

hyporheic aquifer

perirheic aquifer

bedrock

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Wohl et al. (2021) Frontiers in Earth Science





South Fork McKenzie River, Oregon. Photos by Kate Meyer, US Forest Service.

#### Channel Incision: disconnects River Channels from their Floodplains



### Crowder Creek, North Mississippi: late-1970s

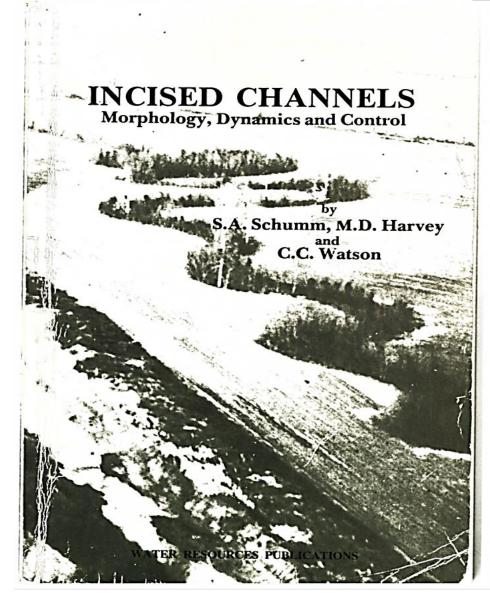
Photo courtesy of David S. Biedenharn, US Army Corps of Engineers

## **Channel Evolution Model**

INCISED CHANNELS Morphology, Dynamics, and Control

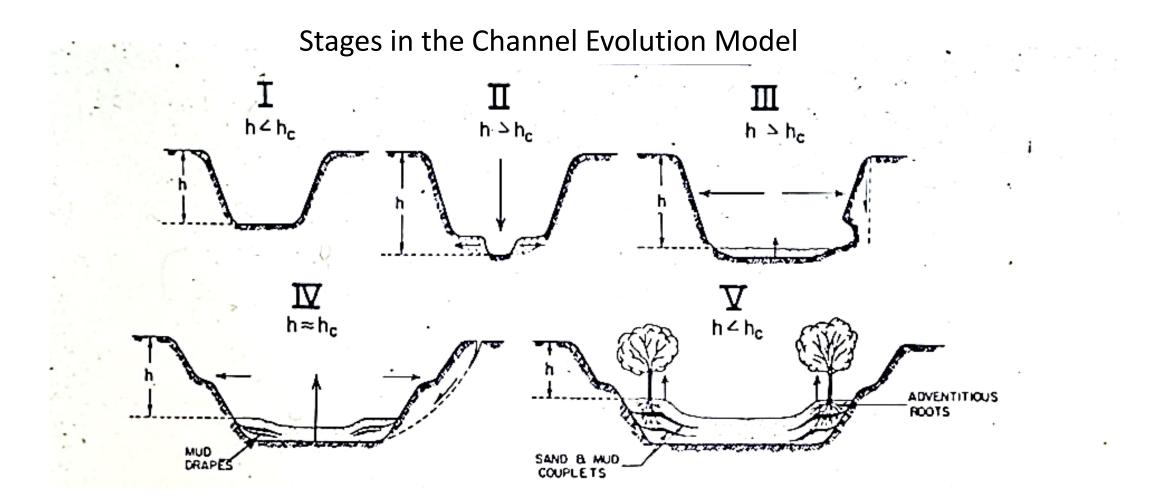
Schumm, Harvey & Watson

Water Resources Publications, Littleton, Colorado

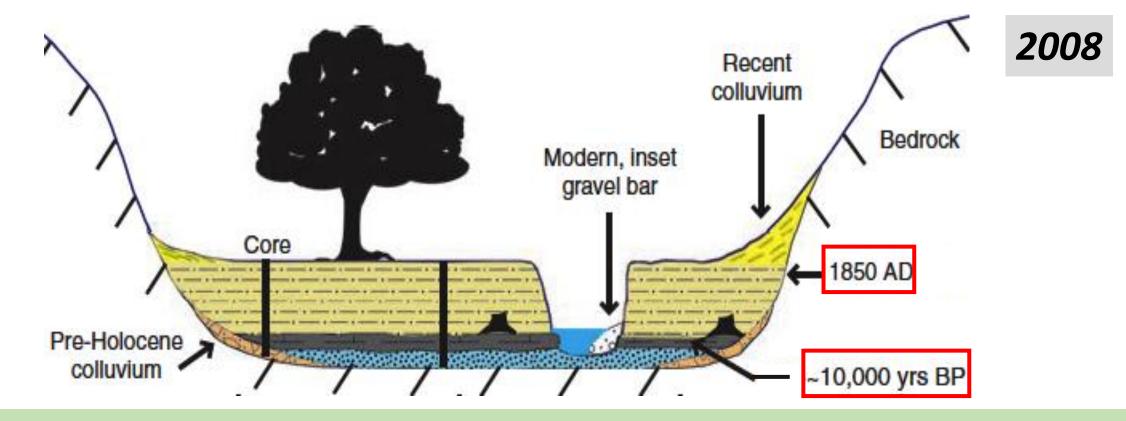


### Schumm, Harvey and Watson

1984

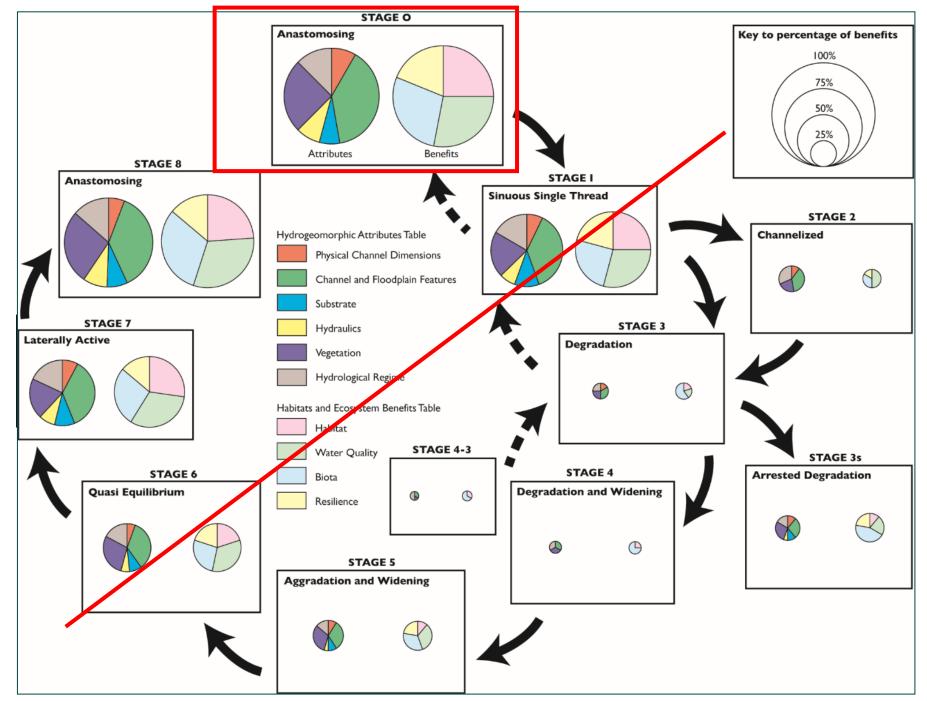


Schumm, S. A., Harvey, M. D., & Watson, C. C. (1984). Incised channels: morphology, dynamics, and control. Water Resources Publications.



"...before European settlement, the streams were small, anabranching channels within extensive, vegetated wetlands"

Walter, R.C. and Merritts, D.J., 2008. Natural streams and the legacy of water-powered mills. *Science*, *319*(5861), pp.299-304.



Cluer, B. and Thorne, C.R. (2014) A Stream Evolution Model Integrating Habitat and Ecosystem Benefits. *River Science and Applications*, 30(2), 135-154. DOI: 10.1002/rra.2631.

Stage Zero is the initial, pre-disturbance condition in the 'Stream Evolution Model' (SEM) proposed by Cluer and Thorne (2013)

Stage Zero is characterised by an abundance & wide range of hydromorphic attributes and ecosystem benefits, high fluvial complexity, and full connectivity between the river & its wetlands, floodplain & hyporheic aquifer

http://stagezeroriverrestoration.com,

# Thinking Outside the Channel

Mud Pool Meadow – UK's 1<sup>st</sup> 'Stage 0' restoration. Holnicote Estate, Somerset, UK. PoC Ben Eardley, National Trust. <u>https://www.theguardian.com/uk-news/2019/oct/17/exmoor-river-reset-aims-to-cut-flood-risk-and-bolster-wildlife</u>