Healthy Streams
Safe Roads



U.S. Department of Transportation Federal Highway Administration

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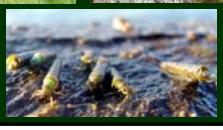
From headwaters to ocean streams connect:

Forests
Wetlands
Lakes
Corridors:
Water
Wildlife
Fish
Invertebrates
Sediment
Nutrients
Organic Matter
LW, CPOM, FPOM



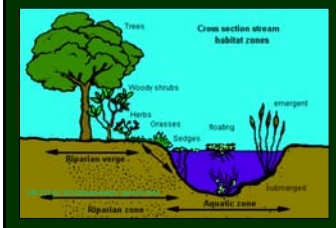


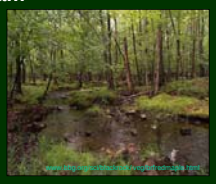


Organic Matter (plants and animals) Drives Ecology

- **Allochthonous – from land**
- **Autochthonous – within the stream**

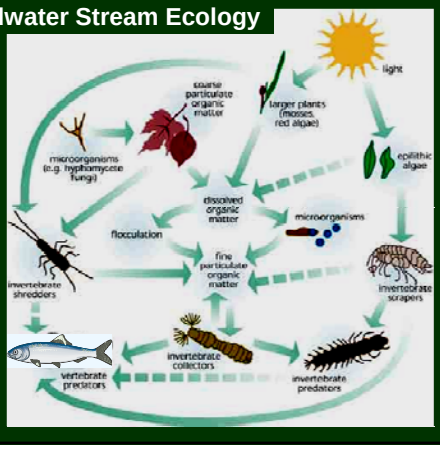
Allochthonous



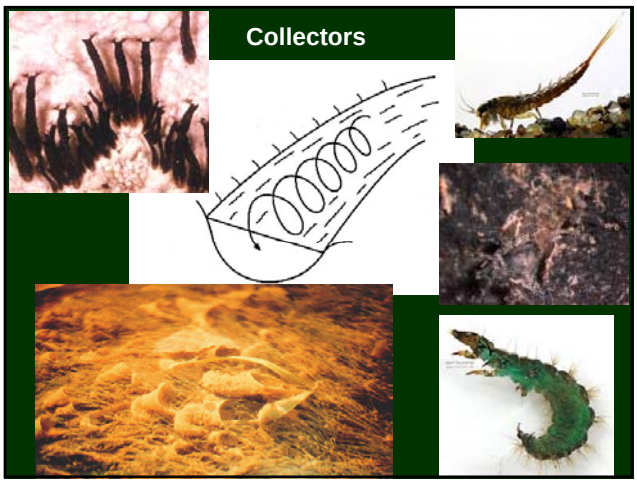


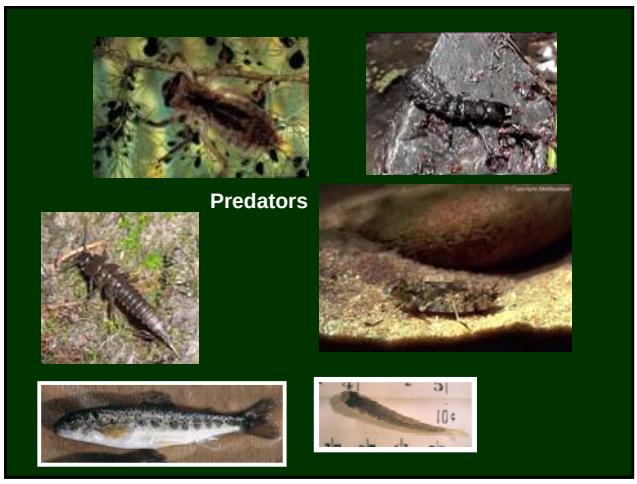

Autochthonous

Headwater Stream Ecology

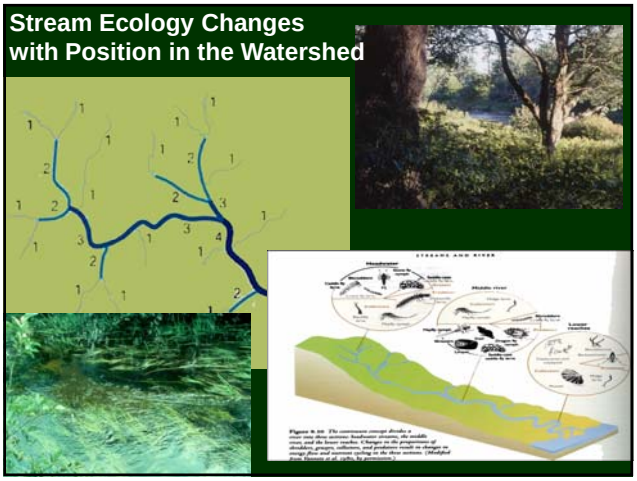



Scrappers
Shredders


Collectors


Predators

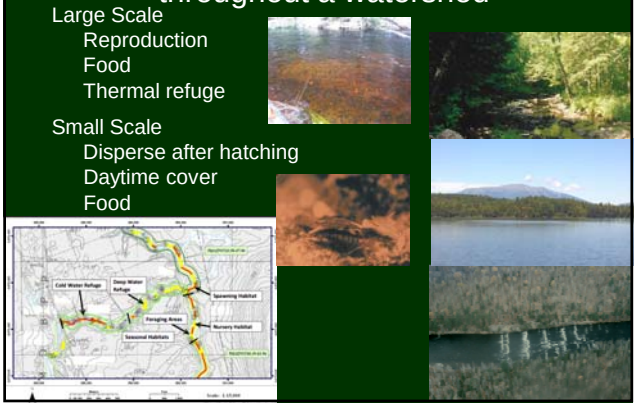
Stream Ecology Changes with Position in the Watershed



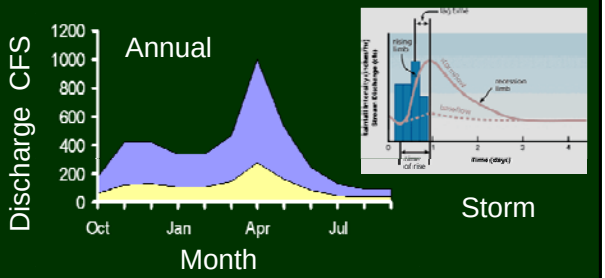
Animals move in and along streams throughout a watershed

Large Scale
- Reproduction
- Food
- Thermal refuge

Small Scale
- Disperse after hatching
- Daytime cover
- Food



Movements related to discharge

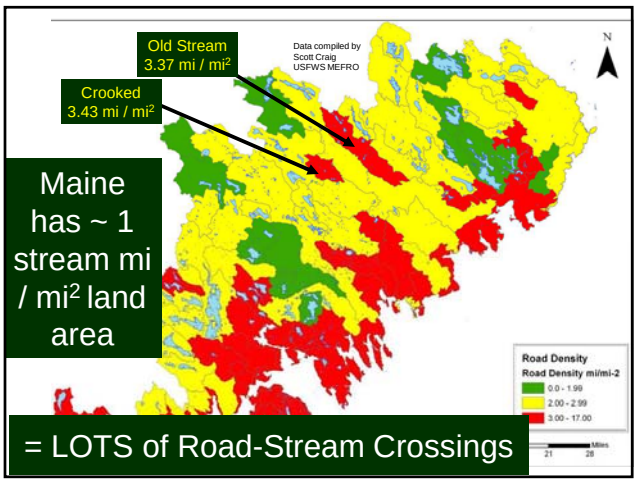


Fish Spawning Movements
Fall (salmon, trout), Spring (suckers, alewife), Summer (dace, bass), Winter (smelt, cusk)

Seasonal Lateral Dynamics
"Flooding" - Access from streams to Forests and Wetlands

Food
Reproduction

Amphibians
Reptiles
Insects
Mammals
Fish



Maine has ~ 1 stream mi / mi² land area

= LOTS of Road-Stream Crossings

MOST BLOCK stream function
Moderate and smaller sized stream often have multiple road crossings

OUTLET CONTROL
"hung culverts"
not the only physical block

Upstream Movement

Velocity

Species have different up stream swimming capabilities
big fish > little fish > insects

Depth

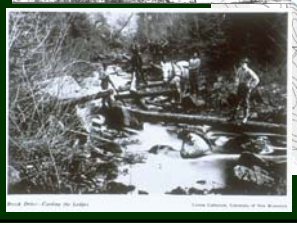
Bigger bodied species need deeper water to swim

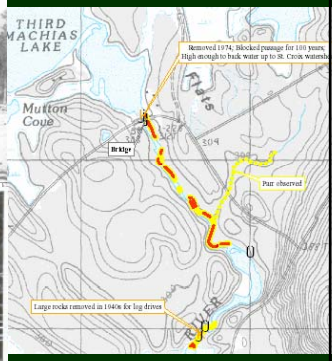
Upstream and Downstream Movement

Blocked Inlet

Creates pond with increased temperature
Blocks cold water species movement

Historic Alterations





Protect Ecological Links