





***Streams, Habitats
& Macroinvertebrates***

A photograph of a stream flowing through a forest. The water is clear and shallow, revealing rocks on the stream bed. The banks are covered with dense green vegetation and trees. The text is overlaid on the lower half of the image.

Main Topics

What shapes stream shapes
Stream habitats (*pools, riffles & runs*)

What shapes macroinvertebrate shapes
Life (in streams) is a drag



A “reach” is an arbitrary stretch of stream

Streams are not “pipes”

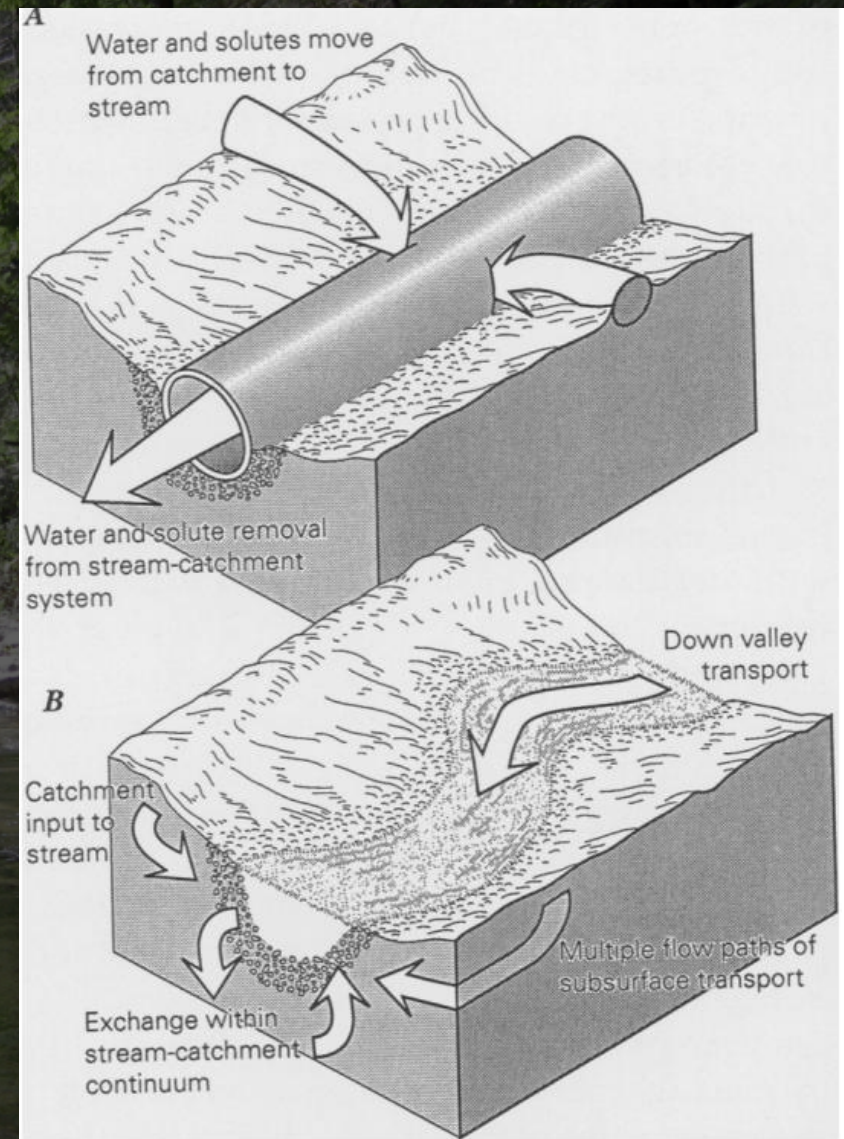
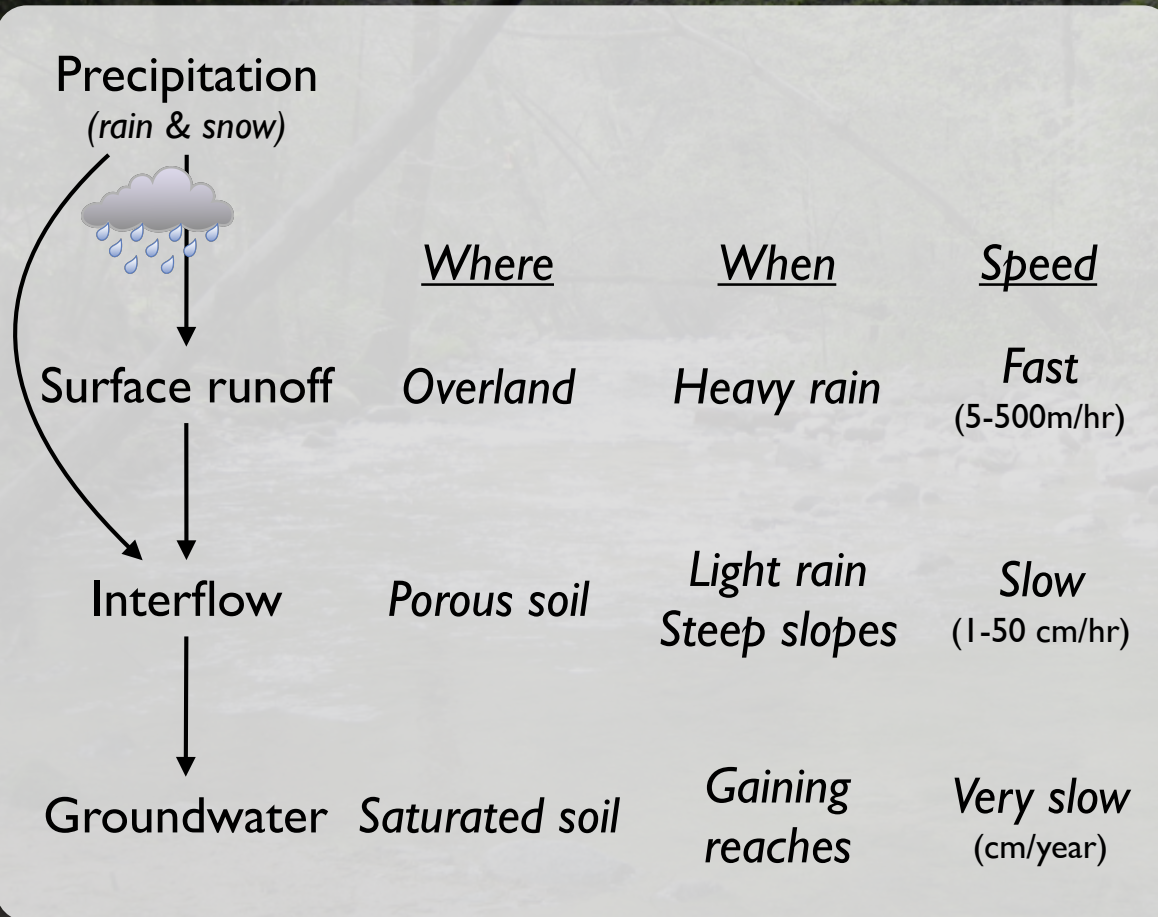


FIG. 1. A.—The stream's function in its catchment is viewed simply as that of a pipe. B.—A contrasting view of the stream's function places the stream as an integral part of the catchment system.

Streams are not “pipes”



Rates of runoff, erosion, infiltration depend on soil conditions, vegetative cover, land-use practices

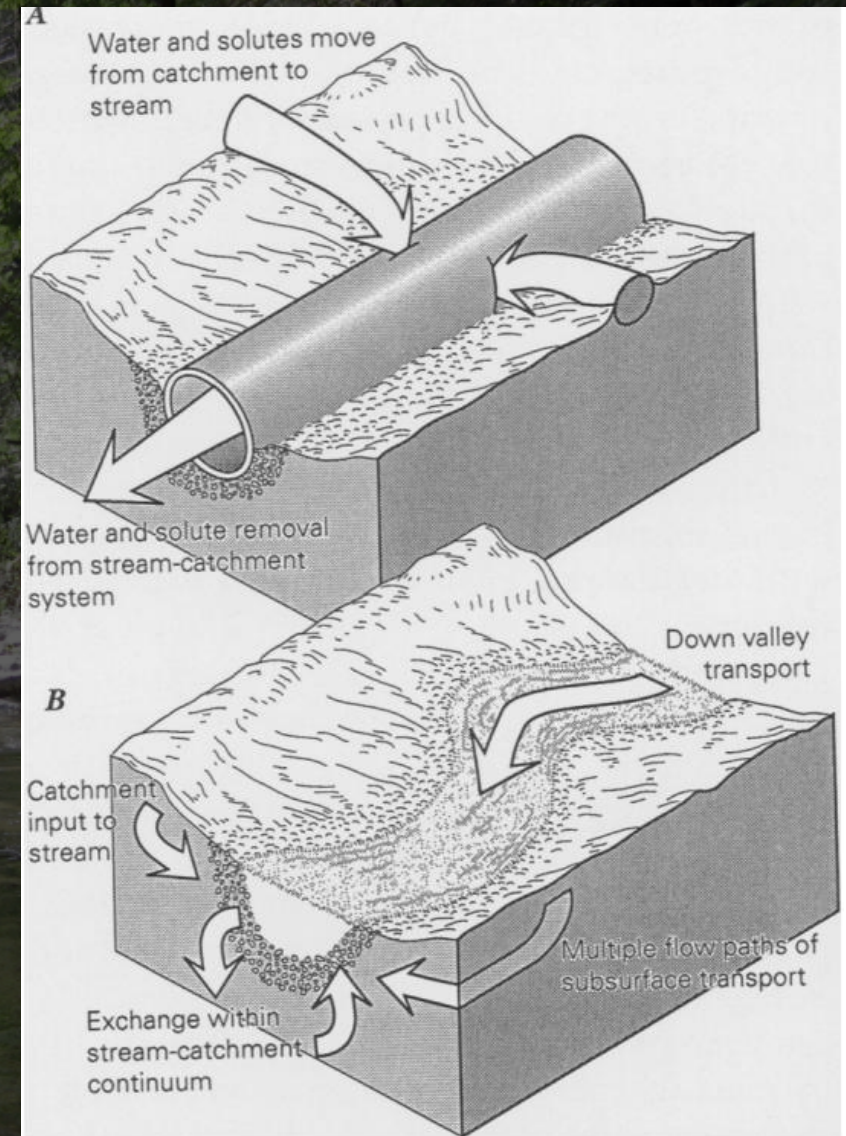


FIG. 1. A.—The stream’s function in its catchment is viewed simply as that of a pipe. B.—A contrasting view of the stream’s function places the stream as an integral part of the catchment system.

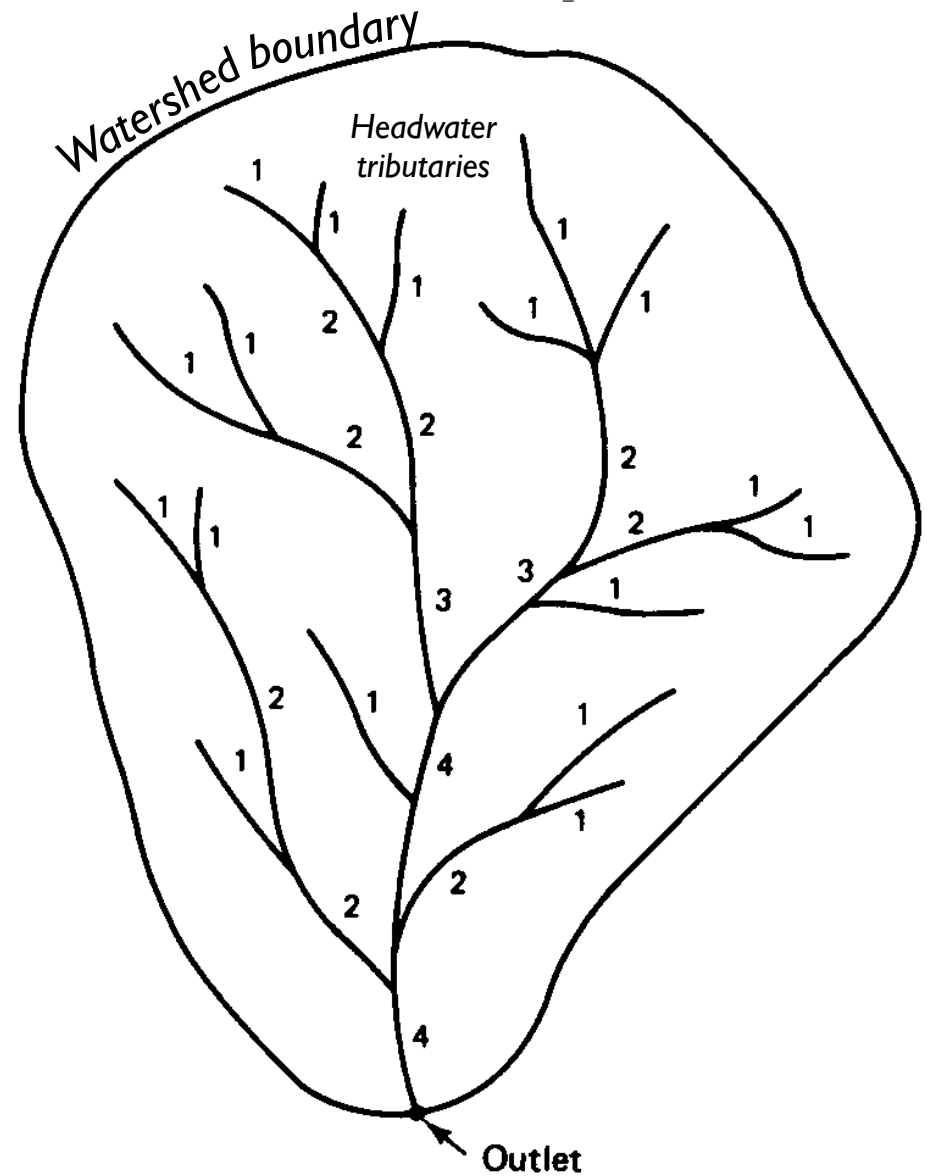
*Stream shape depends on
spatial variation in discharge*

Discharge increases with
stream order

more tributaries

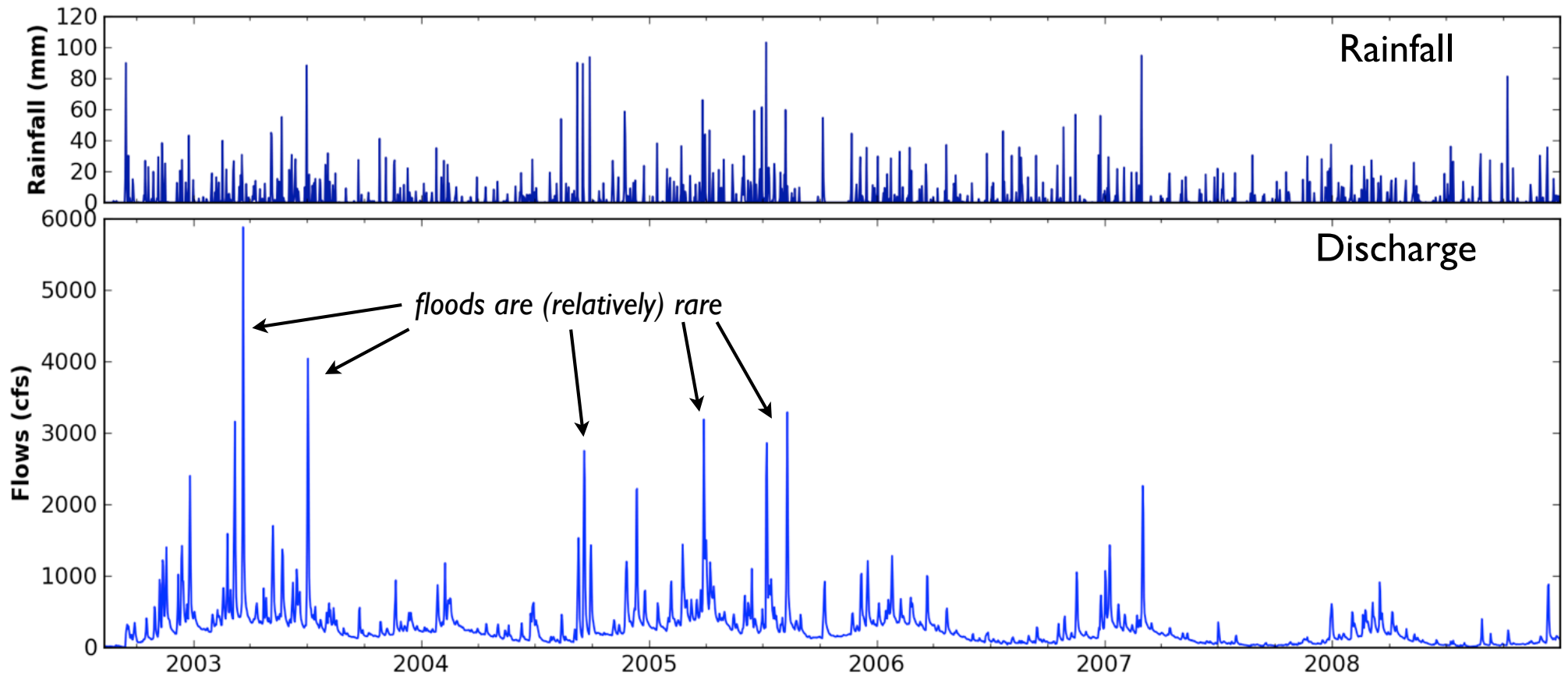
more groundwater input

larger watershed (surface runoff)



Stream shape depends on temporal variation in discharge

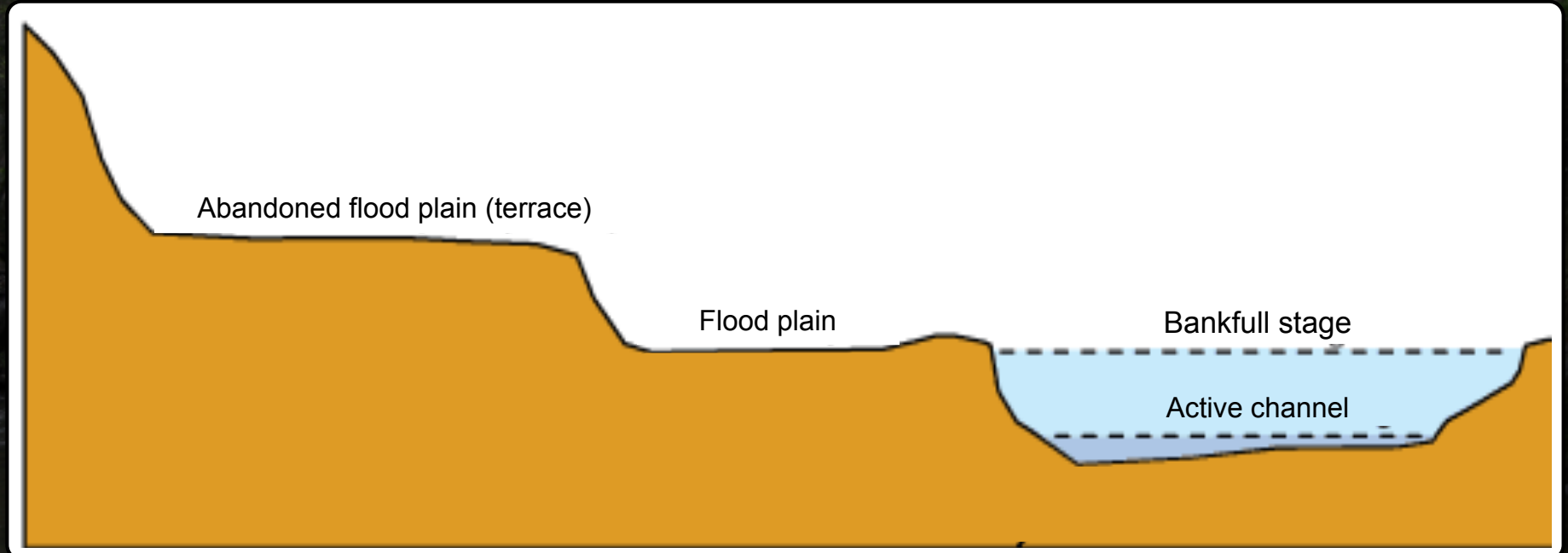
Hydrograph for the North Oconee River at Athens, GA



Floods are relatively rare

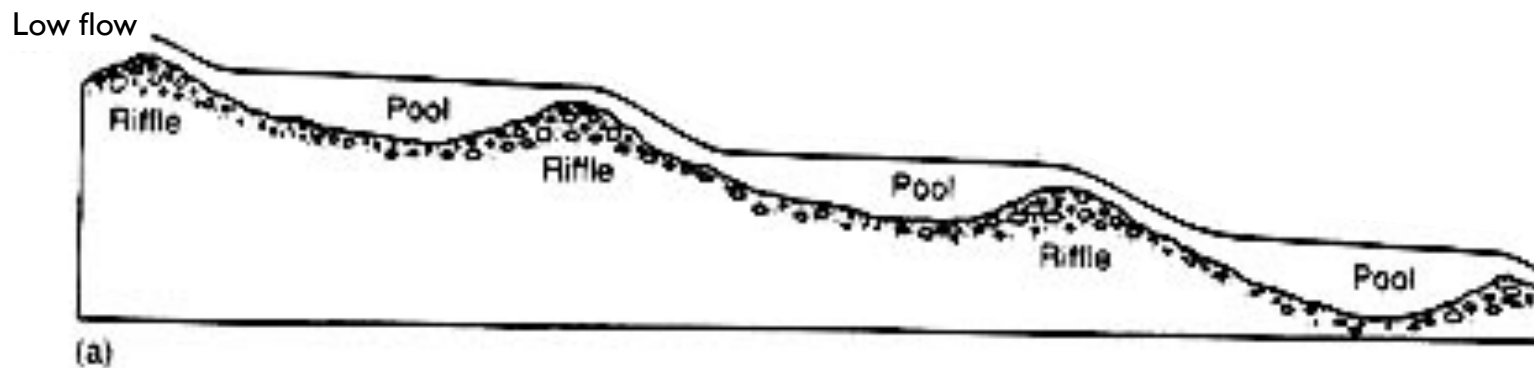
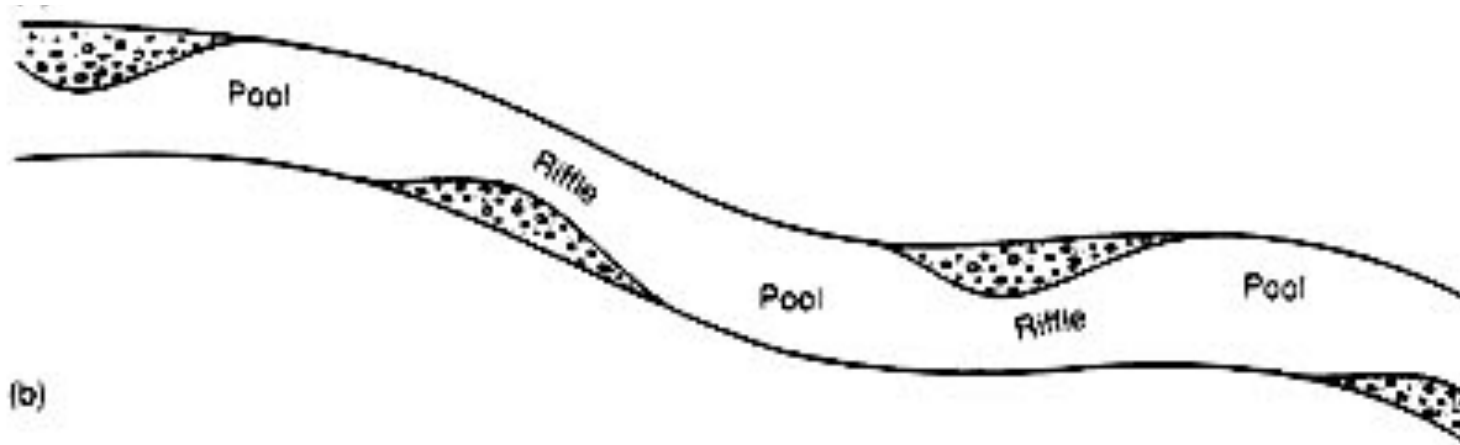
*but are disproportionately important for stream shape
(move boulders, wash out fine sediment, scour stream banks and pools)*

Views of stream shape



Water velocity varies across stream width
(creates different habitats)

Views of stream shape



Water velocity varies across stream length
(creates different habitats: riffles, pool, runs)



Pools

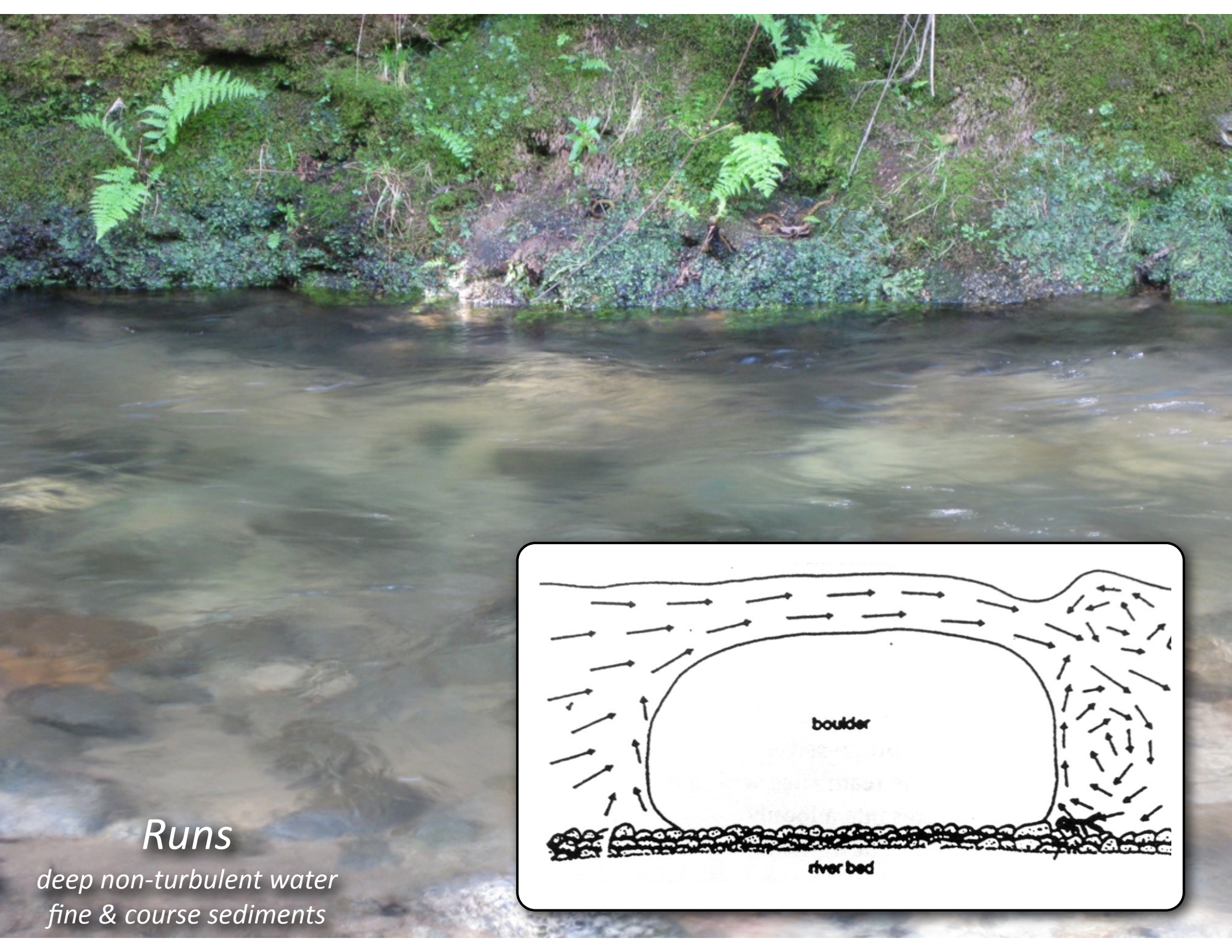
slower moving water

fine sediments (sand, mud)

Riffles

*shallow turbulent water
course sediments (pebbles, boulders)*





Runs

*deep non-turbulent water
fine & coarse sediments*

Macroinvertebrate habitats change with stream order

Headwaters

(low order streams)

Seasonal, “flashy”

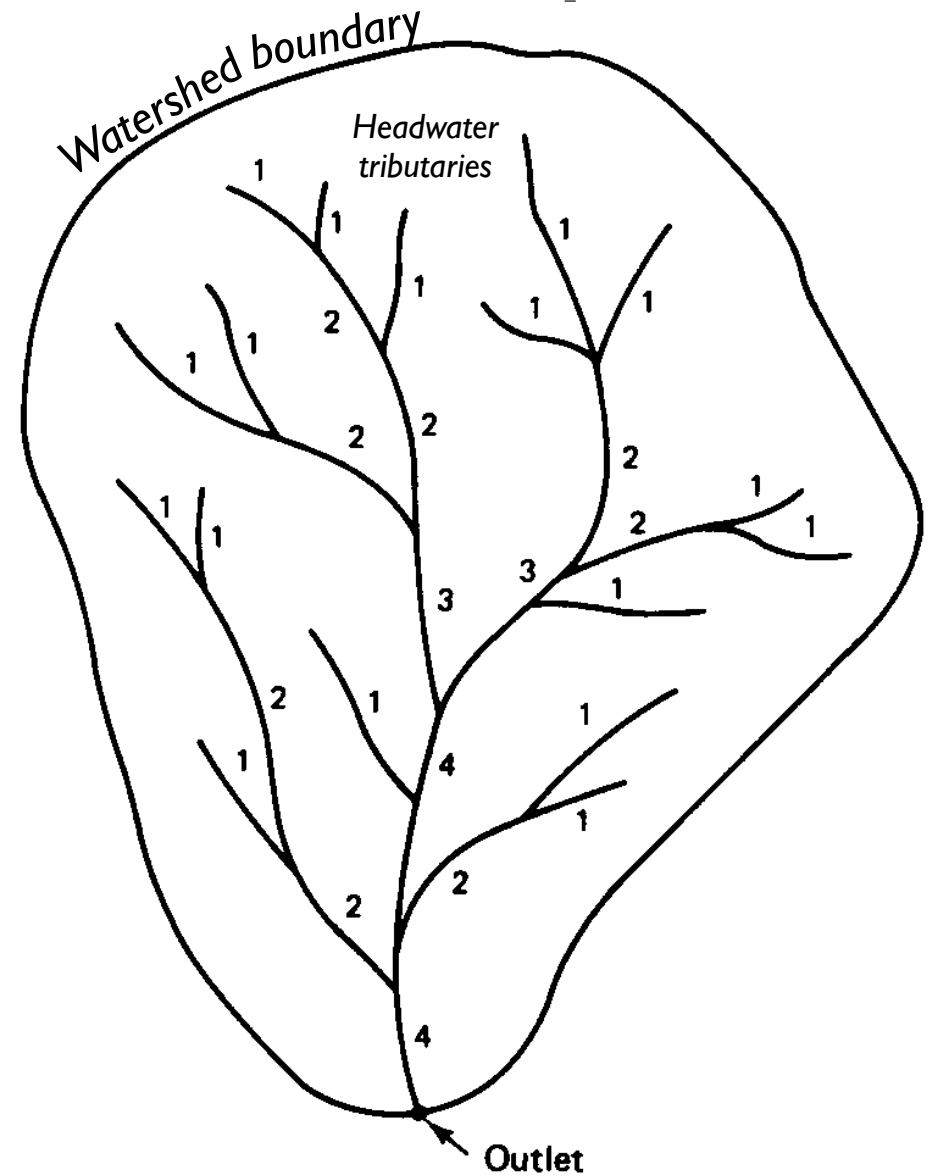
Narrow, shallow

Riffle & pool habitats

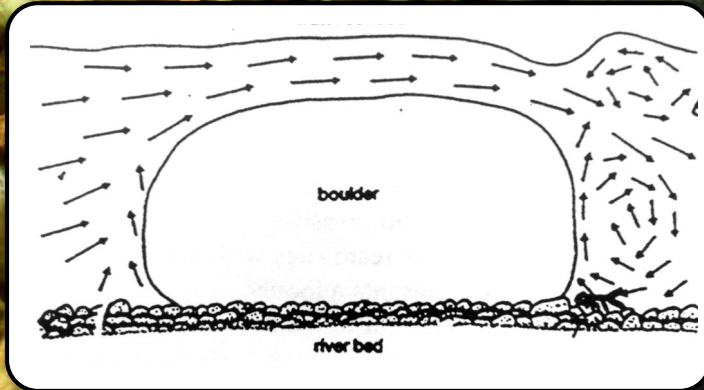
High order streams

Consistent, wide, deep

Runs & side-channel habitats



Life (in streams) is a drag



Habitat choice
Microhabitat choice
Behaviour
Shape (morphology)



Suckers (rare)
Silk production (e.g., caddisflies, moths)
Ballast (e.g., caddisfly cases)
Flat body shapes

Mayfly

Mayfly

Body parts to focus on

Tail

Legs

Wing pads

Gills

Head

Diet plays a role too

Midge

Dragonfly

Stonefly

Caddisfly





Stream macroinvertebrates
Functional groups & diversity

Macroinvertebrate habitats change with stream order

Headwaters

(low order streams)

Seasonal, “flashy”

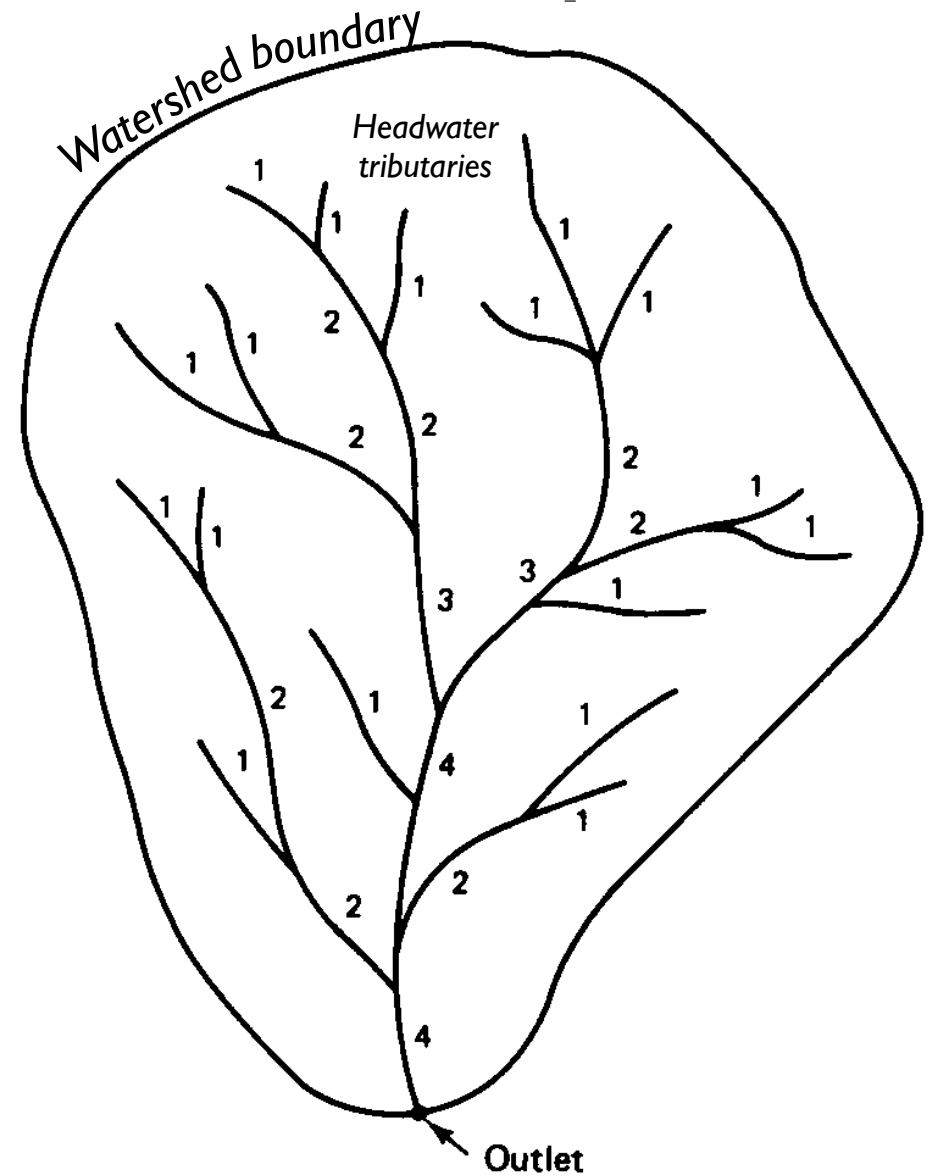
Narrow, shallow

Riffle & pool habitats

High order streams

Consistent, wide, deep

Runs & side-channel habitats



Macroinvertebrate food resources change with stream order

Headwaters

High leaf input

Coarse Particulate Organic Matter

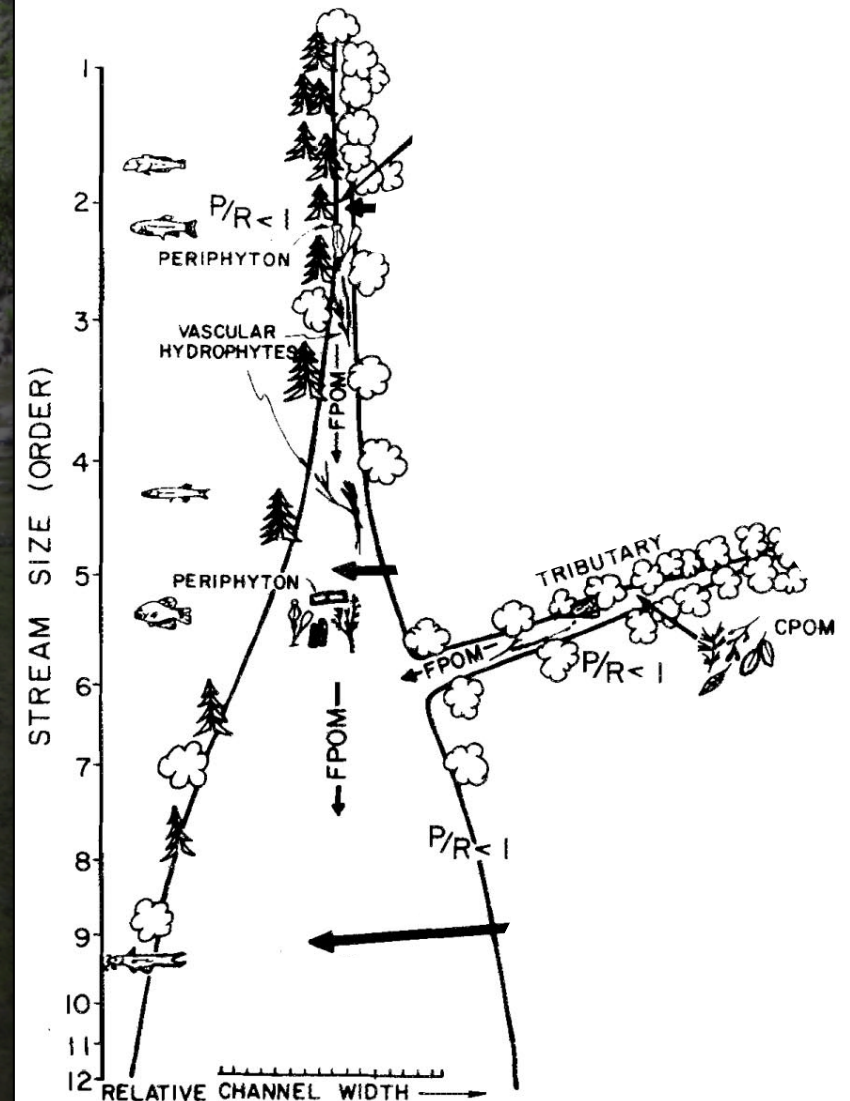
Shredders & Collectors dominate

High order streams

Fine Particulate Organic Matter

Light for photosynthesis

Collectors & Grazers dominate



Caddisfly



Caddisfly



AQUATIC INSECT.NET
jan hamrsky

Midge



Caddisfly



Stonefly



Stonefly



Caddisfly

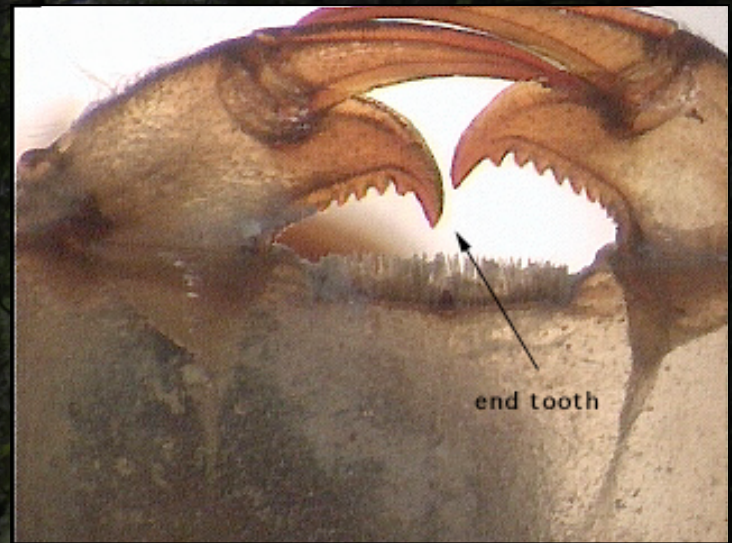


Crane fly





Dragonfly

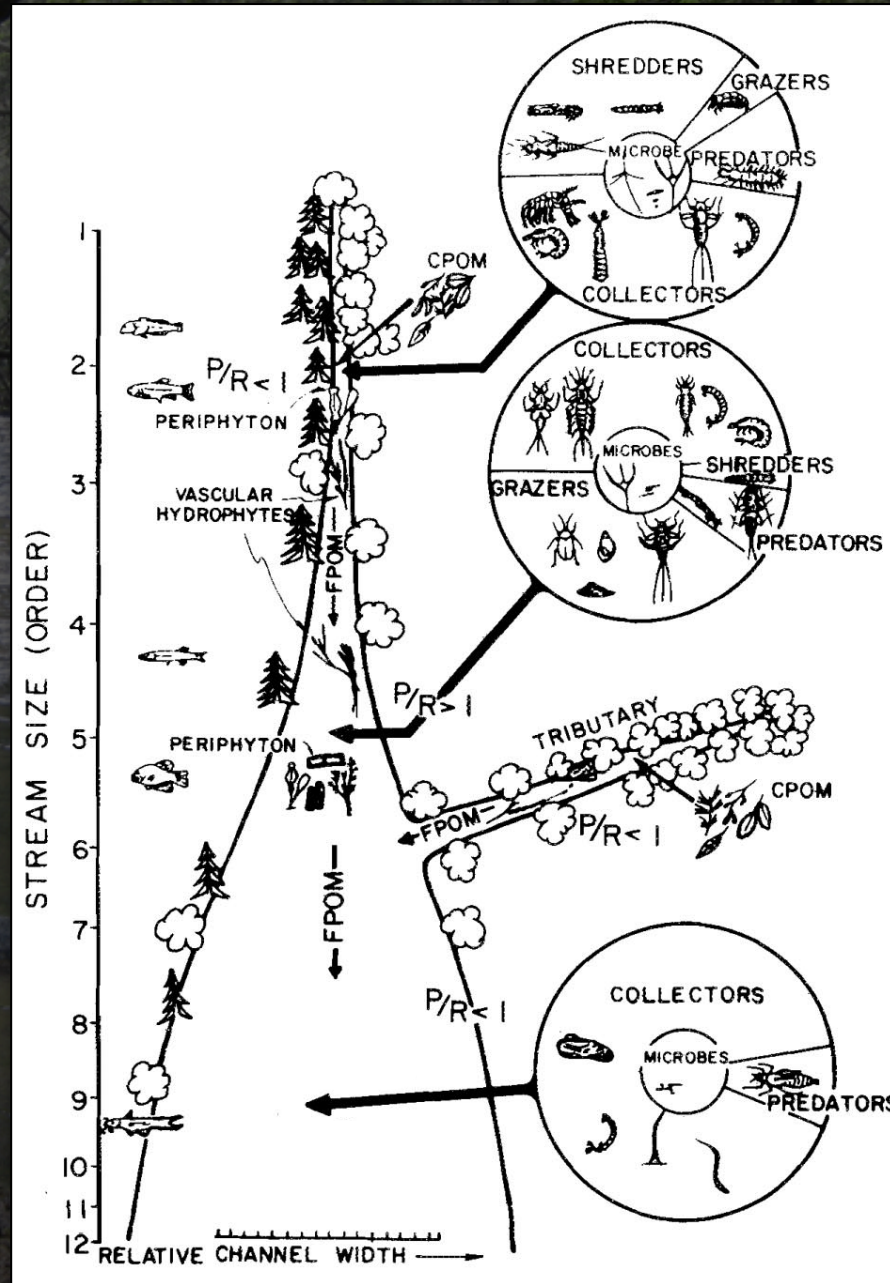


Crayfish



Dobsonfly

Macroinvertebrate functional roles change with stream order





Mayfly (*Ephemeroptera*)



Stonefly (*Plecoptera*)



Caddisfly (*Trichoptera*)



Macroinvertebrate Diversity

Richness

(# of species)

Evenness

(# of individuals/species)

Indices of Stream Health

Species vary in sensitivity

EPT index

(% of mayflies, stoneflies & caddisflies)

