

Aquatic connectivity

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What is connectivity in aquatic systems?

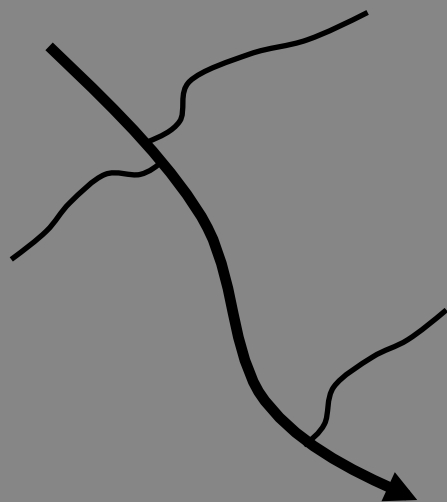
Why does it matter?

What can we do about it?

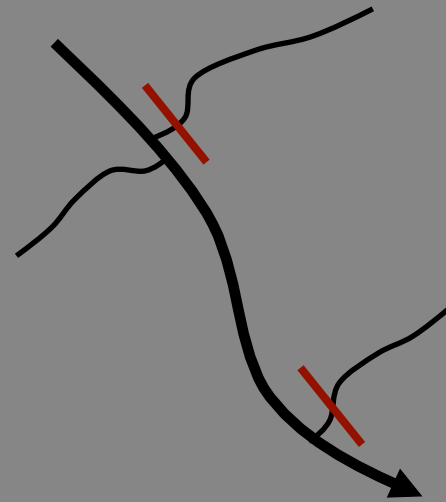
2 kinds of aquatic connectivity

Animal movements – corridors

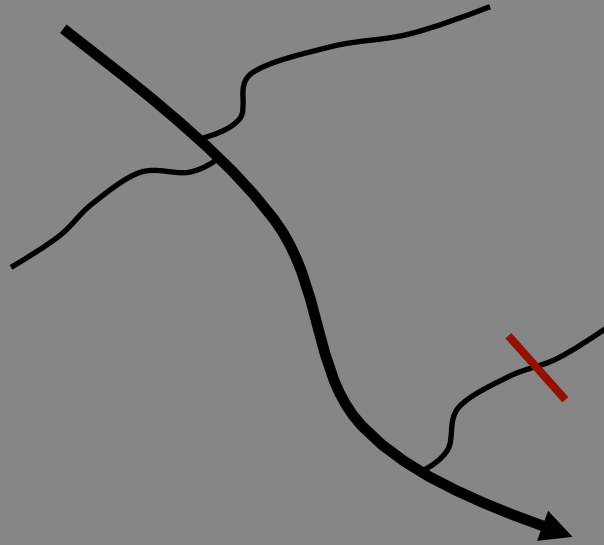
Water exchange - hyporheic, flood plain



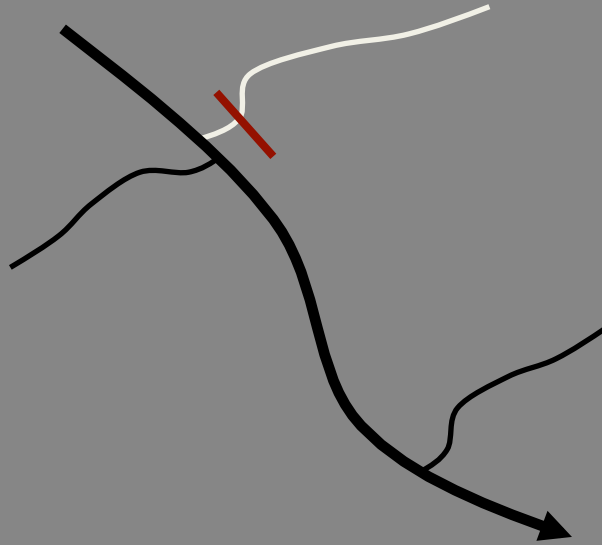
Intact system



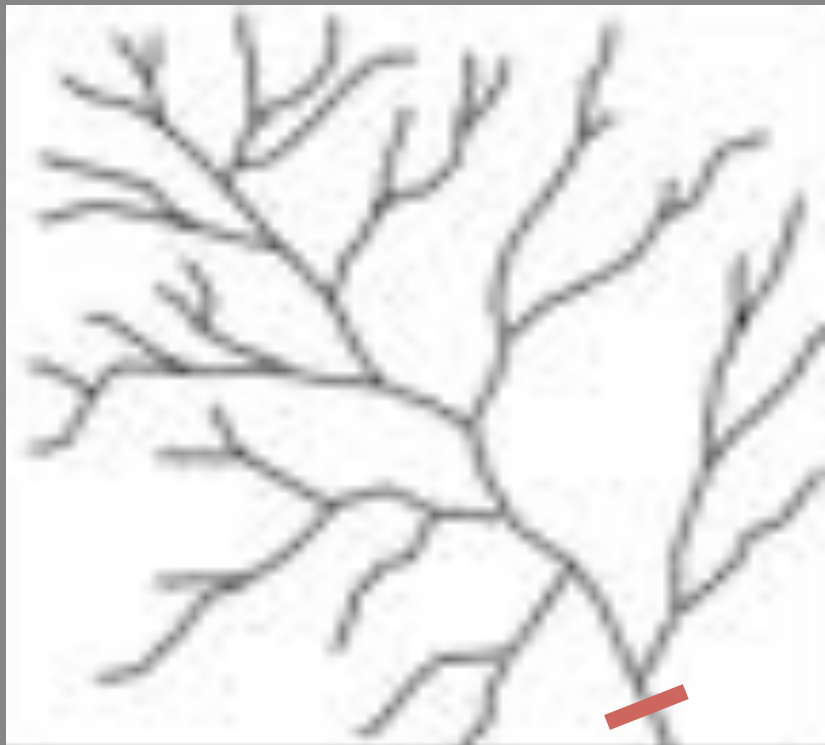
Fragmented system

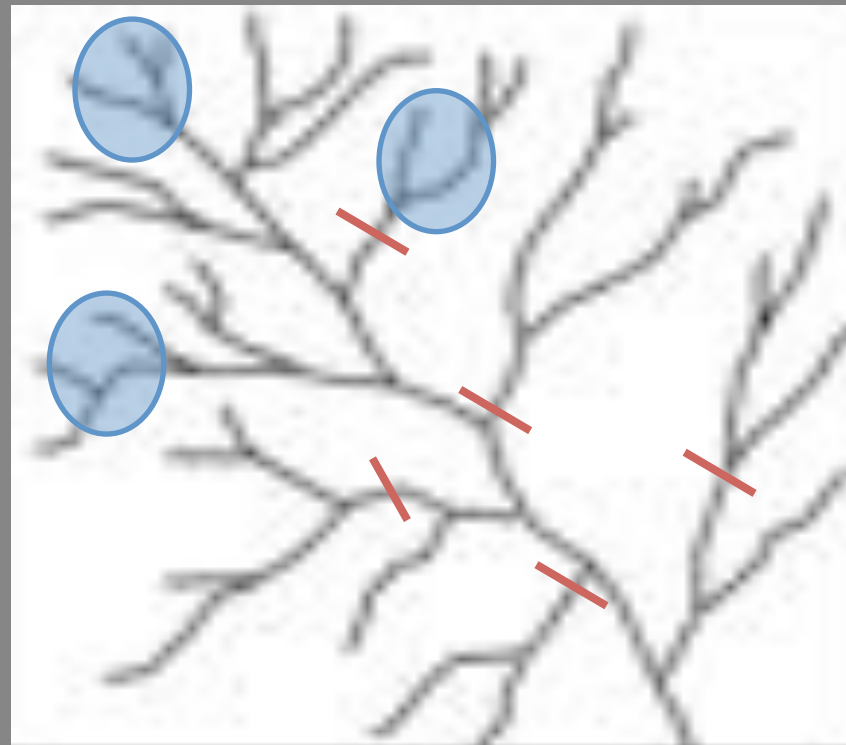
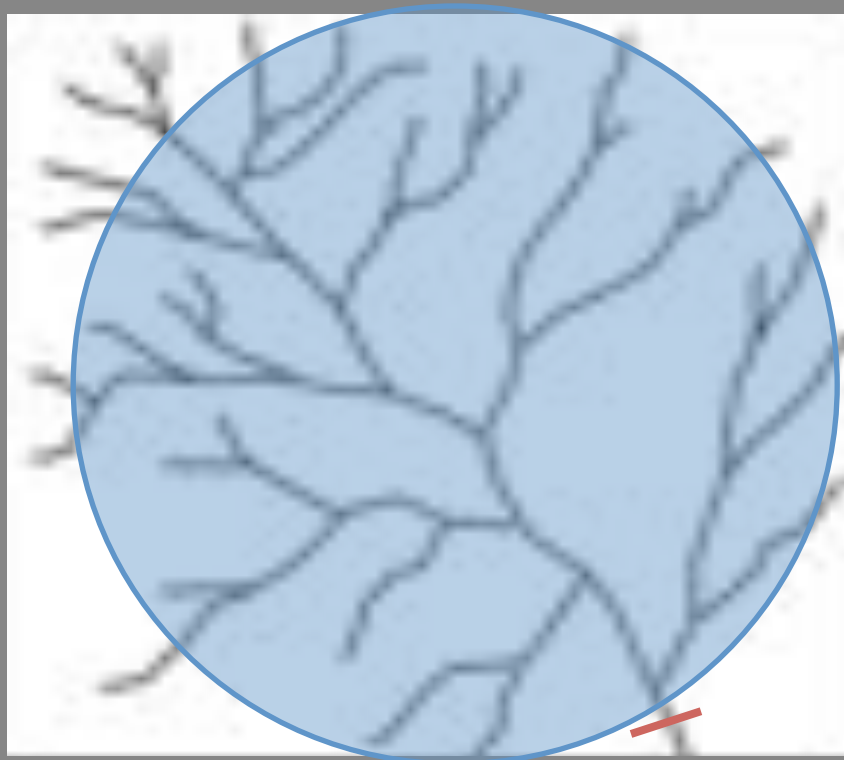


Habitat size

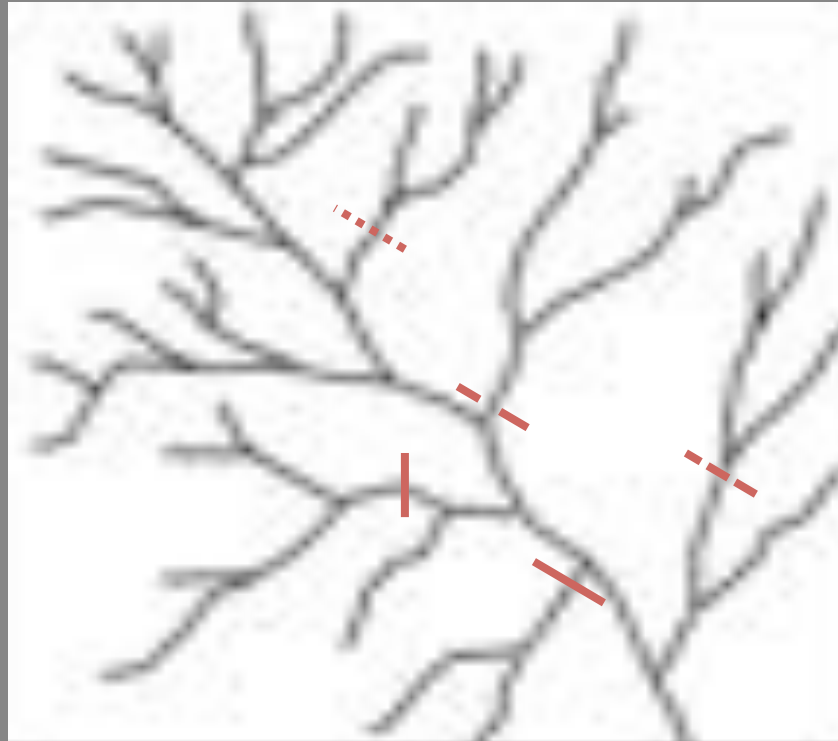


Life cycle completion

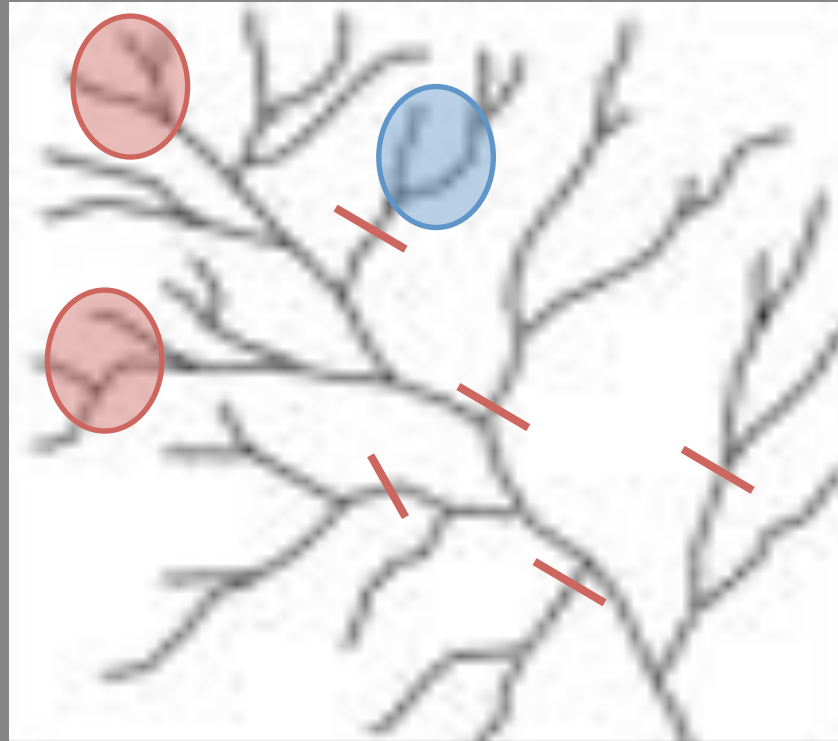




Importance of scale



Reproduction, refuge, vital rate variation
→ Portfolio



Possibility of local adaptation

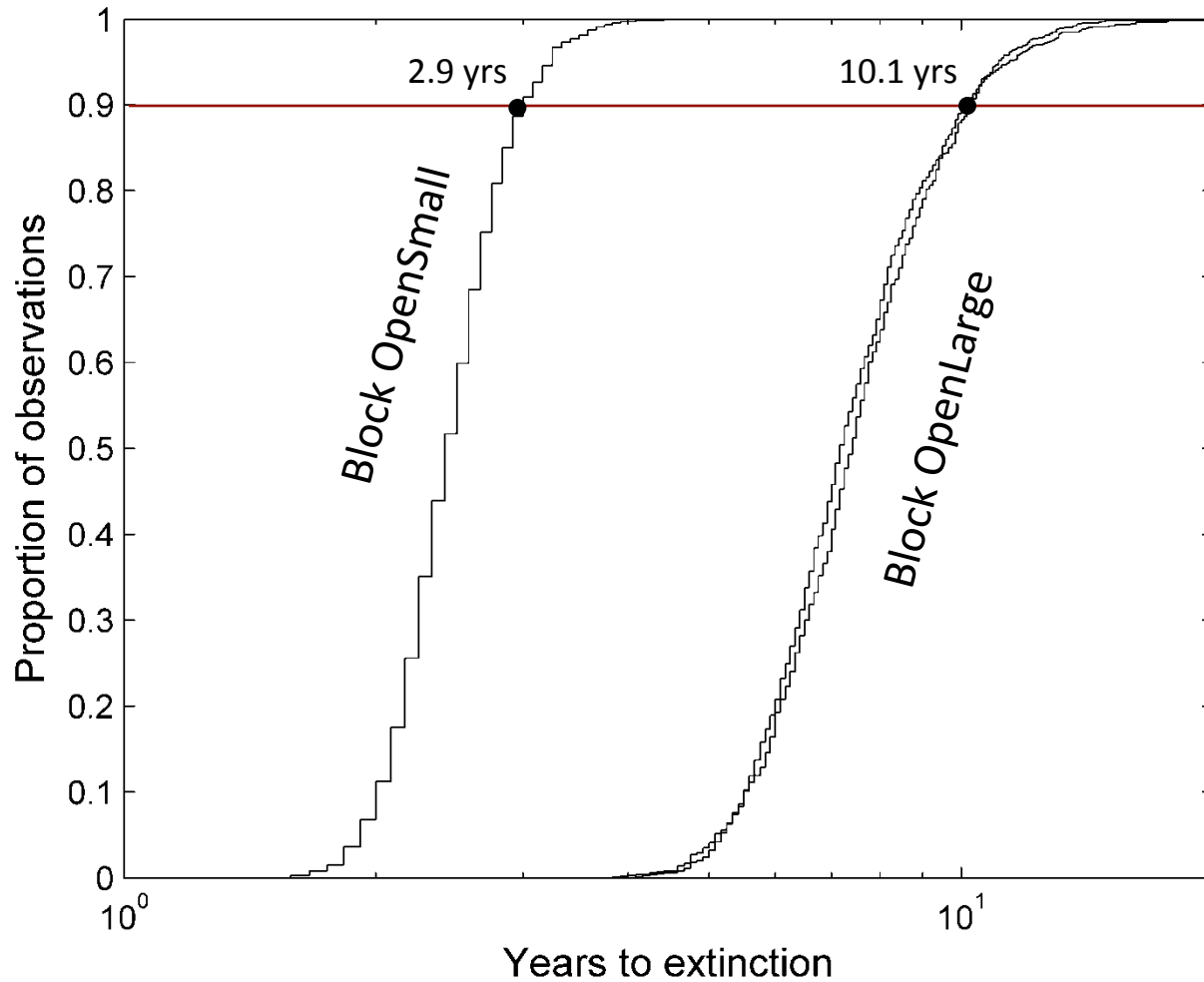
Why does it matter?

Why does it matter?

Population persistence
Community structure

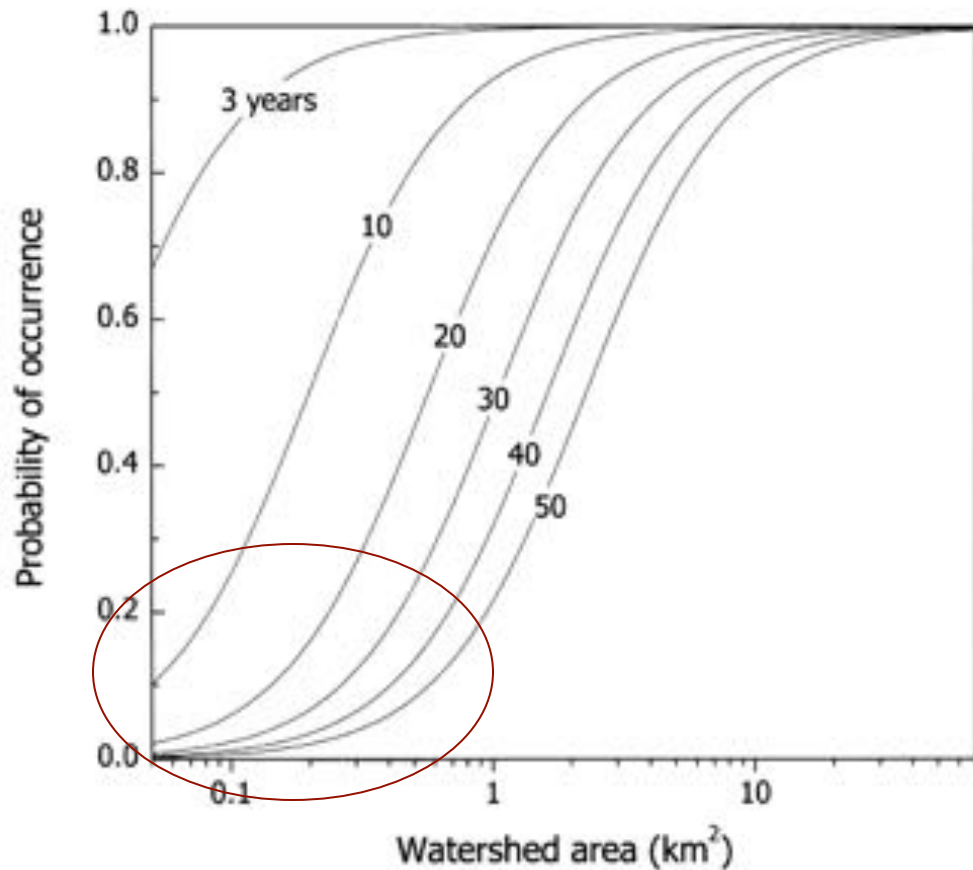
‘Climate squeeze’

Simulated tributary extinction times with fragmentation



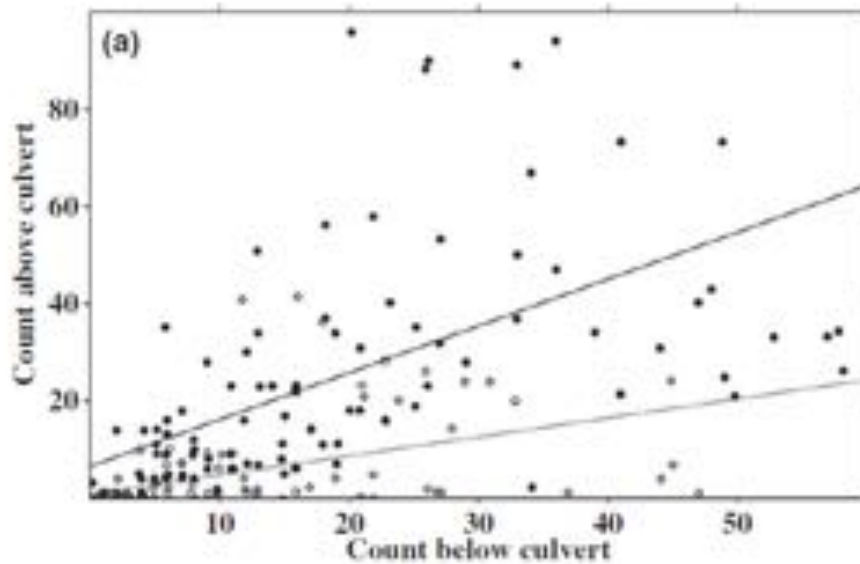
Generation time
= 1.9 years

Probability of occurrence above dams

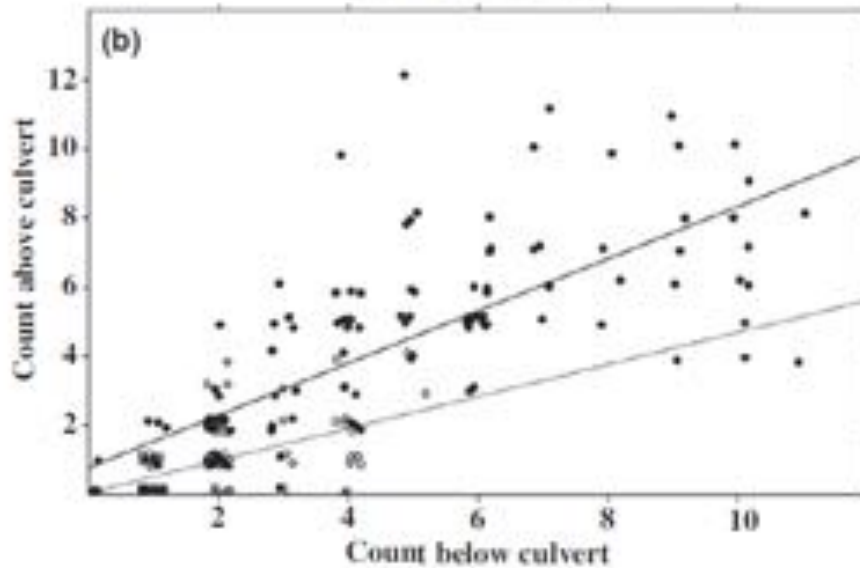


White-spotted char
in Japan

Fish in smaller streams more
likely to go extinct sooner



Abundance is lower above impassable culverts



Species richness is lower above impassable culverts

Top line: passable
Bottom line: impassable

What can we do about it?

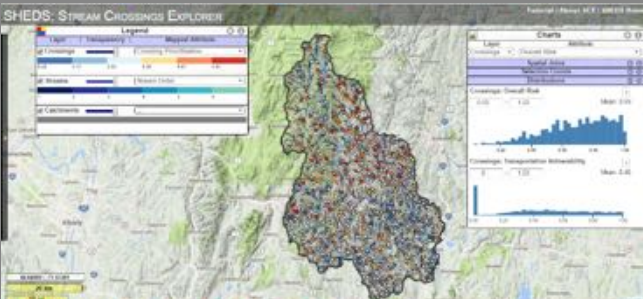


Which ones do we fix?

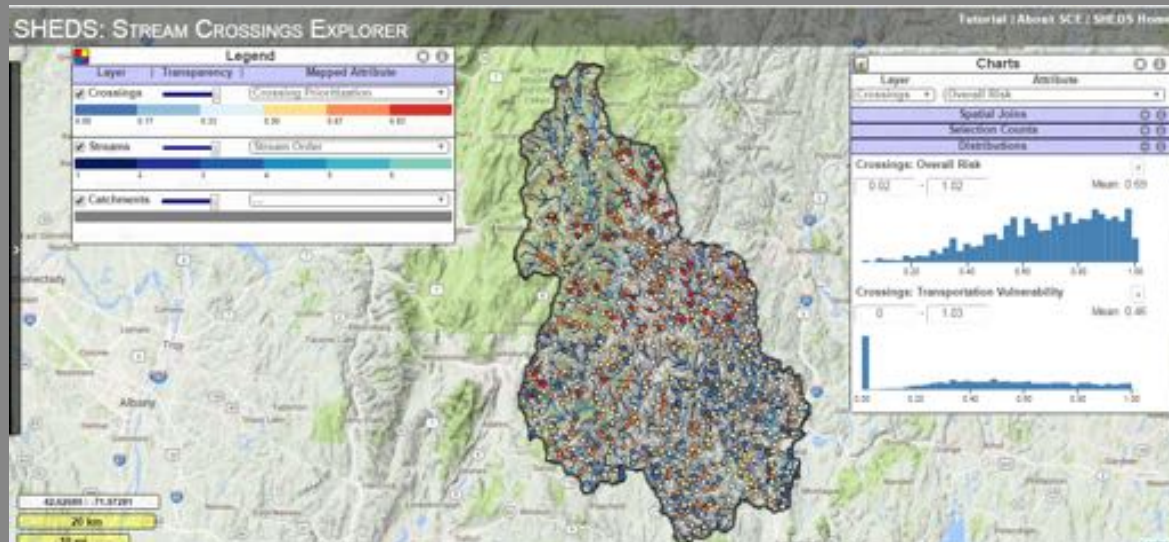
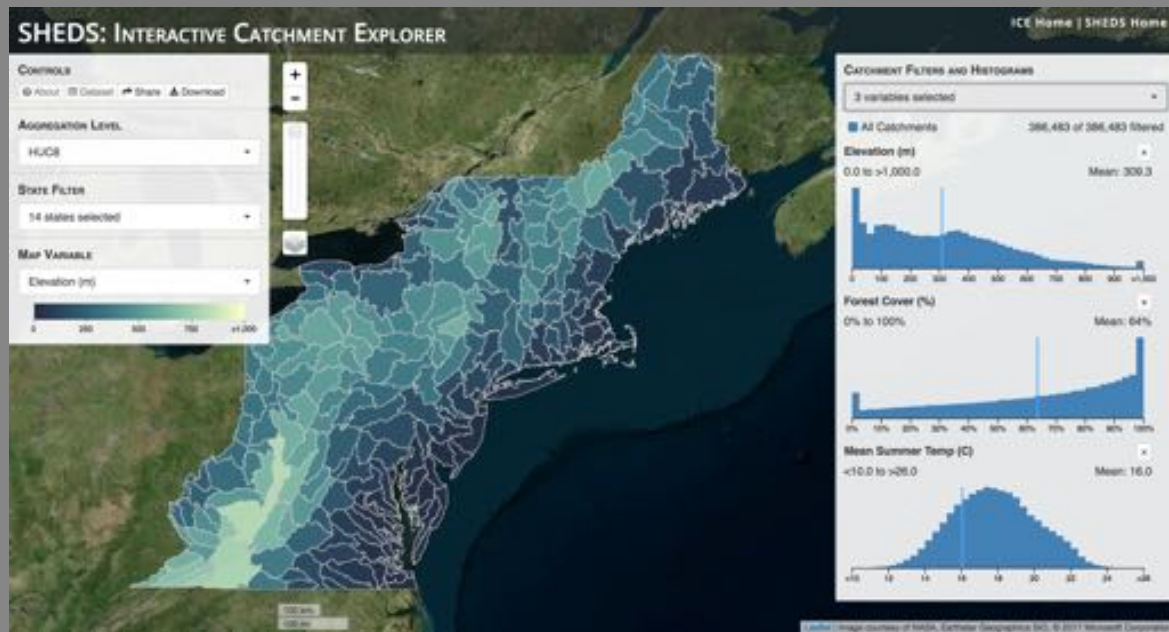
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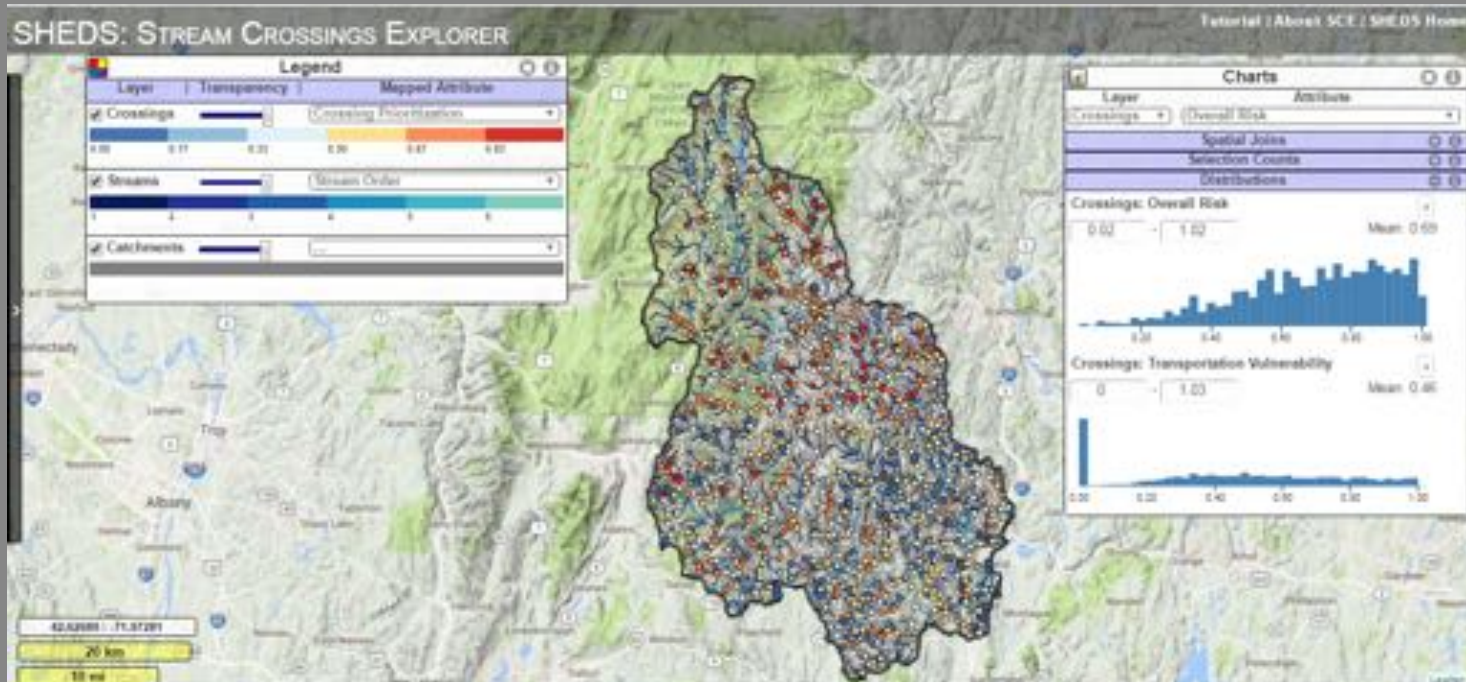


maps.freshwaternet.org/northeast



Stream Crossing Explorer [not finalized]



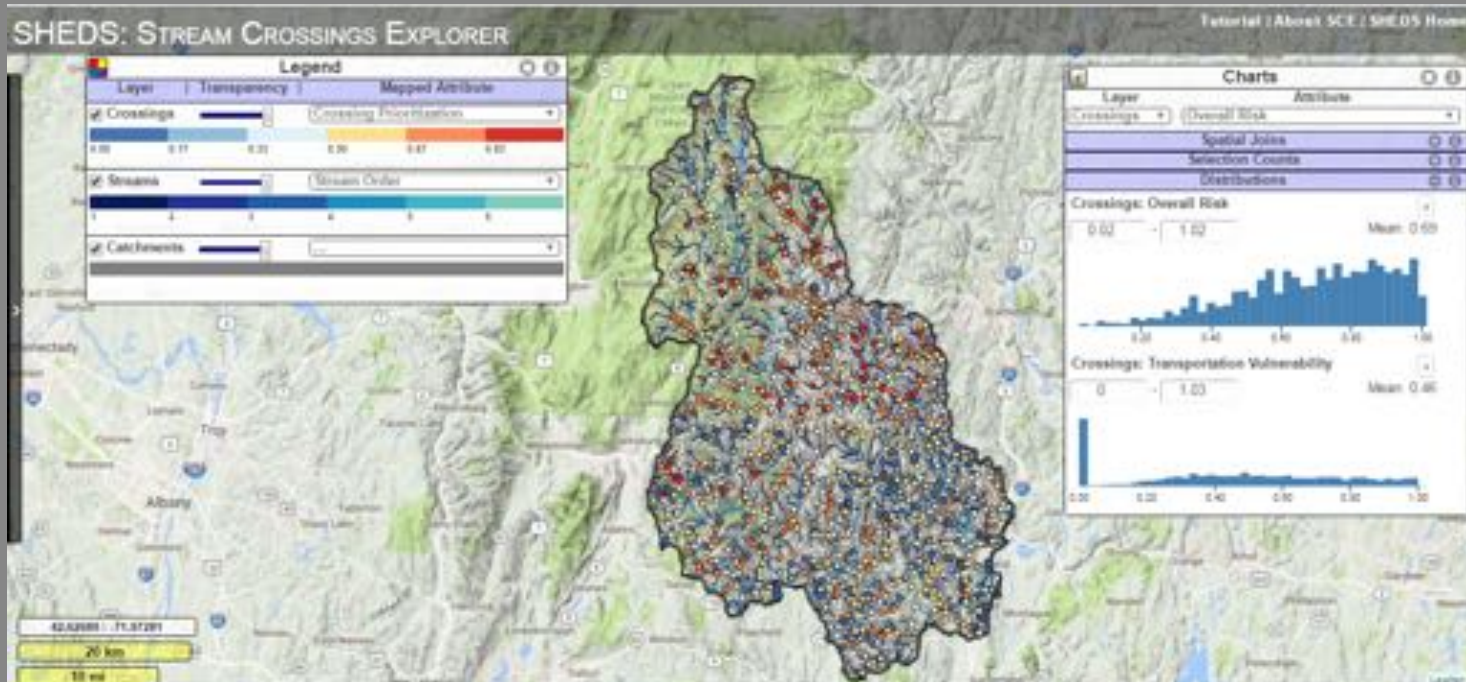


Stream crossing explorer

Crossings, streams, catchments

Cross-filter

Ecological disruption, emergency service disruption, crossing risk of failure

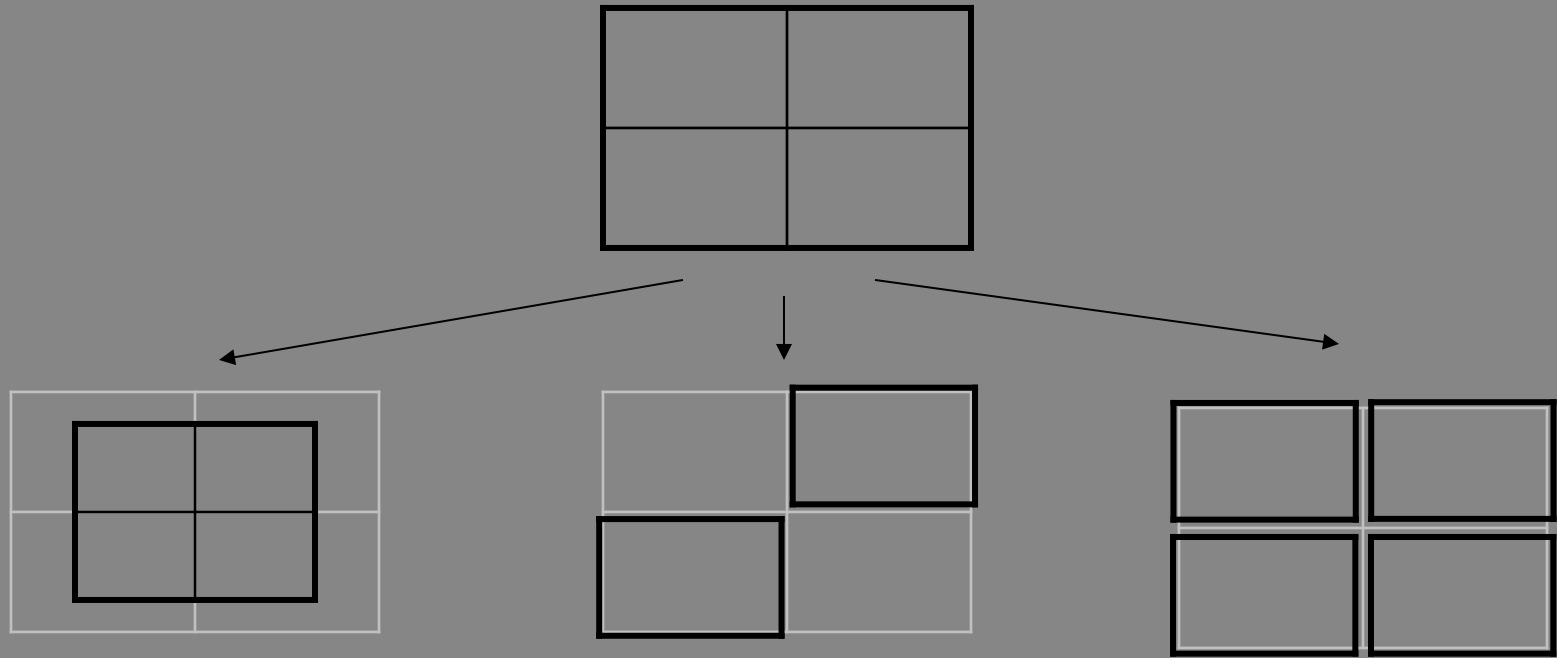


Stream crossing explorer

Next steps

Link NAACC culvert database

Expand to 13 state region



Habitat loss alone

Habitat loss +
fragmentation

Fragmentation alone

Difficult to separate habitat loss effects from fragmentation effects



Ferraz et al. 2007



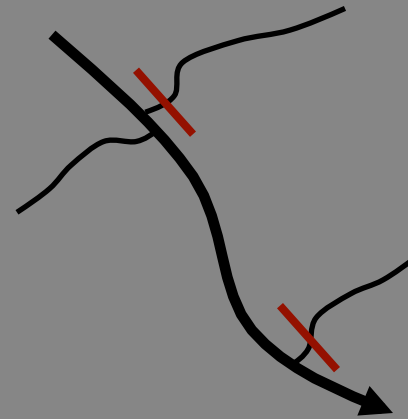
Damschen et al. 2006

2-d habitat fragmentation

1-d habitat fragmentation



Intact system



Fragmented system