Riparian Restoration
Range & Pastureland Systems

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Thought Process

Condition of channel
and associated riparian zone?

What is potential?

What initiated change?

What are your options?

Channel Succession

Riparian Plant Community Dynamics

Channel Succession

Tools -

Stream Classification

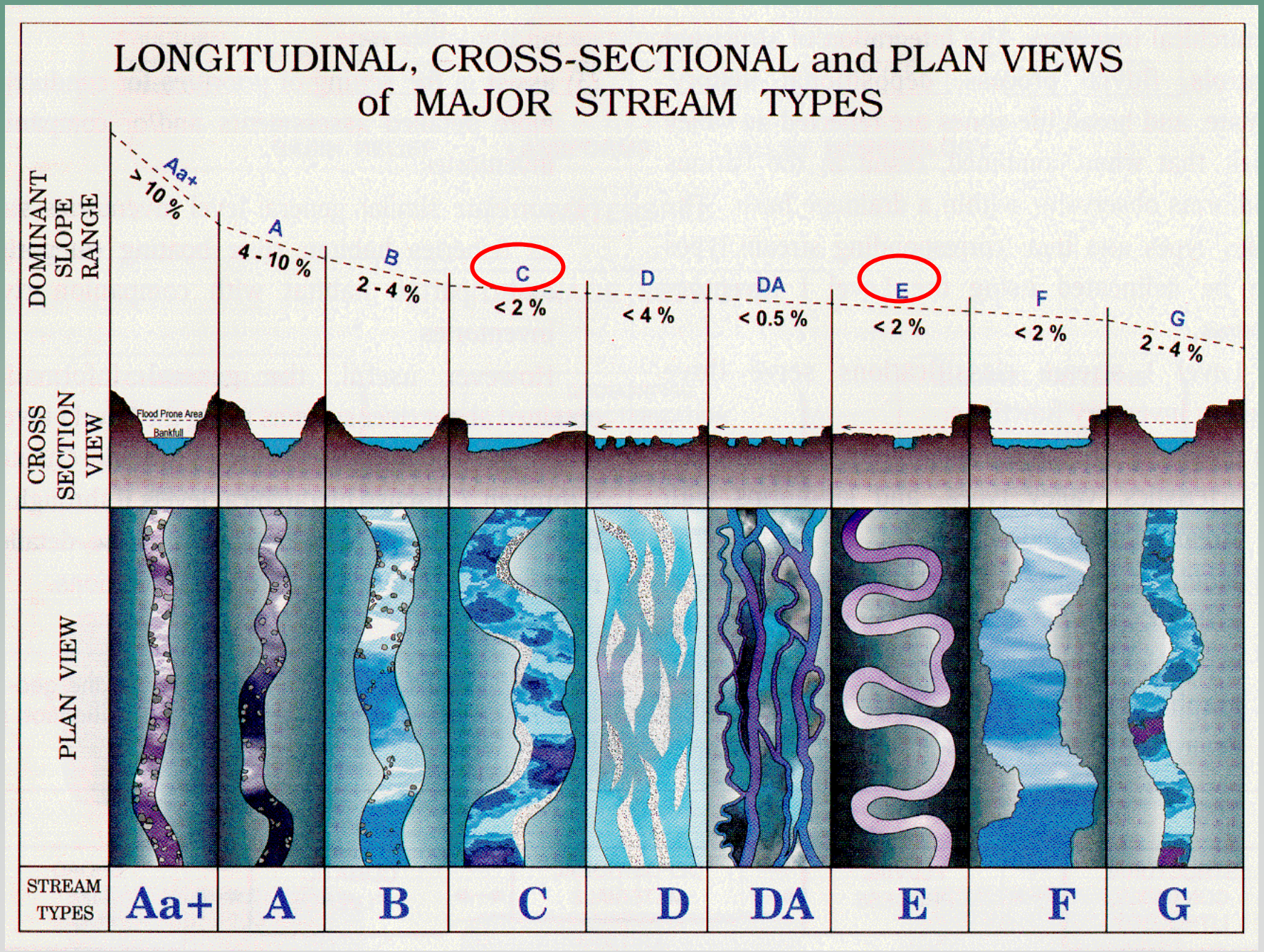
Rosgen (1996)

Channel Evolution Model

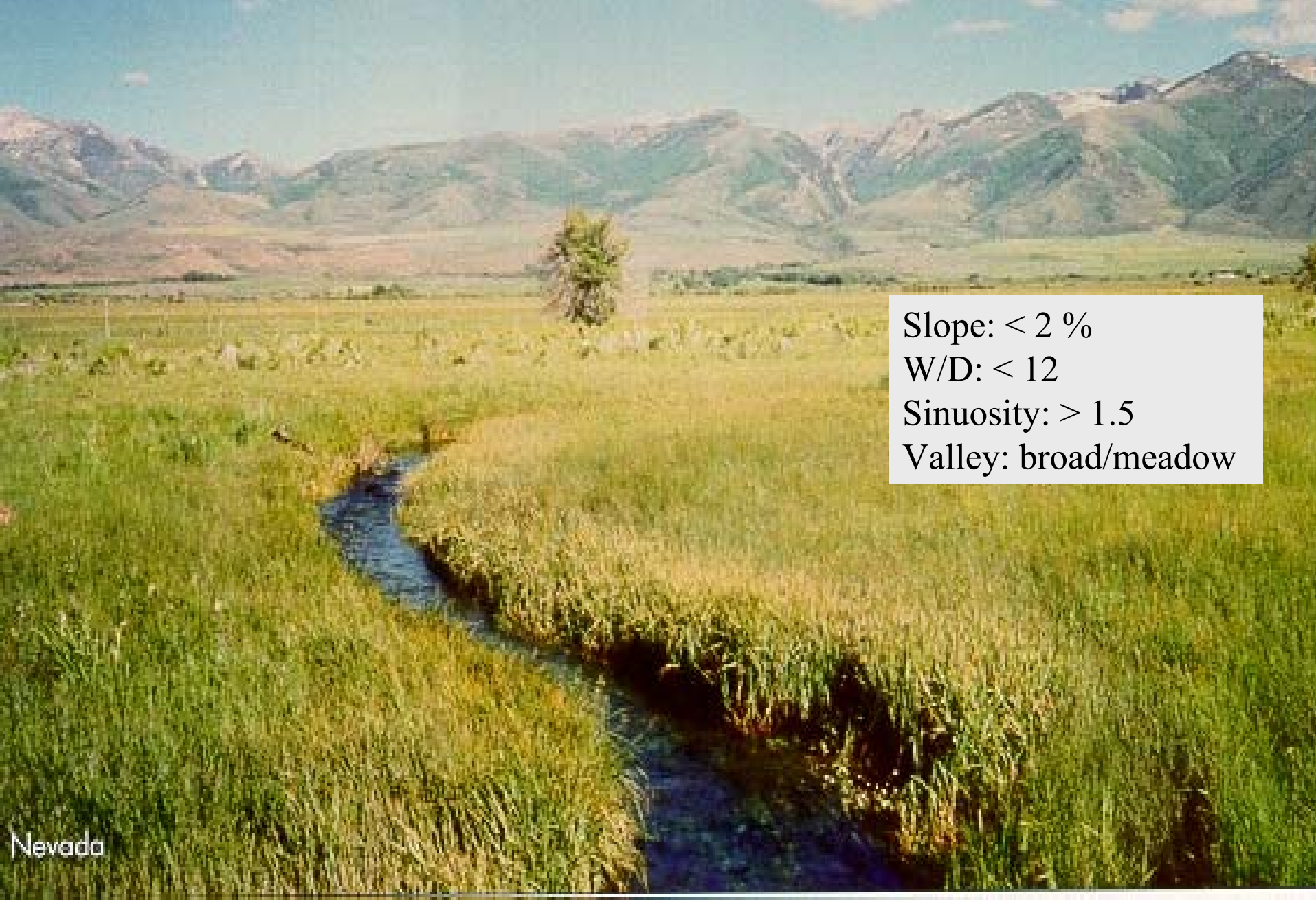
Schumm (1999, 1984)

Proper Functioning Condition

(USDI, BLM TR 1737-9)

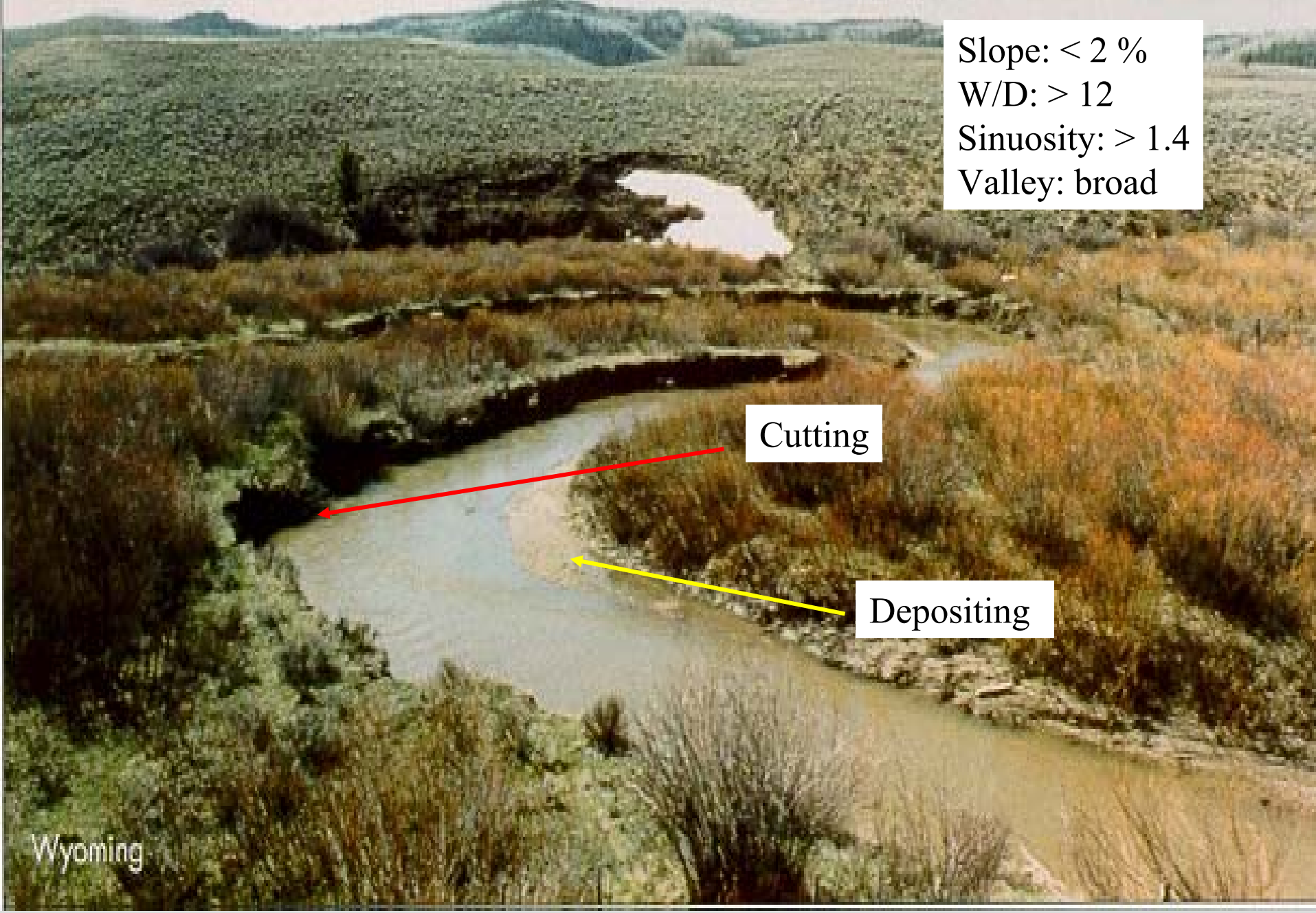


From Rosgen 1996.

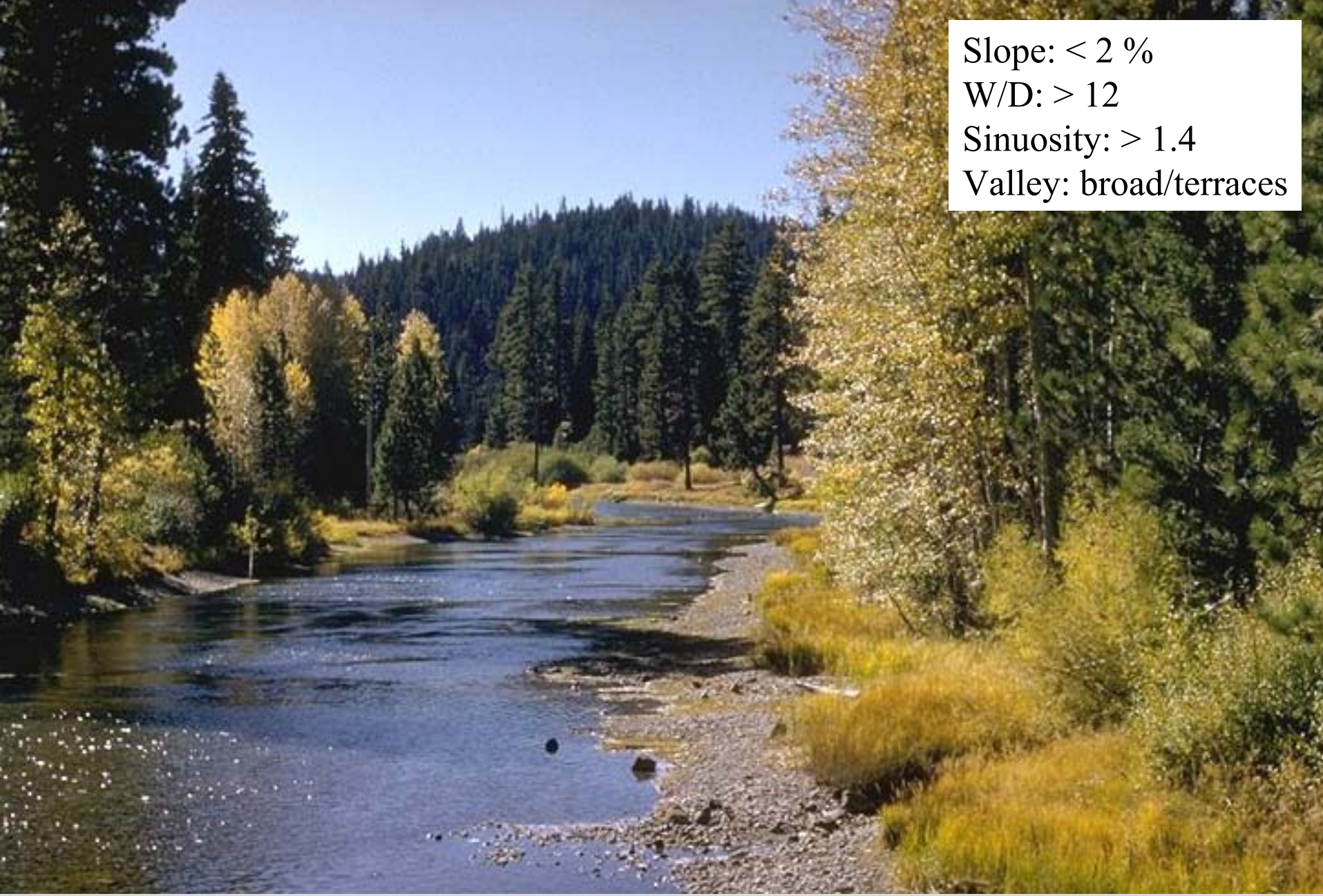


E type channel. From Rosgen 1996.

E Type Channel: Oregon



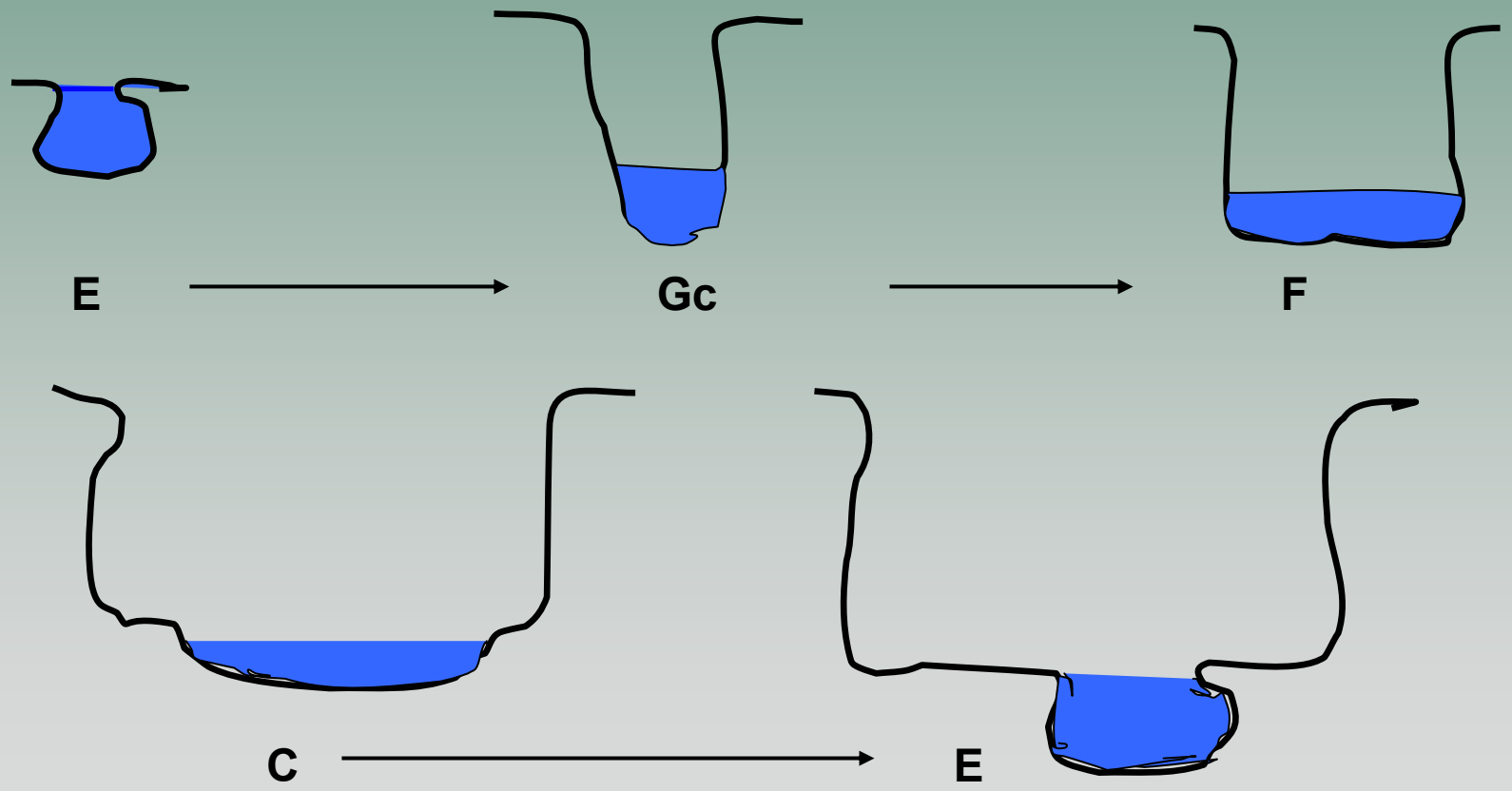
C6 type channel. Silt-clay substrate. From Rosgen 1996.



C4 type channel. Gravel-dominated substrate.

Channel Evolution Model

(Schumm 1984, Rosgen 1996)



Channel Evolution Model

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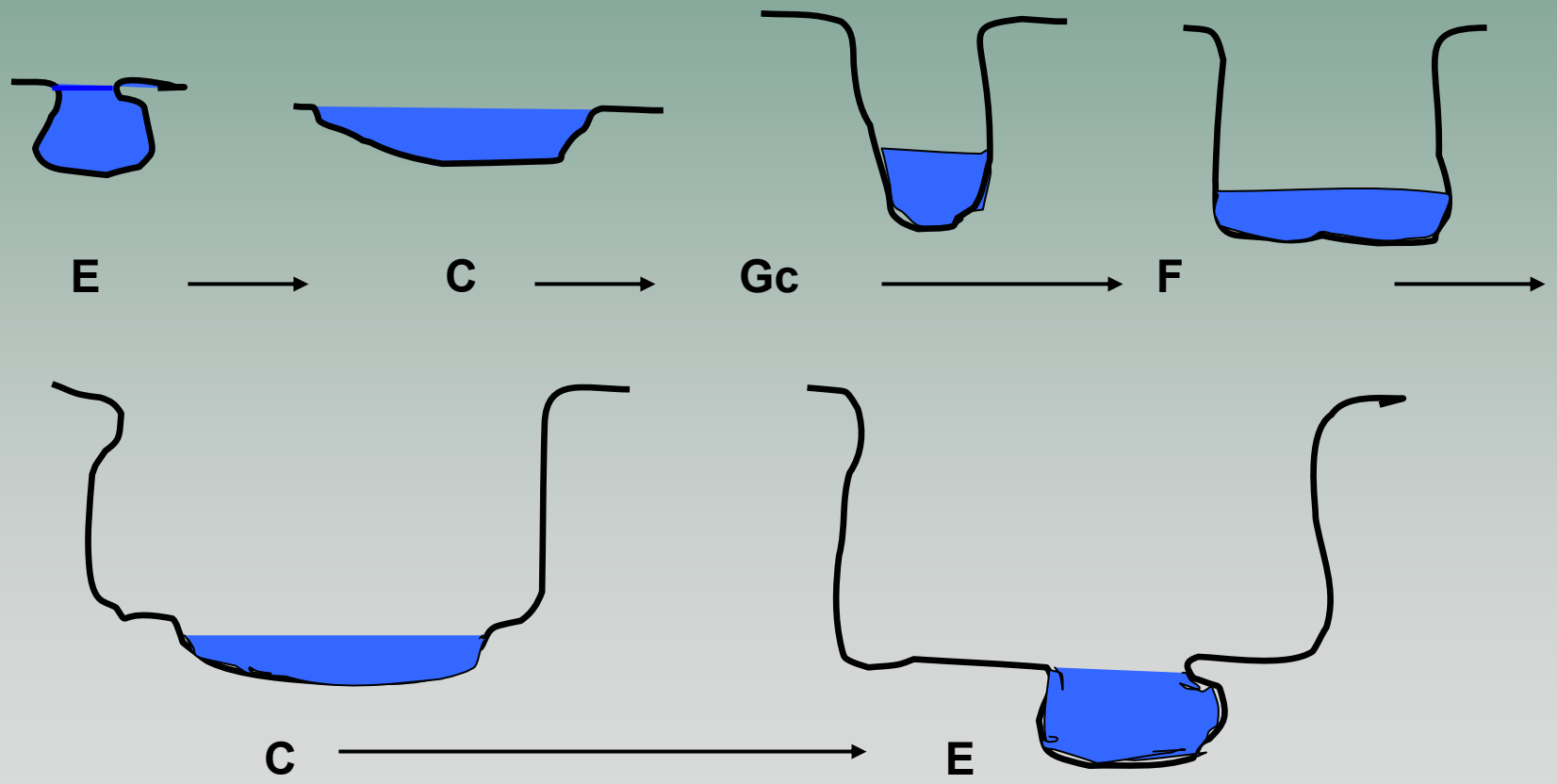
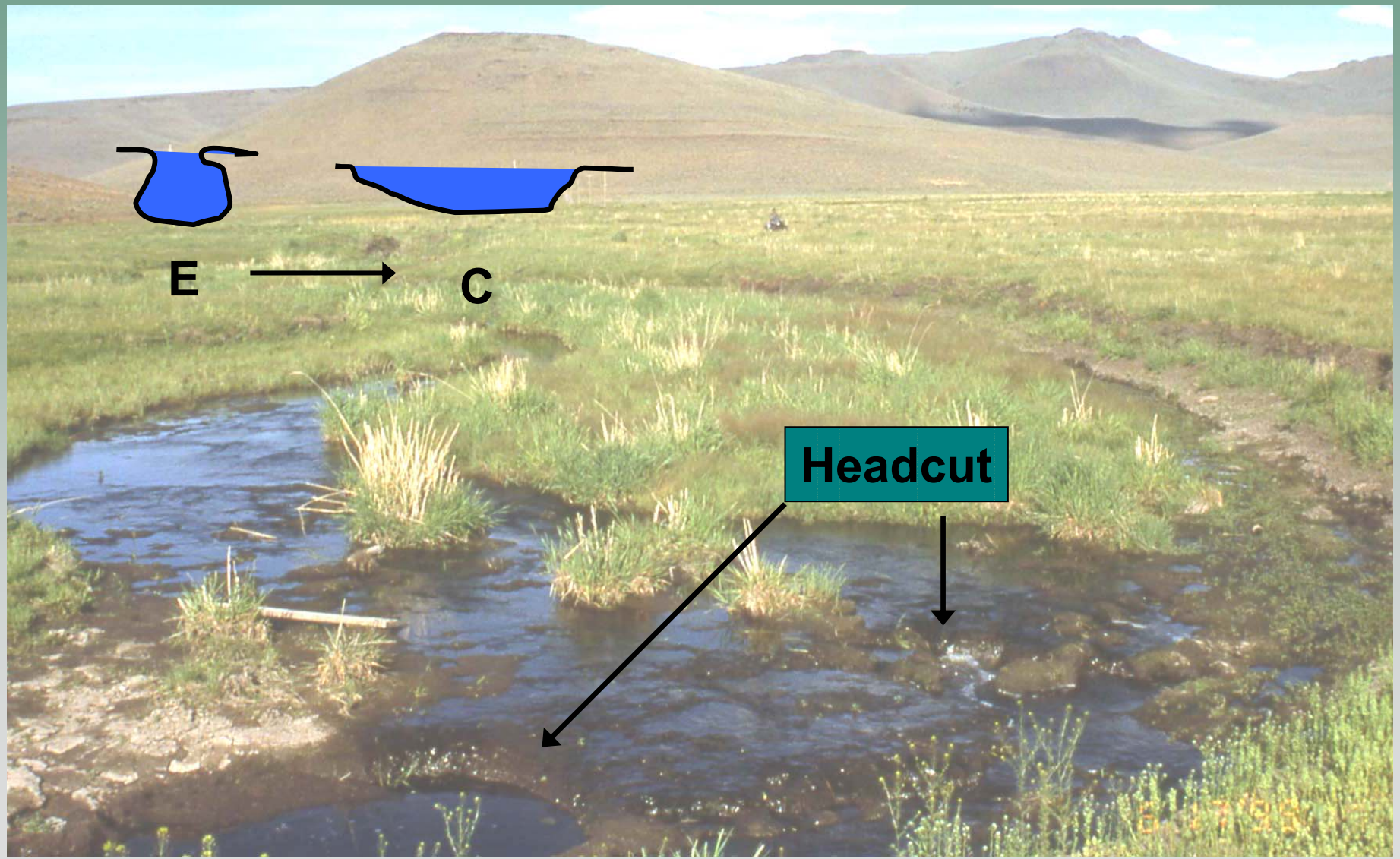
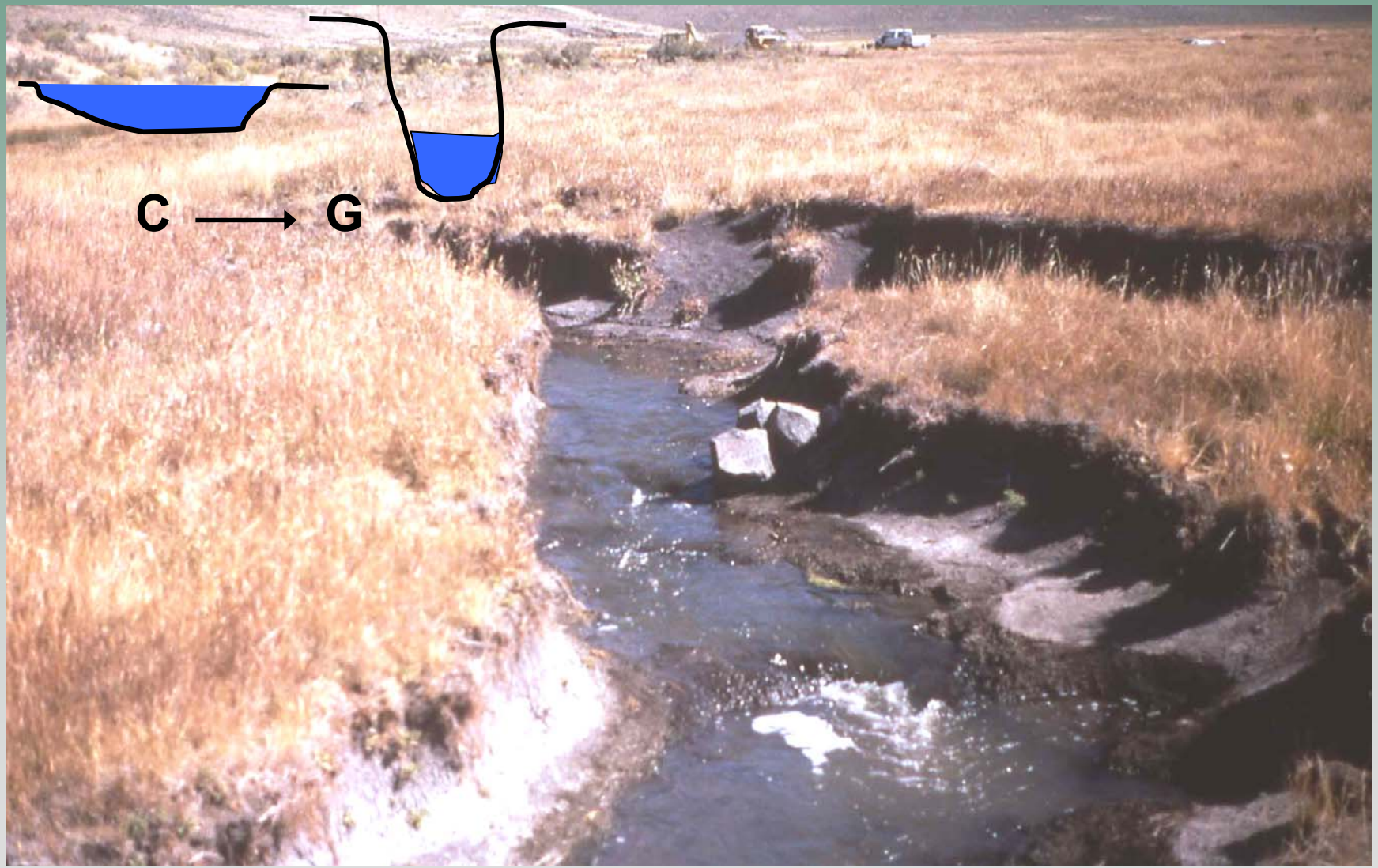


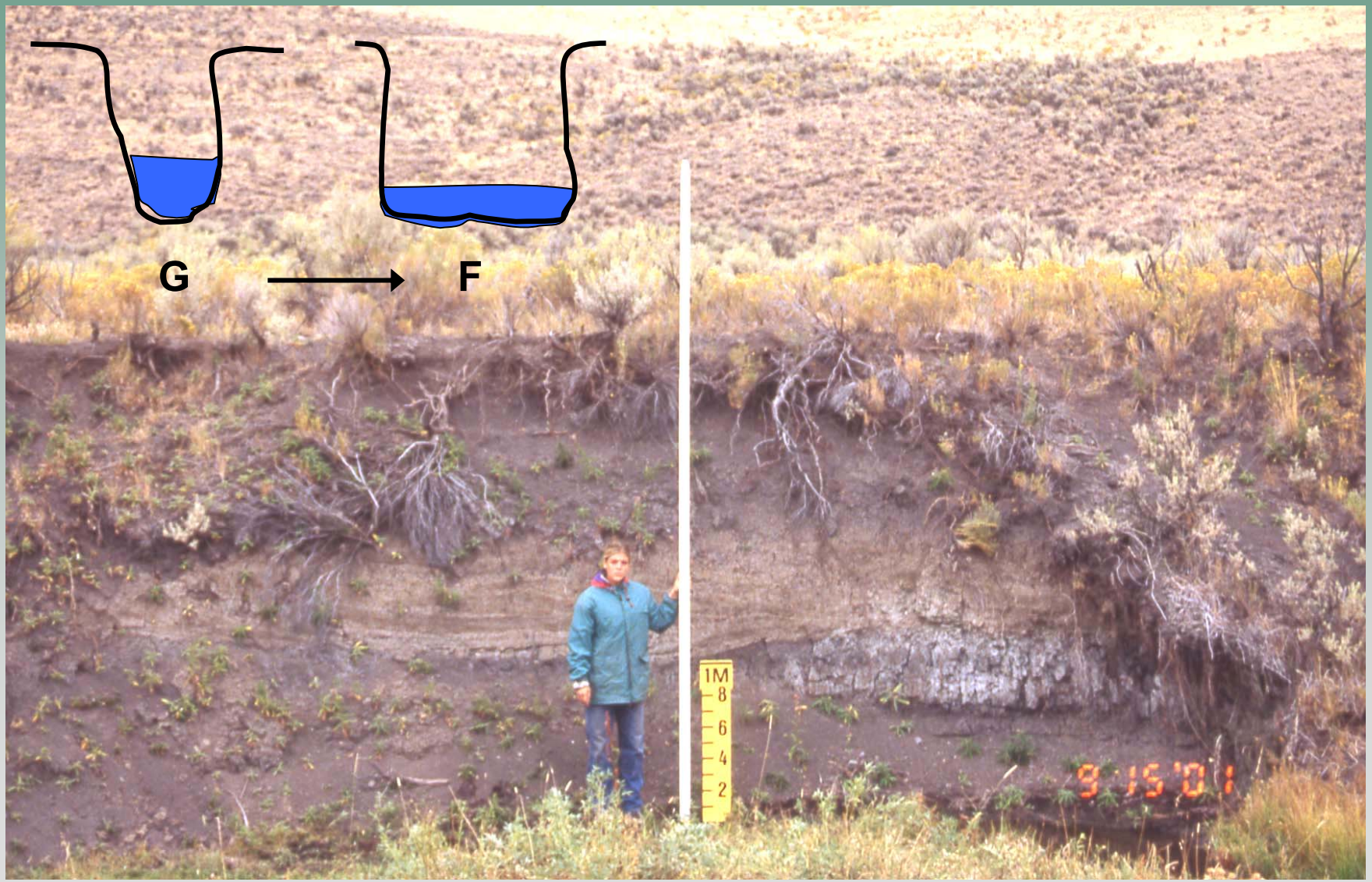
Channel Evolution: E to C



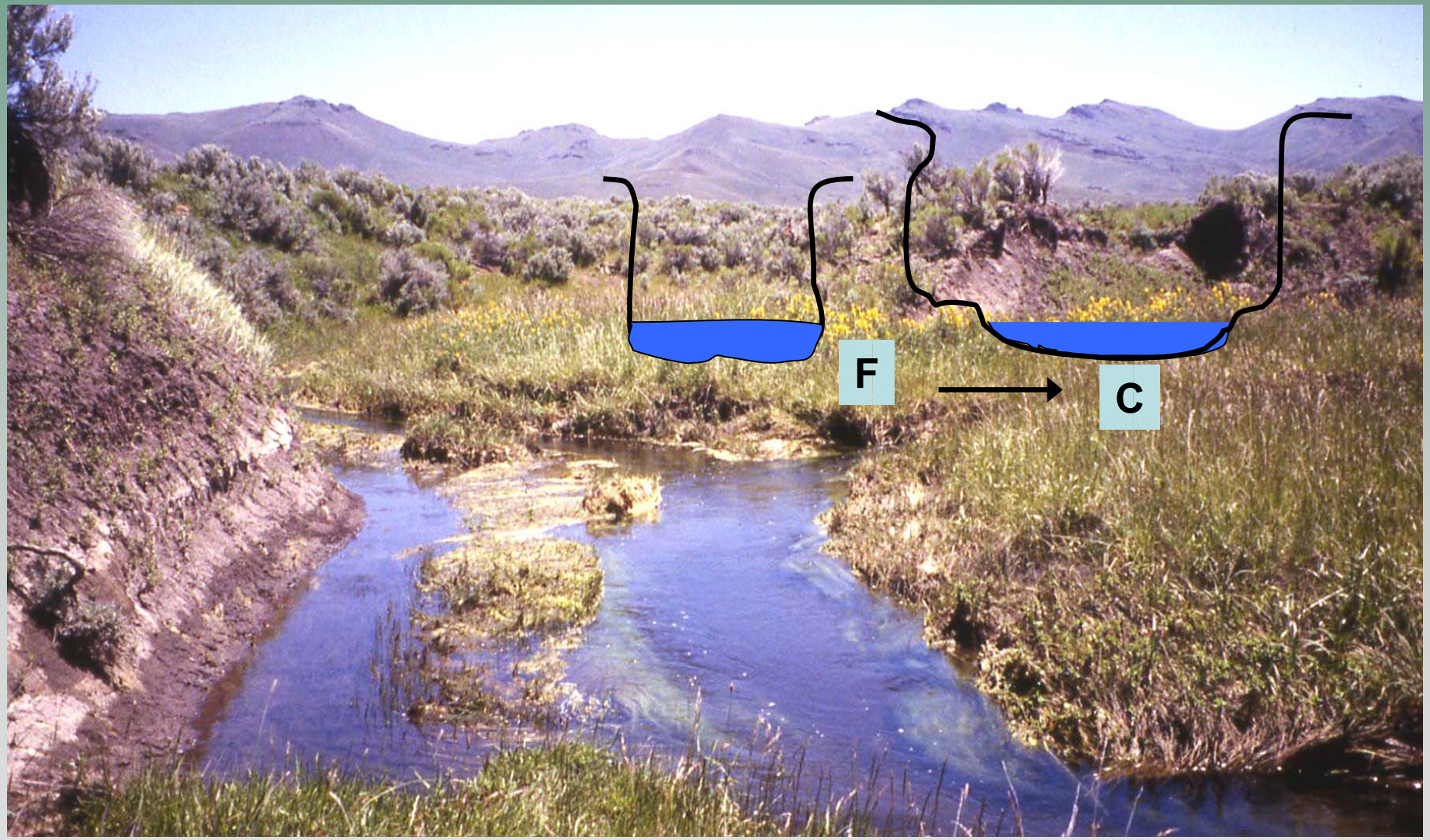
Channel Evolution: E to C to G



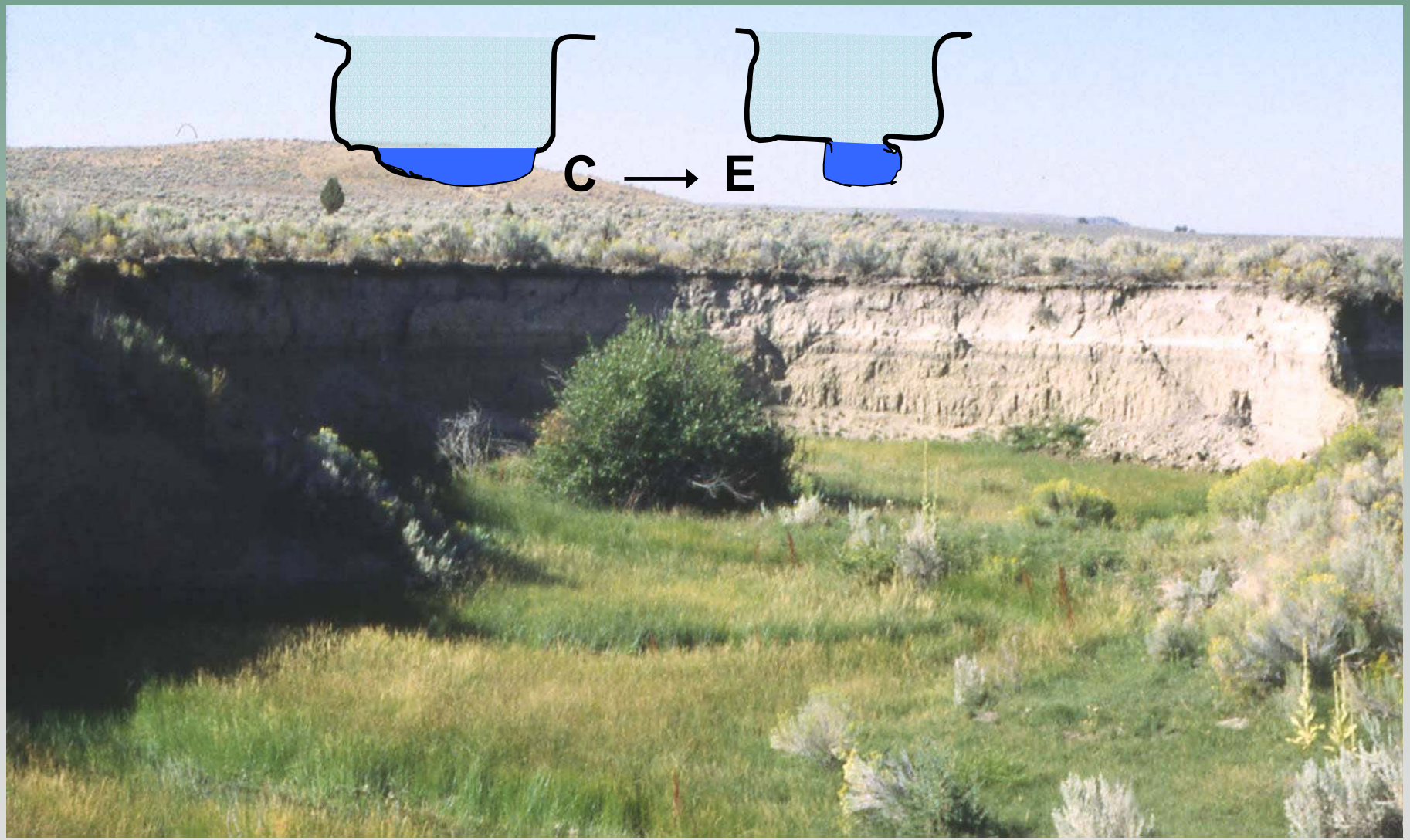
Channel Evolution: E to C to G to F



Channel Evolution: E to C to G to F to C

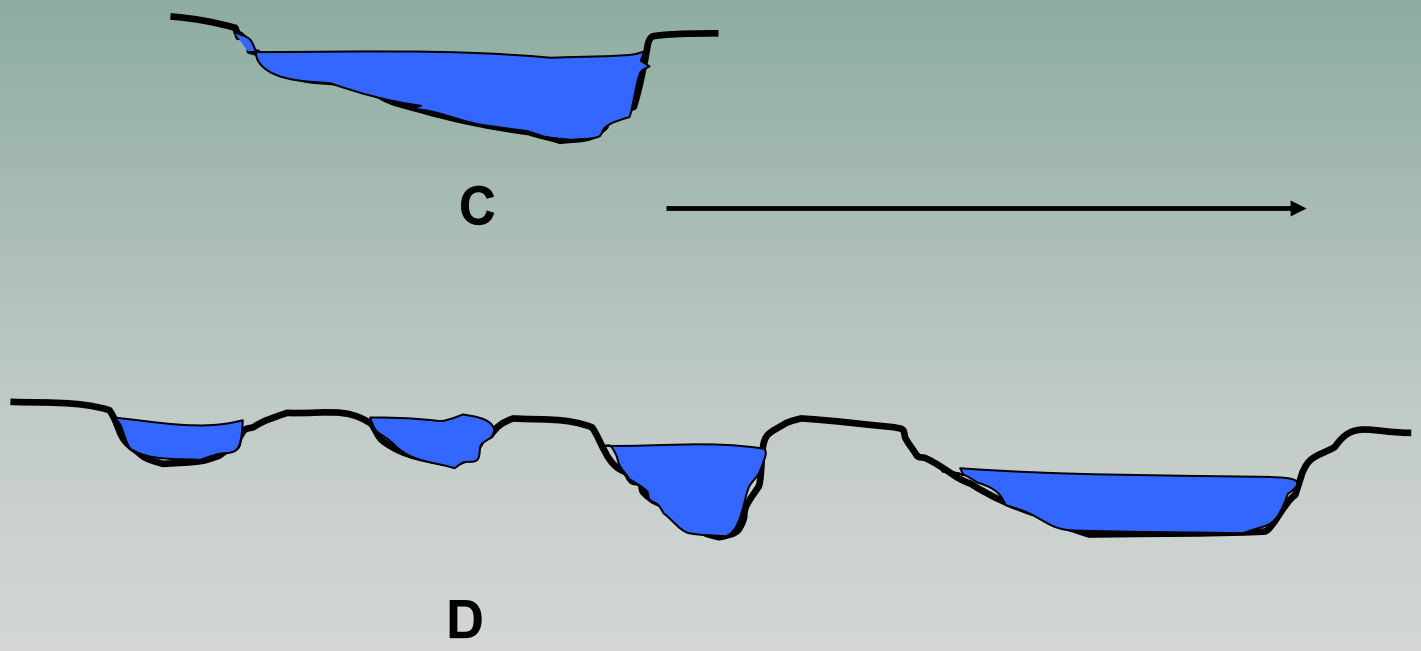


Channel Evolution: E to C to G to F to C to E



Channel Evolution Model

(Schumm 1984, Rosgen 1996)



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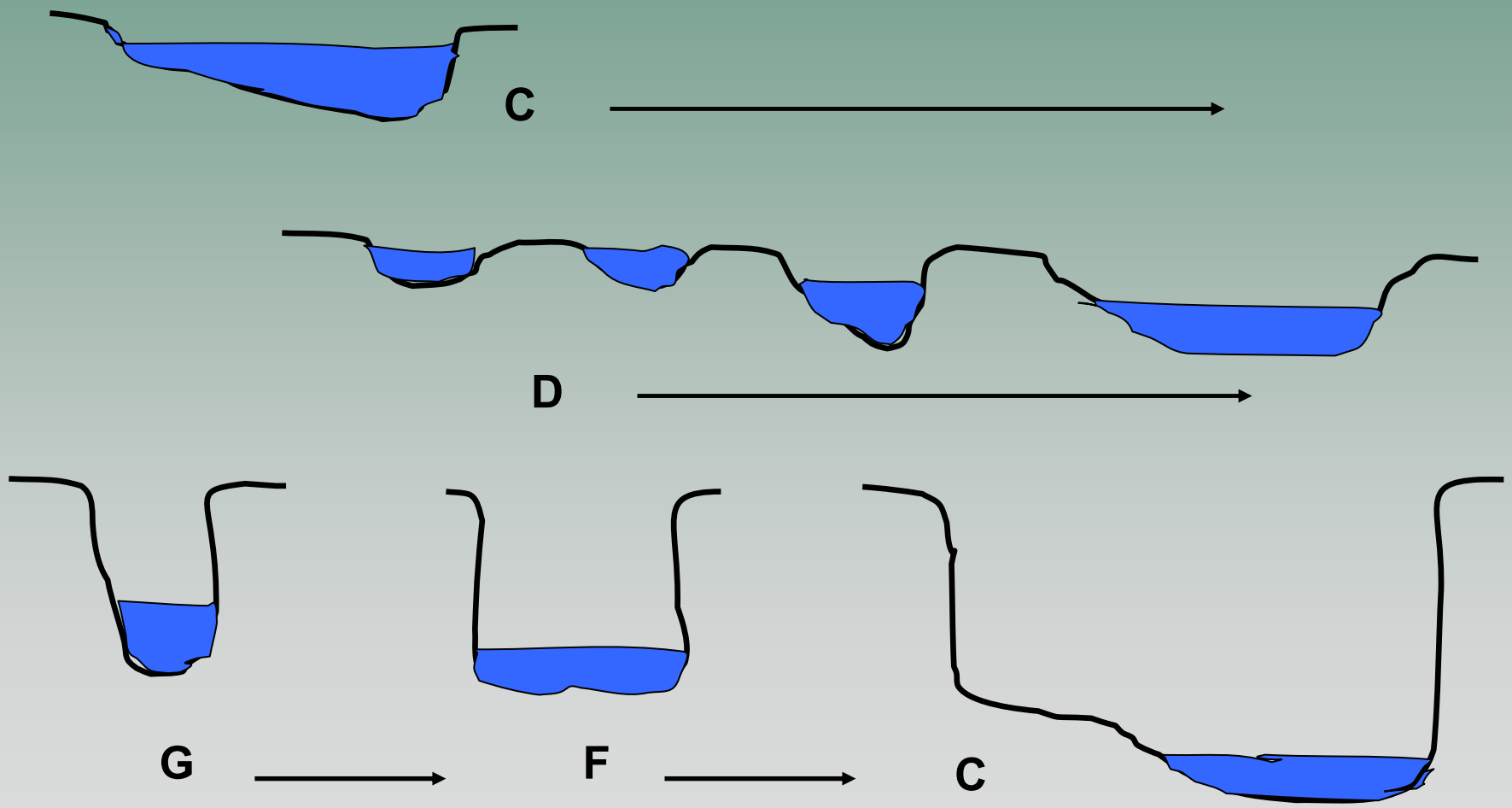
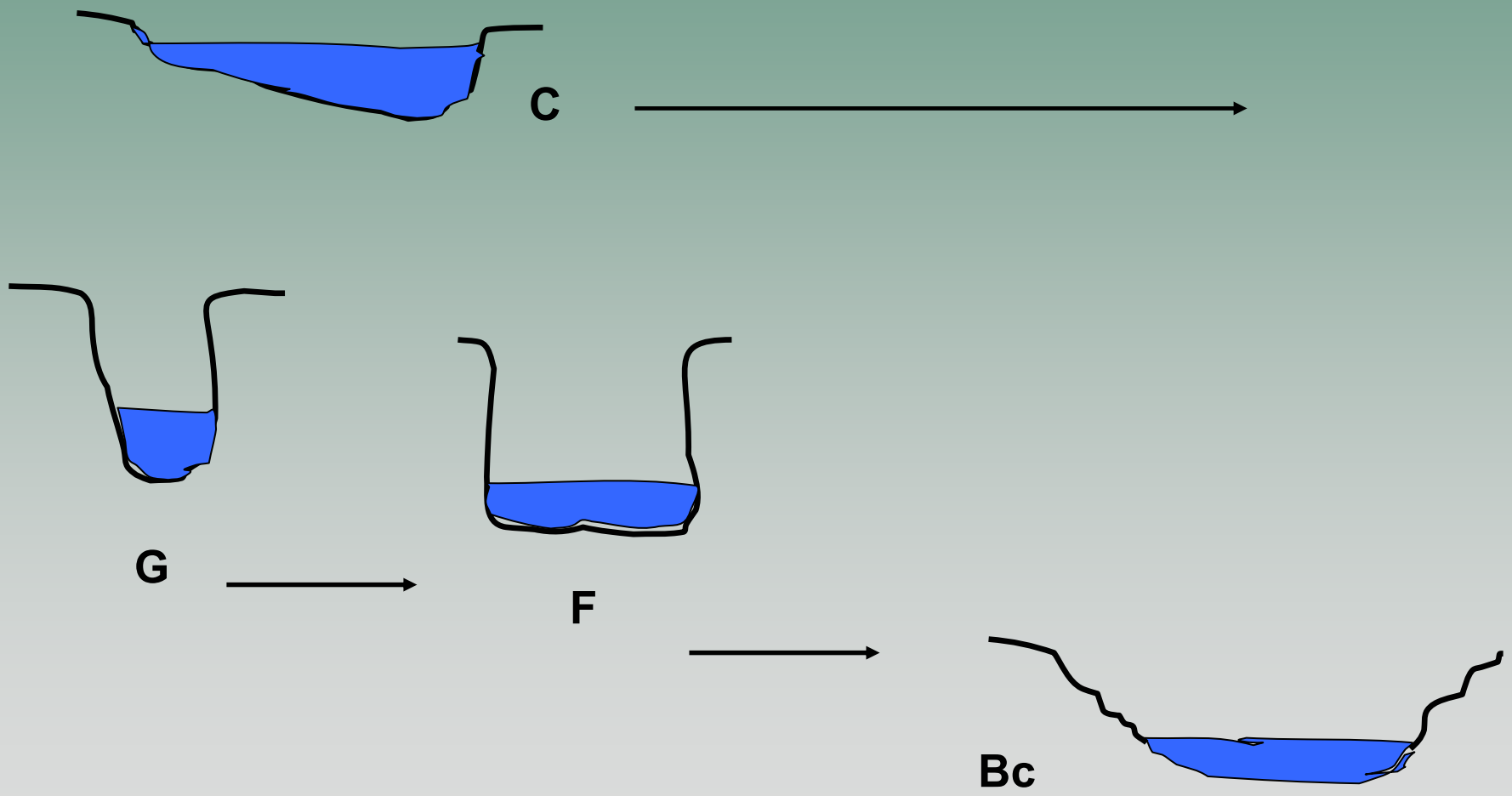


Channel Evolution Model
(Schumm 1984, Rosgen 1996)



Channel Succession

Tools -

Stream Classification

Rosgen (1996)

Channel Evolution Model

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Proper Functioning Condition

(USDI, BLM TR 1737-9)

Channel Succession
Riparian Plant Community Dynamics

Plant Community Dynamics

Tools -

Ecological Site Descriptions

Leinard (2003)

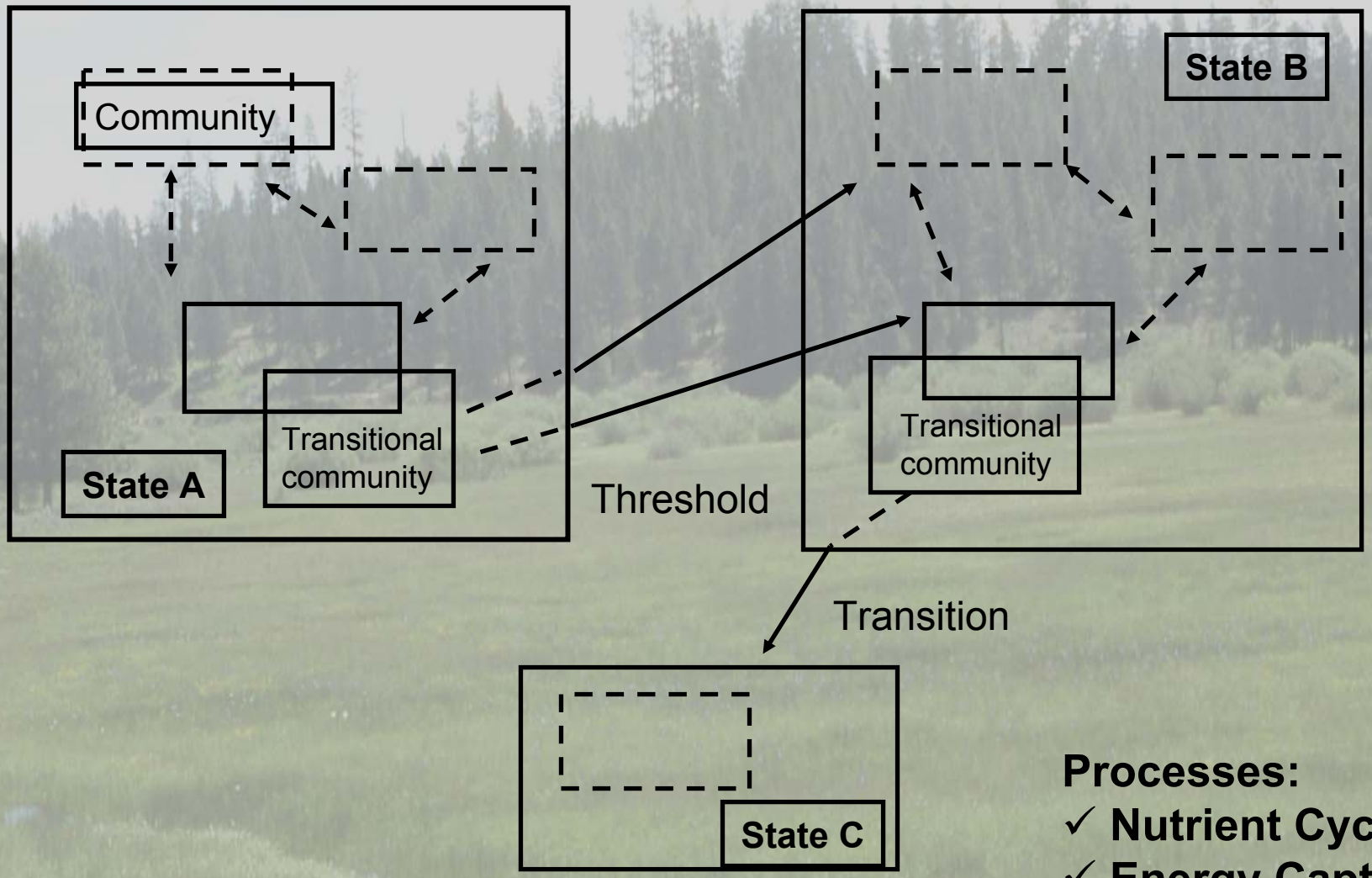
State-and-Transition Models

Stringham et al., (2001, 2003)

Plant Community Dynamics

Ecological Site Descriptions

- ✓ *channel description*
- ✓ *channel evolution model*
- ✓ *water table / plant community*
- ✓ *plant communities = indicator species groups*
- ✓ *state-and-transition model*



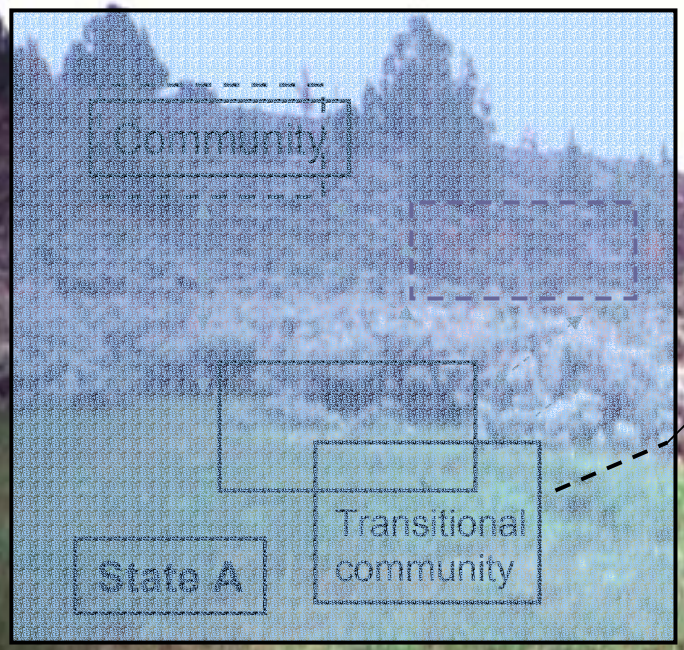
Processes:

- ✓ **Nutrient Cycling**
- ✓ **Energy Capture**
- ✓ **Water Cycle**

www.glti.nrcs.usda.gov/technical/presentations/eco_site_desc/srm_sym_stringham.html

Riparian Ecosystems

model adjustment



State B

Transition

Threshold

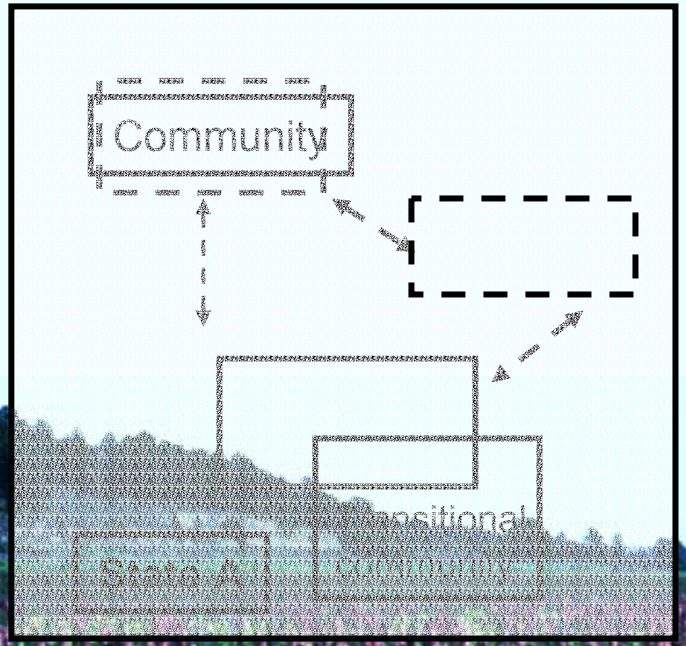
Processes:

- ✓ Nutrient Cycling
- ✓ Energy Capture
- ✓ Water Cycle

? Hydrology
channel morphology
influent - effluent

Riparian Ecosystems

model adjustment



Multiple Plant Communities

or indicator groups within one riparian ecosystem

plant communities may not be seral stages but indicator groups within a riparian zone

Community or Indicator Group Dynamics

shift position and/or amount
in response to natural stream movement

Restoration

Ecological Site Descriptions

- Valley and Channel Types (Rosgen 1996)
- Plant Community or Indicator Groups
- Channel Evolution Models
- State-and-transition Model
  - state change defined by channel change as related to water table change

Restoration

- ✓ Hard Fixes

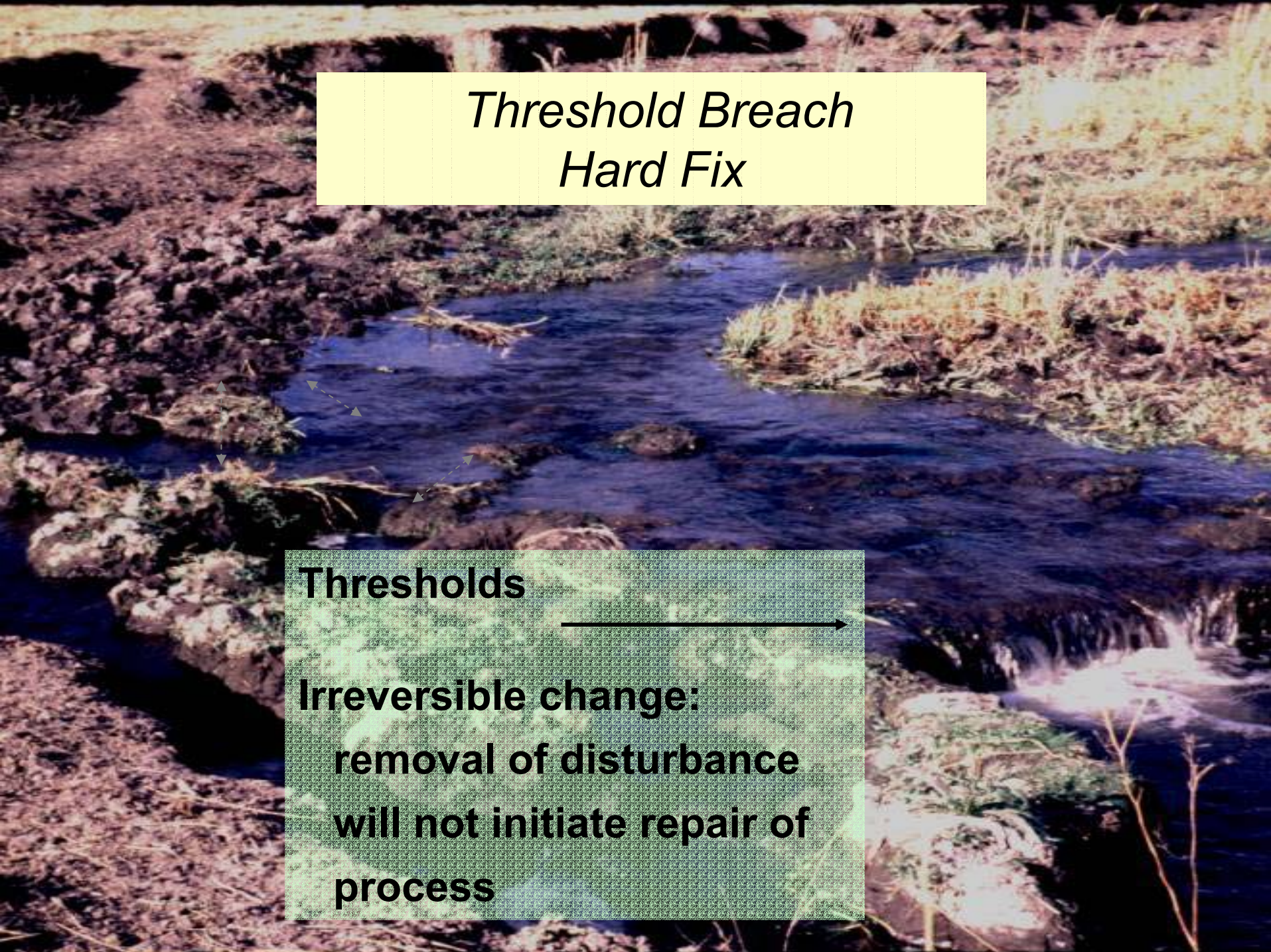
  Crossed a threshold?

  Engineering solution

- ✓ Soft Fixes

  Transitioning toward a threshold?

  Vegetation solution



Threshold Breach
Hard Fix

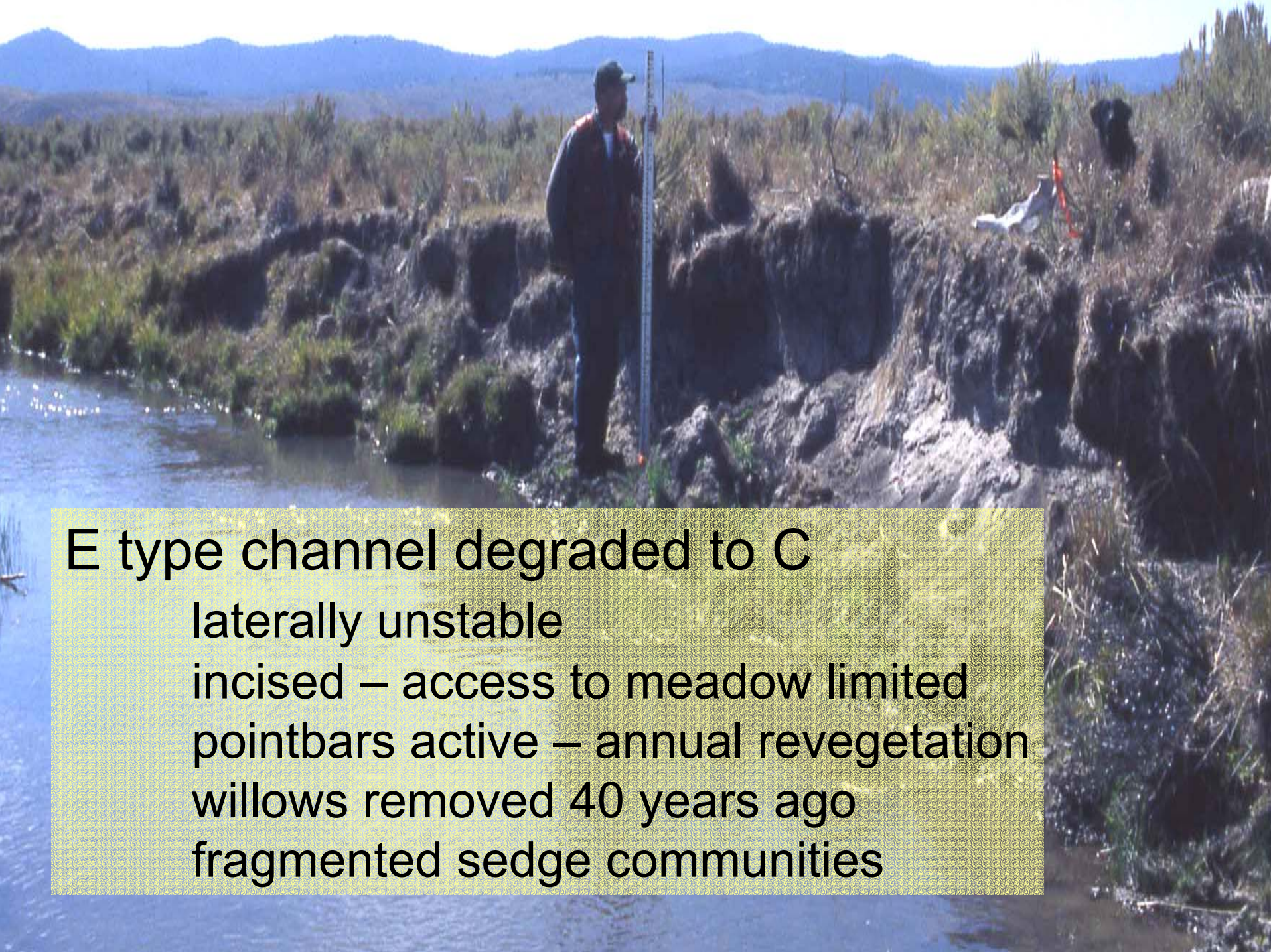
Thresholds →

Irreversible change:

removal of disturbance will not initiate repair of process

JOHN DEERE
310D
9 11'01

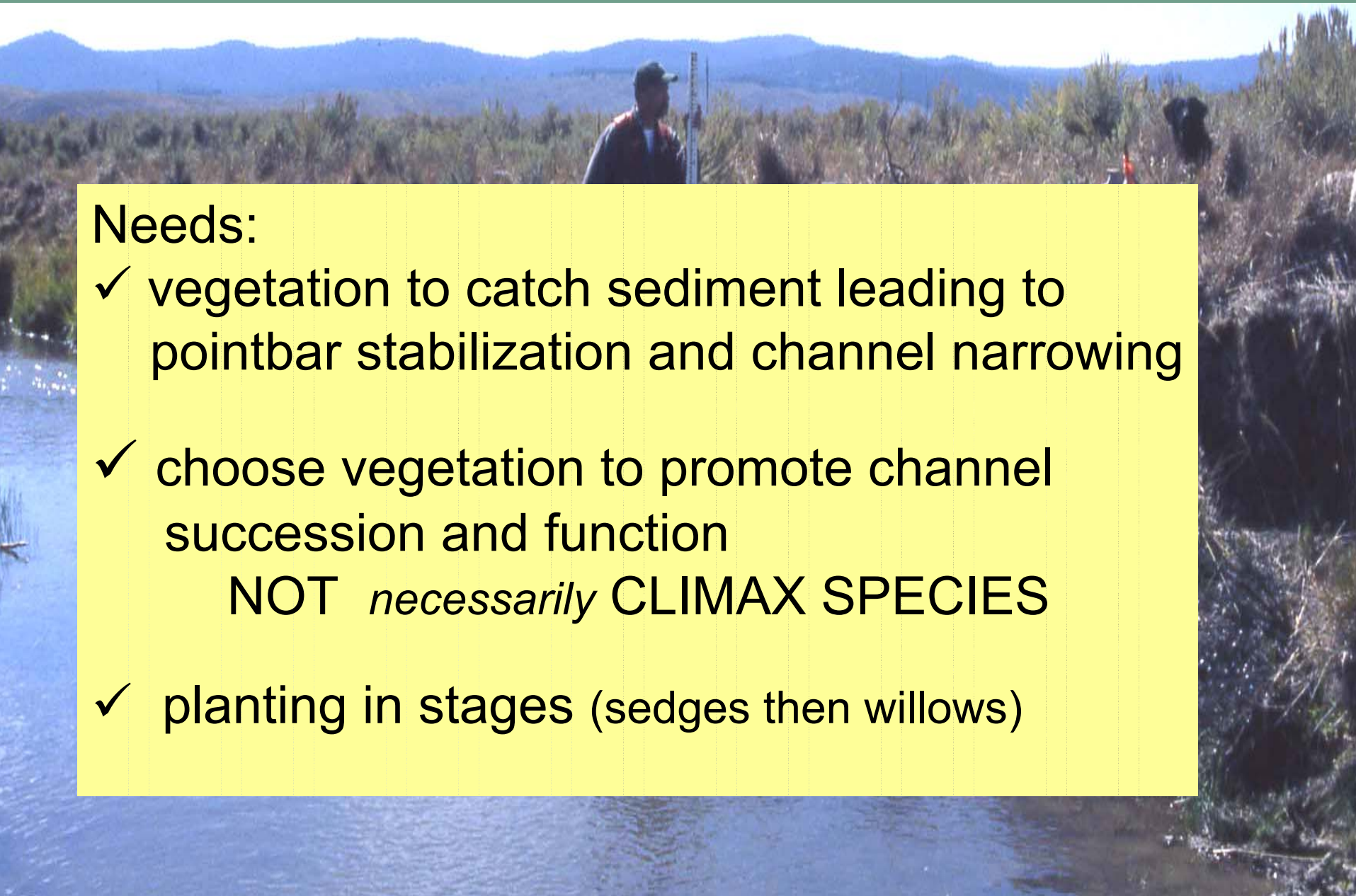
Stabilized
Vegetation addition?



E type channel degraded to C

- laterally unstable
- incised – access to meadow limited
- pointbars active – annual revegetation
- willows removed 40 years ago
- fragmented sedge communities

Restoration: Plant Material Needs



Needs:

- ✓ vegetation to catch sediment leading to pointbar stabilization and channel narrowing
- ✓ choose vegetation to promote channel succession and function
  NOT *necessarily* CLIMAX SPECIES
- ✓ planting in stages (sedges then willows)

Conclusion

Plant Material Development

- Field trials using vegetation to direct channel succession
- Native plant selection = competitive advantage

Ecological Site Descriptions

- Channel and valley types
- Plant communities or indicator groups
- Channel evolution models
- State-and-transition models