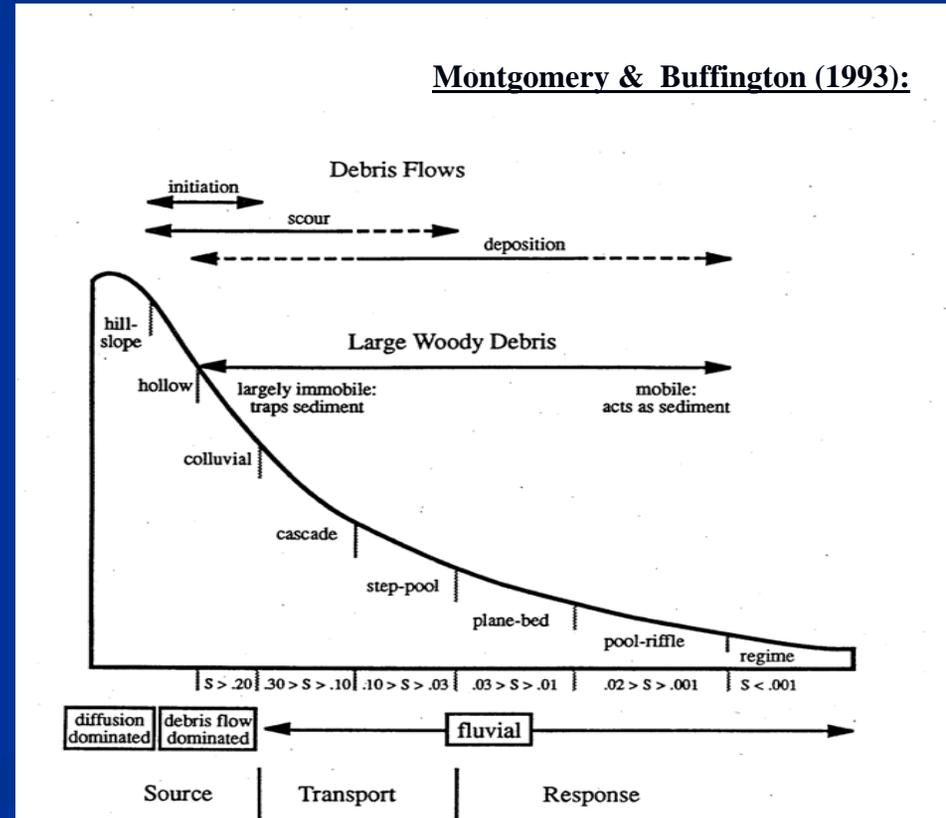


Stream Classification Level II & Departure Analysis



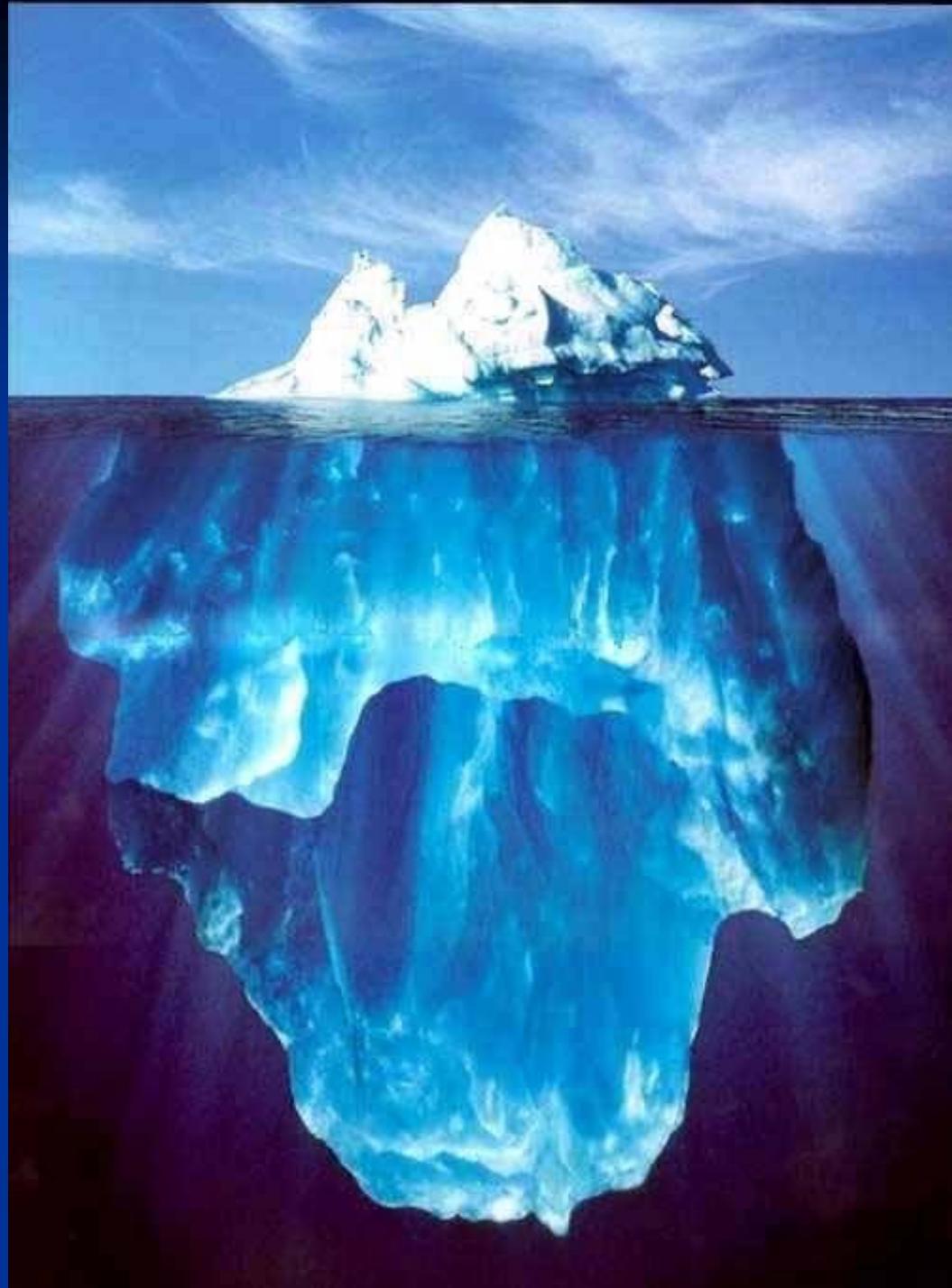
W. Barry Southerland



Why is stream classification and channel evolution important?

- Condition and trend
- Site potential
- Stratification of stream types leads to a more accurate characterization of morphology and predicted response
- A considerably more robust analysis of the riparian with its associated floodplain characteristics
- Design and physical range of natural variability

Classification is an effort to characterize a complicated system with a manageable amount of data. FG helps you understand what's underneath.

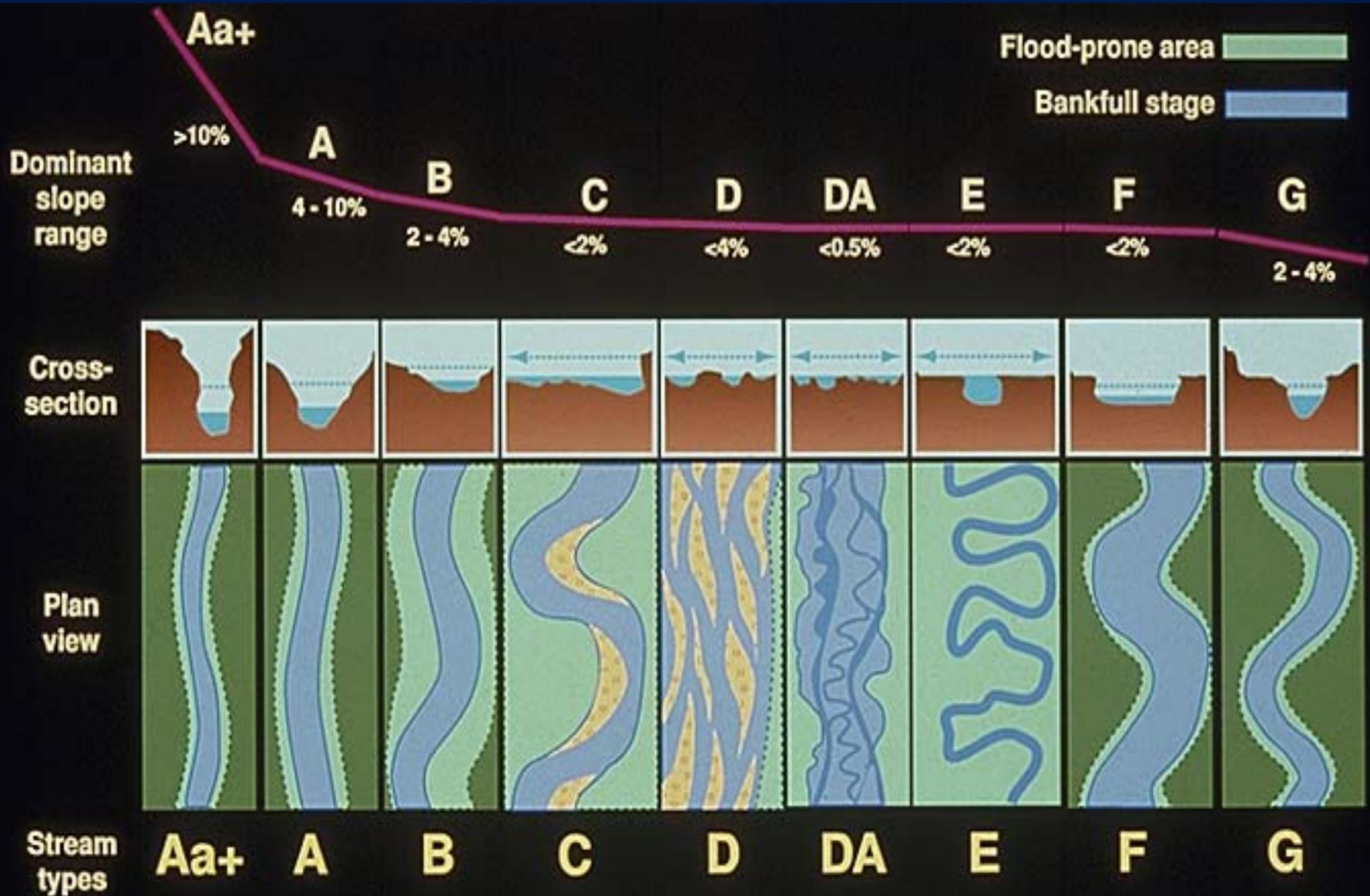


Geomorphic Stream Classification

“A Classification of Natural Rivers”, Rosgen, D.L.

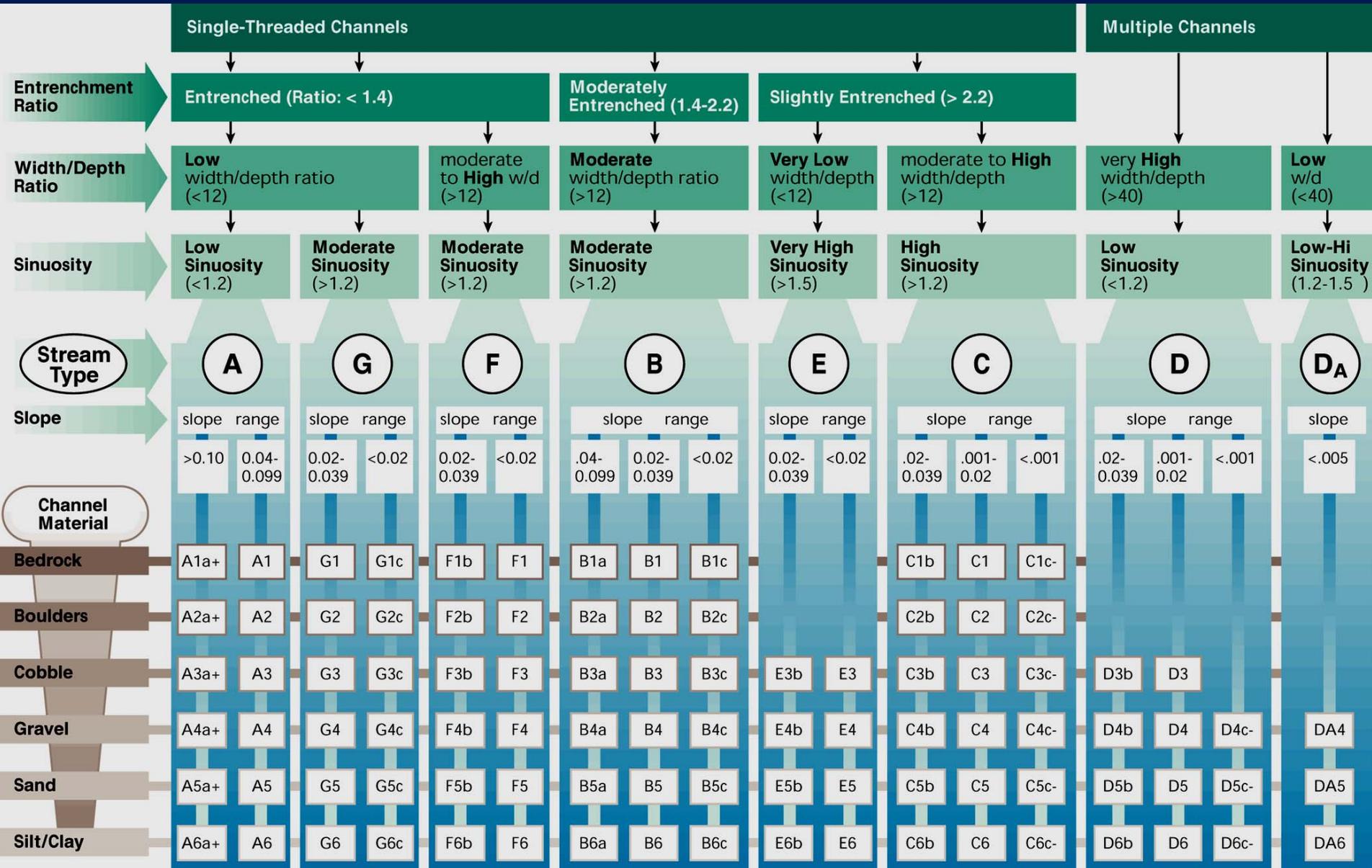


Rosgen Classification, Level 1



Geomorphic Stream Classification

Level II

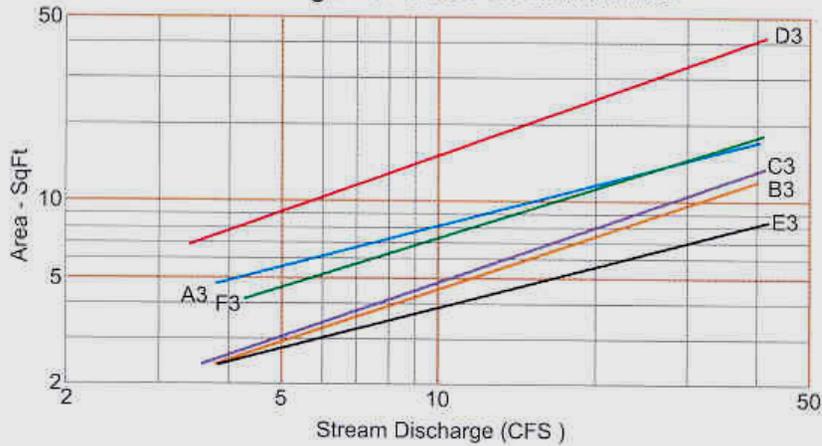


Source: Rosgen 1996. Published by permission of Wildland Hydrology.

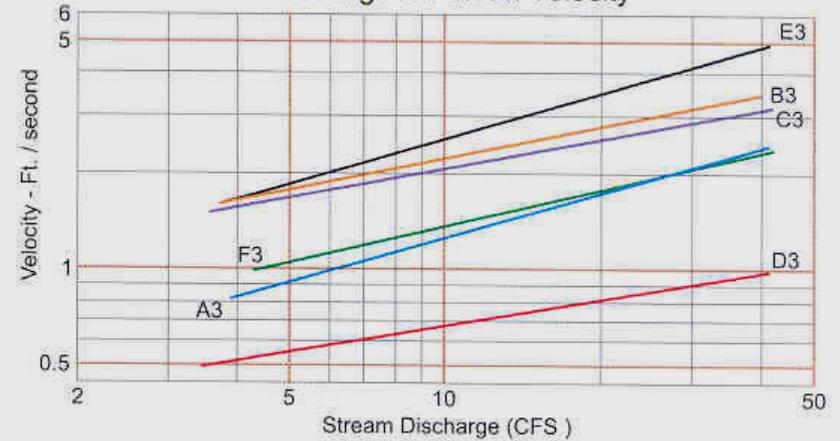
Does stream type matter?

If your interested in hydraulic geometry it does

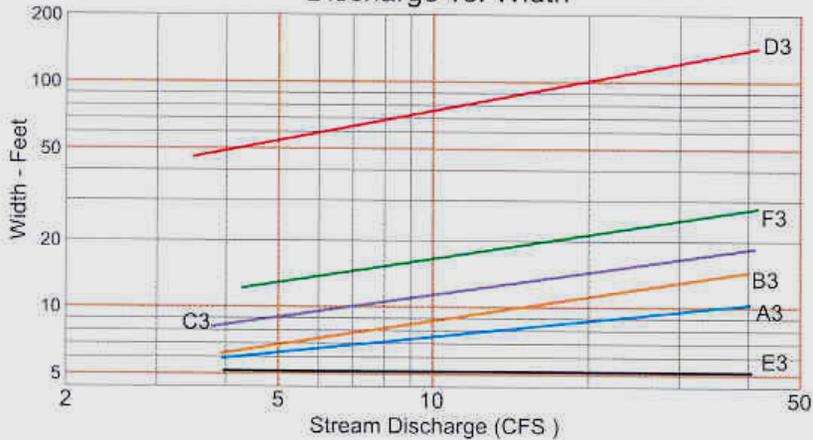
Discharge vs. Cross-Sectional Area



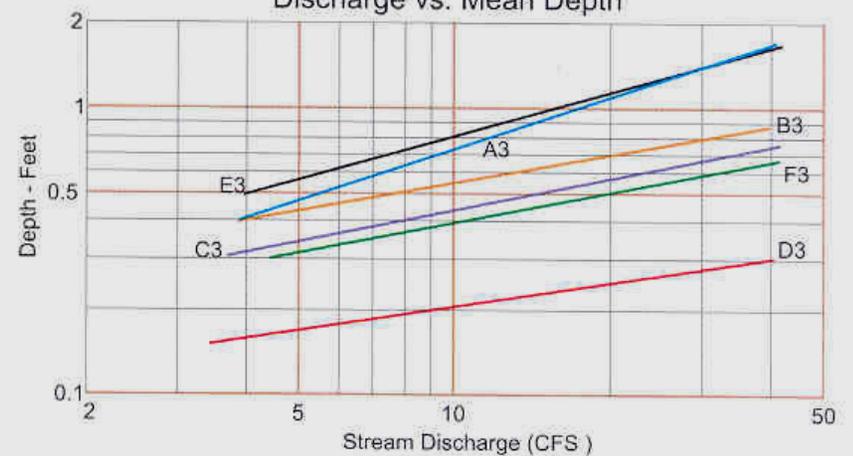
Discharge vs. Mean Velocity



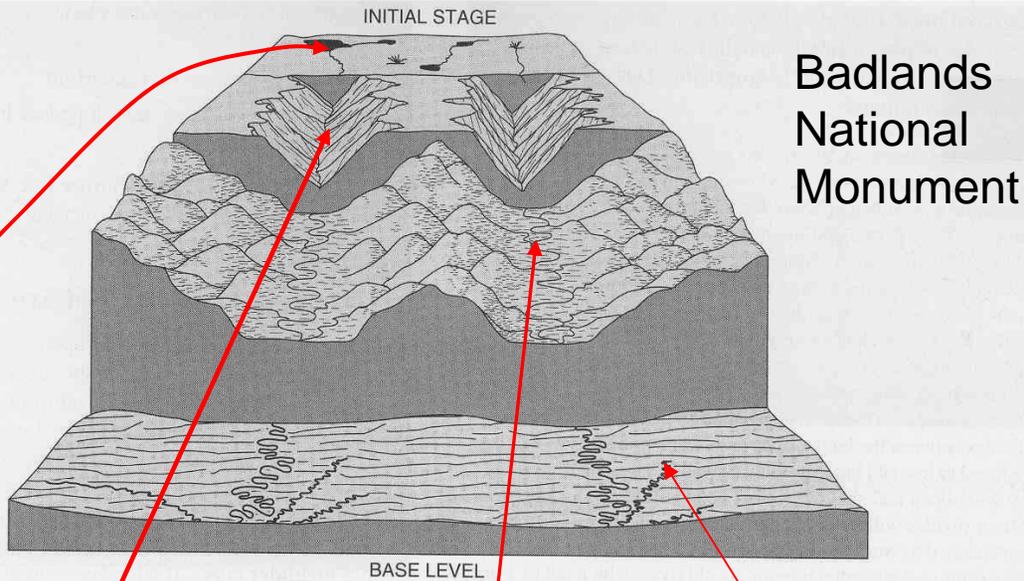
Discharge vs. Width



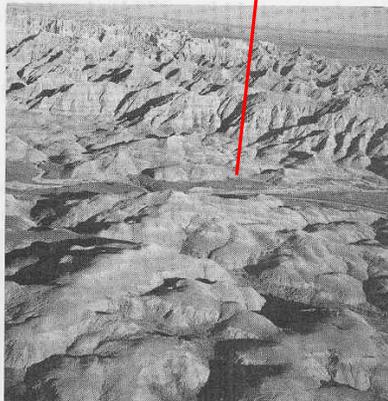
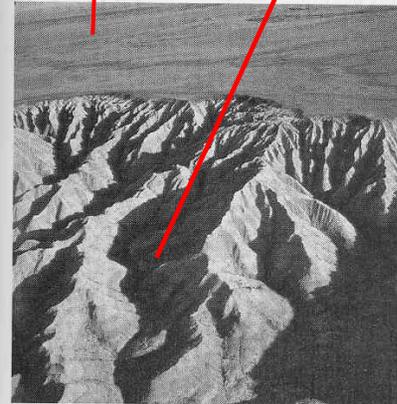
Discharge vs. Mean Depth



Age: Davis's Observation



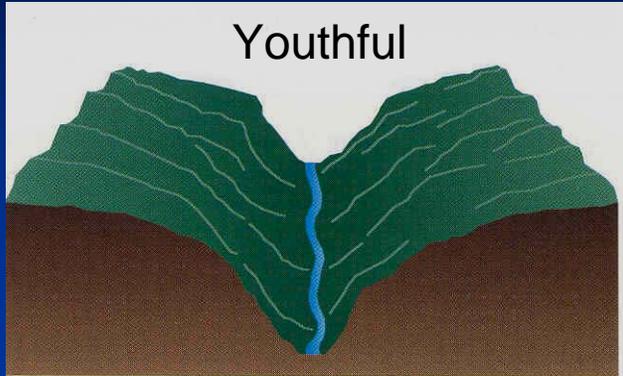
This is what we mean by age of a valley. Your stream site and its potential are highly dependent on the valley type.



Easterbrook, 1999

Geomorphic Valley Types

Youthful



Wildland Hydrology, 1996

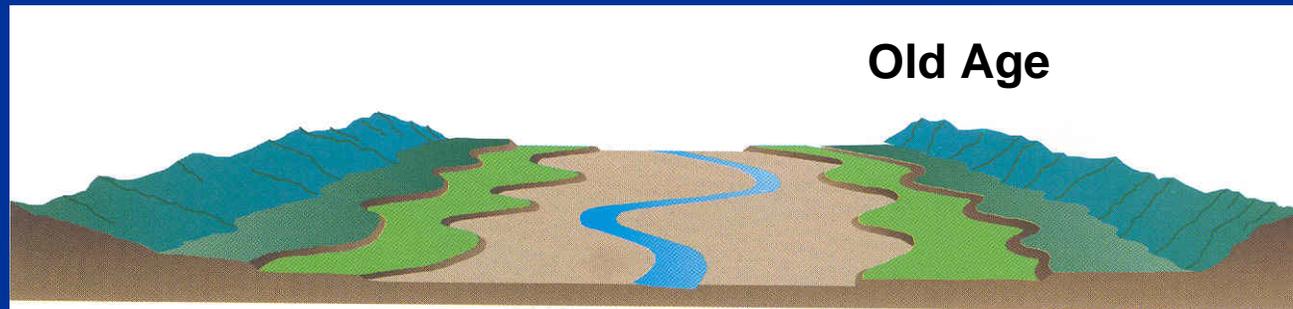
Early Mature



Wildland Hydrology, 1996

What do William Morris Davis (1899) and Dave Rosgen have in common?

Old Age



Wildland Hydrology, 1996

Old Age



Wildland Hydrology, 1996

Use and Limitations of CEM

- Excellent tool for developing a management strategy for incised stream systems
- Indicates condition of floodplain attachment and potential for riparian restoration
- Indicates threshold changes in cost of physical treatment
- Sometimes base-grade has been manipulated by entities such as county road departments, municipalities, or others. Short-term alterations may confuse casual observer. (e.g. hard checks put by road departments)
- Enough history of perturbations have passed that there are no reference sites to build upon for stage I of the Schumm Model
- Some Stage Vs are natural

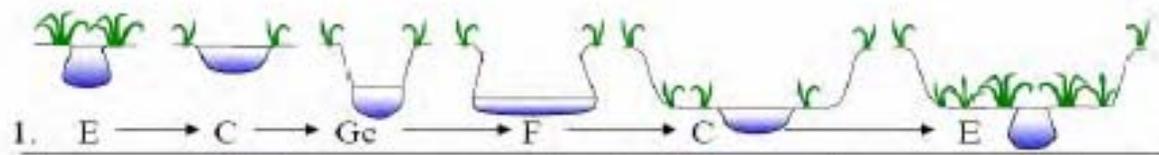
Use and Limitations Rosgen's Classification System

UPSIDE

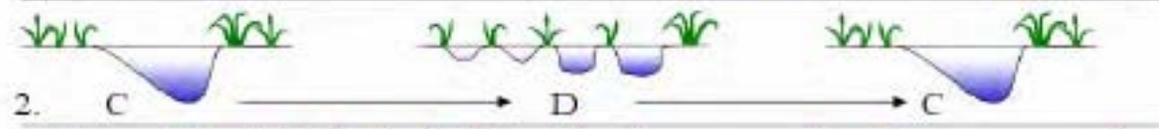
- System is morphometric based and results are reproducible
- Stratification into correct stream type leads to a more appropriate planning and design
- We can talk in common terms about stream types instead of a wordy complicated description
- System is Robust

DOWNSIDE

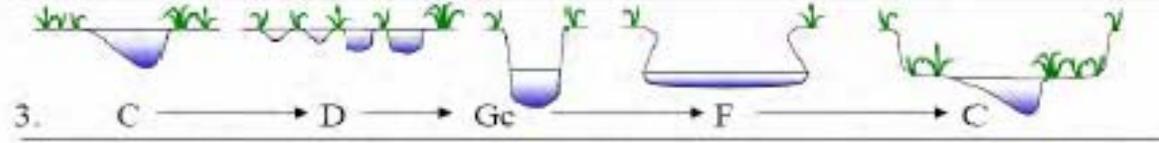
- Bankfull Indicators can be difficult to find
- Bankfull regional curves are recommended but they can be time consuming and data may be limiting
- Mis-use of system
- Validation process may be time consuming



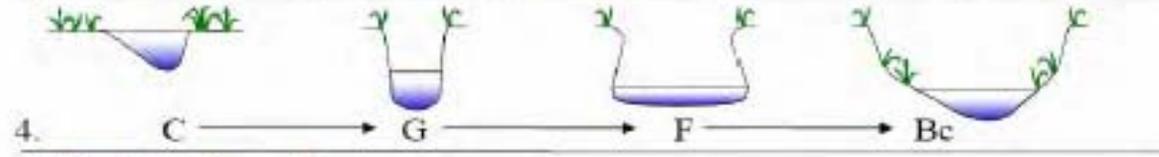
Schumm CEM*



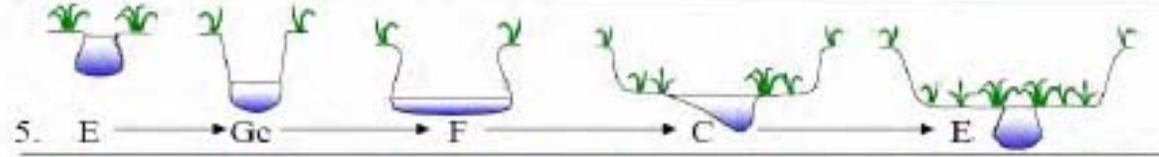
Schumm CEM



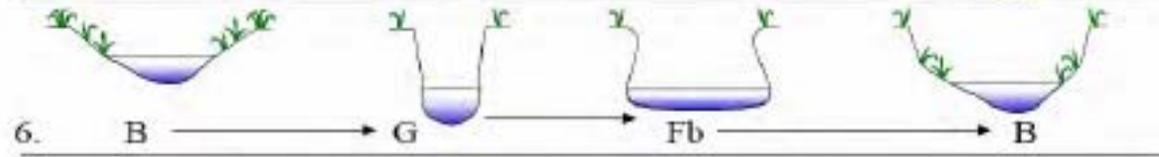
Schumm CEM



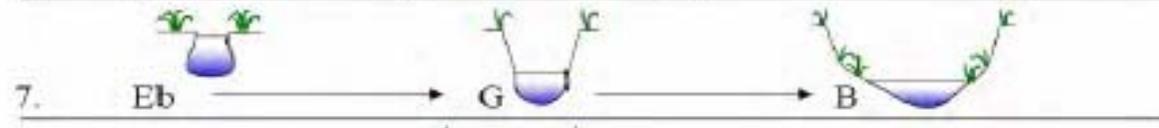
Schumm CEM



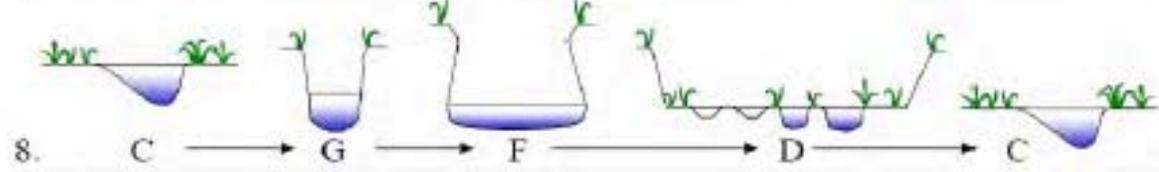
Schumm CEM



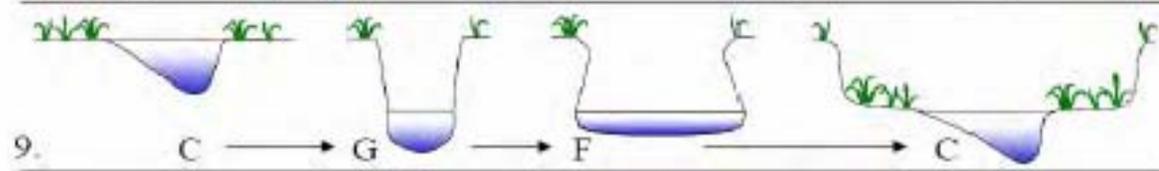
Schumm CEM



Schumm CEM



Schumm CEM*



Aquatic Habitat Response to Stream Type Change

Variable	C → G	G → F	F → C	C → D
Instream Cover	↓	↓	↑	↓
Overhead Cover	↓	↓	↑	↓
Substrate Composition	↑	↓	↑	↓
Pool Quality	↓	↓	↑	↓
Holding Cover Velocity	↓	↓	↑	↓
Temperature	→	↑	↓	↑
Oxygen	→	↓	↑	↓
Macro Invertebrates	↓	↓	↑	↓
Spawning Habitat	↓	↓	↑	↓
Diversity	↓	↓	↑	↓
Rearing	↓	↑	↑	↑
IBI Score	↓	↓	↑	↓

If you see sheep . . .



. . . you need glasses!

**How good are we
at observation?**