

Challenges of connectivity within urban landscapes:

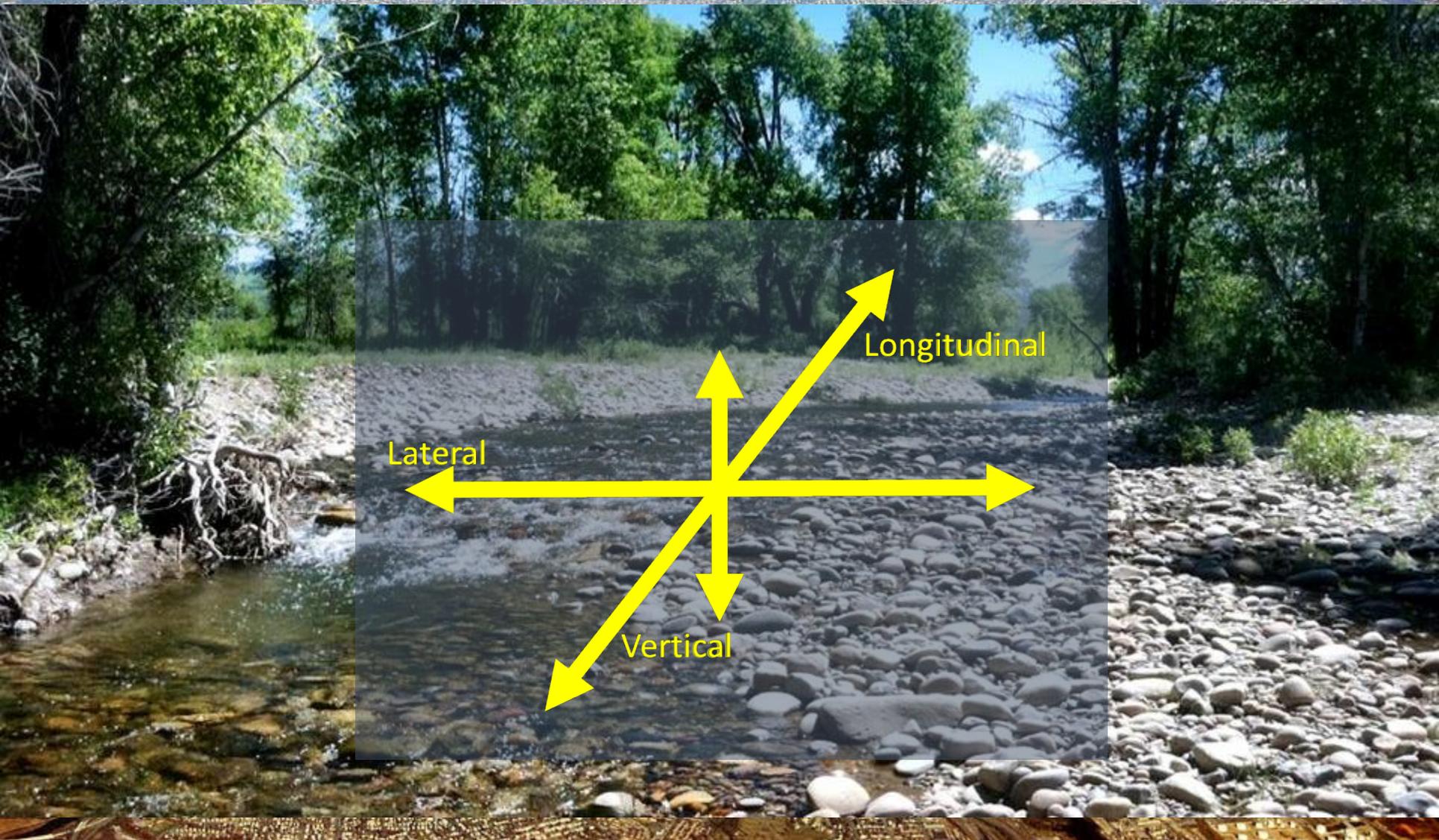


Examples from the Baltimore Ecosystem Study

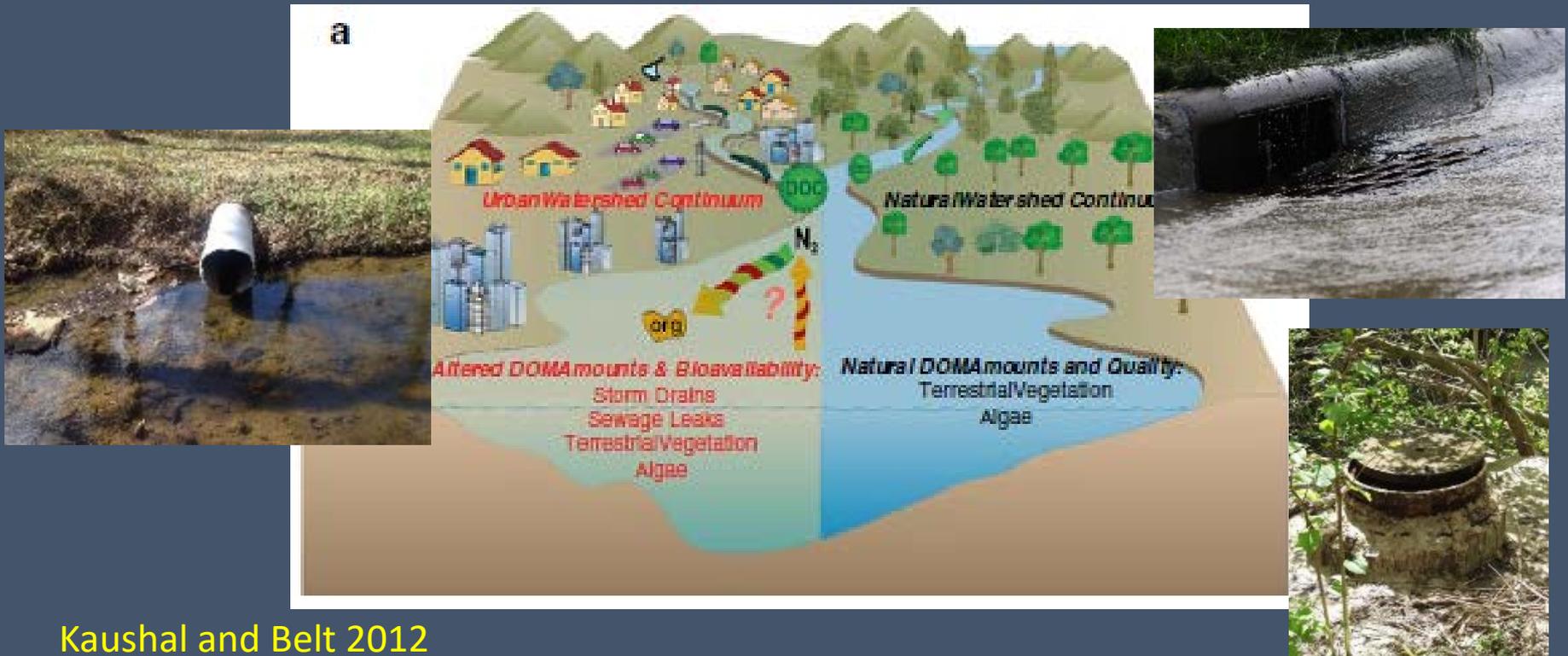
Alexander J. Reisinger, Emma J. Rosi, Erinn Richmond,
Sujoy S. Kaushal, Peter M. Groffman



Dimensions of connectivity



Longitudinal connectivity



Kaushal and Belt 2012

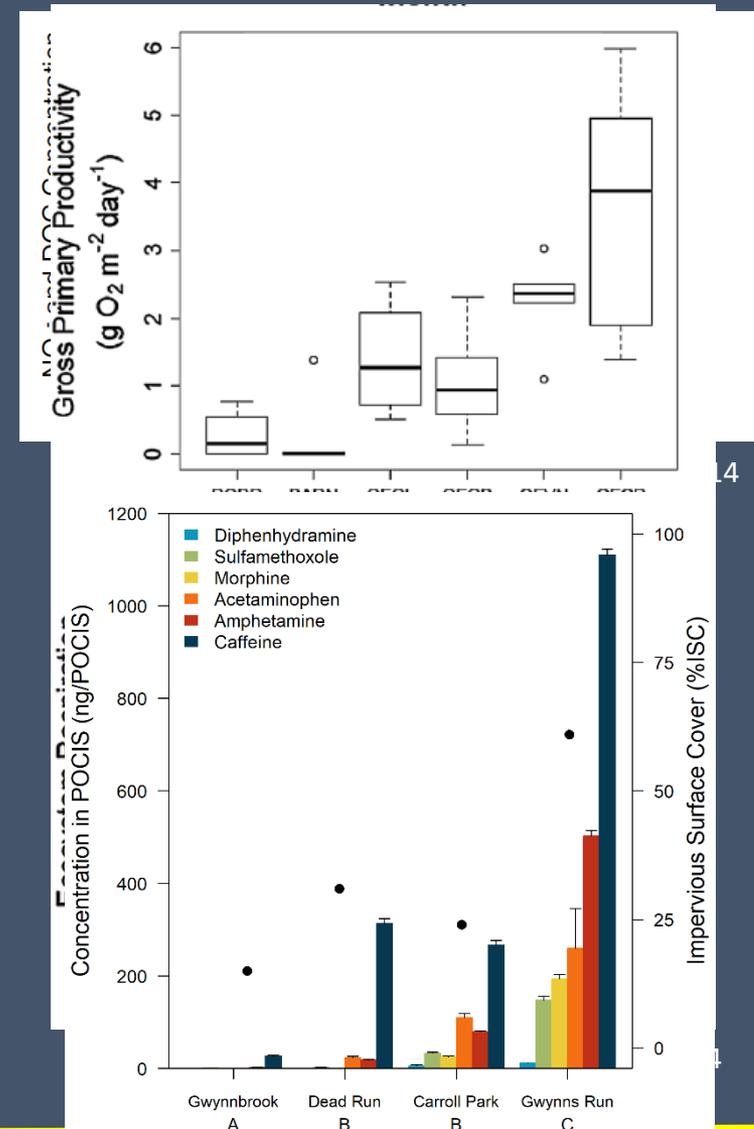
Urban development replaces natural drainage with infrastructure

- Storm drain systems
- Leaky sewers
- Impervious surfaces

Impacts on material and energy transport downstream

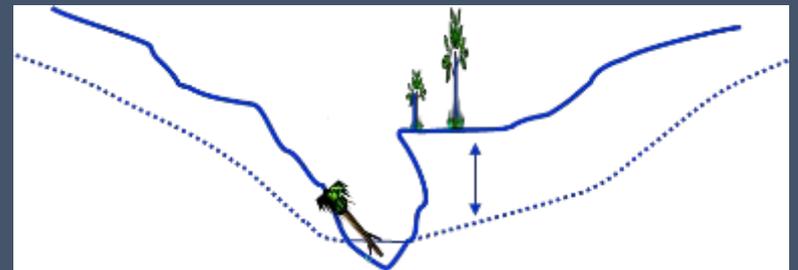
Longitudinal chemical signatures

- Increased DOC and DON suggest wastewater (effluent, sewage leaks)
- A range of pharms increase moving towards urban core of Baltimore
- Increasing stream metabolism moving downstream

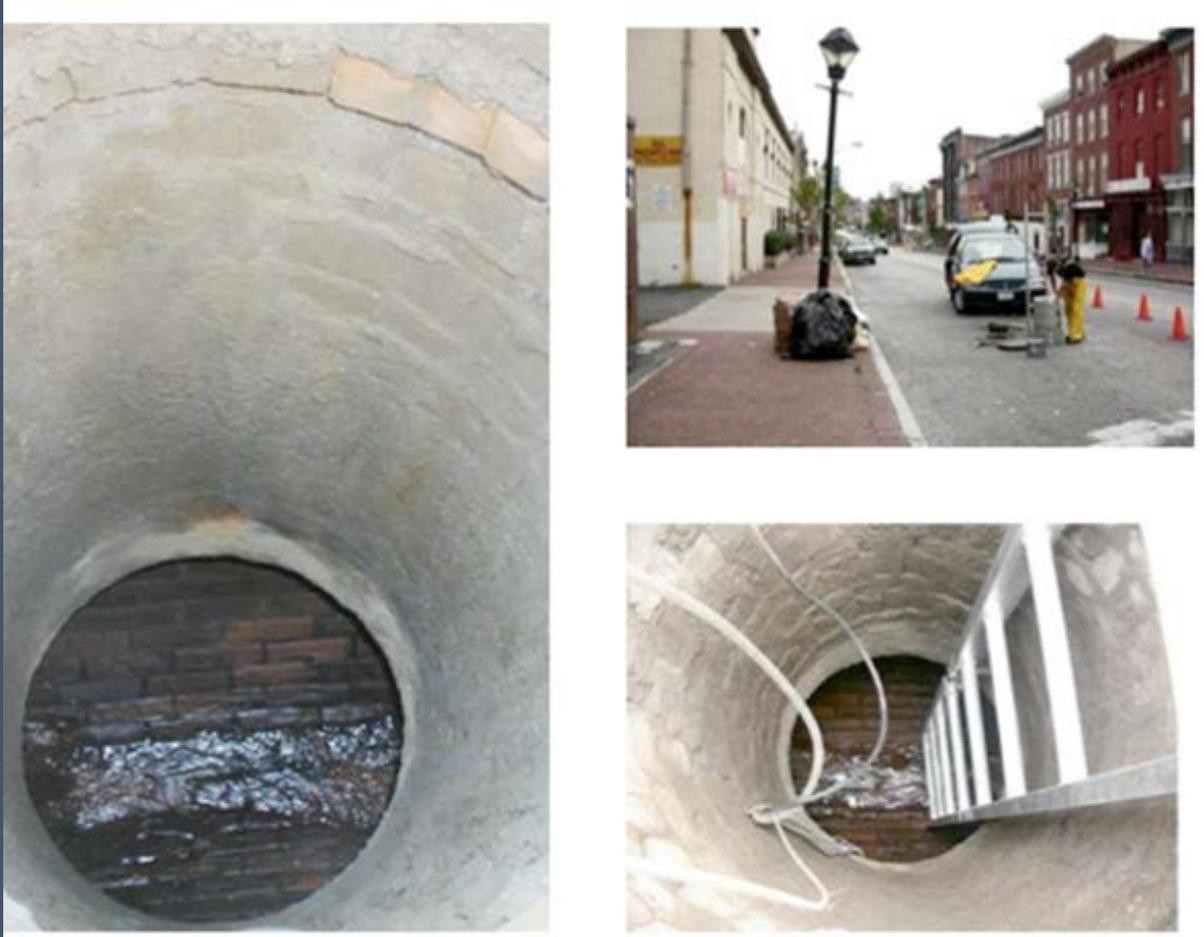


Lateral connectivity

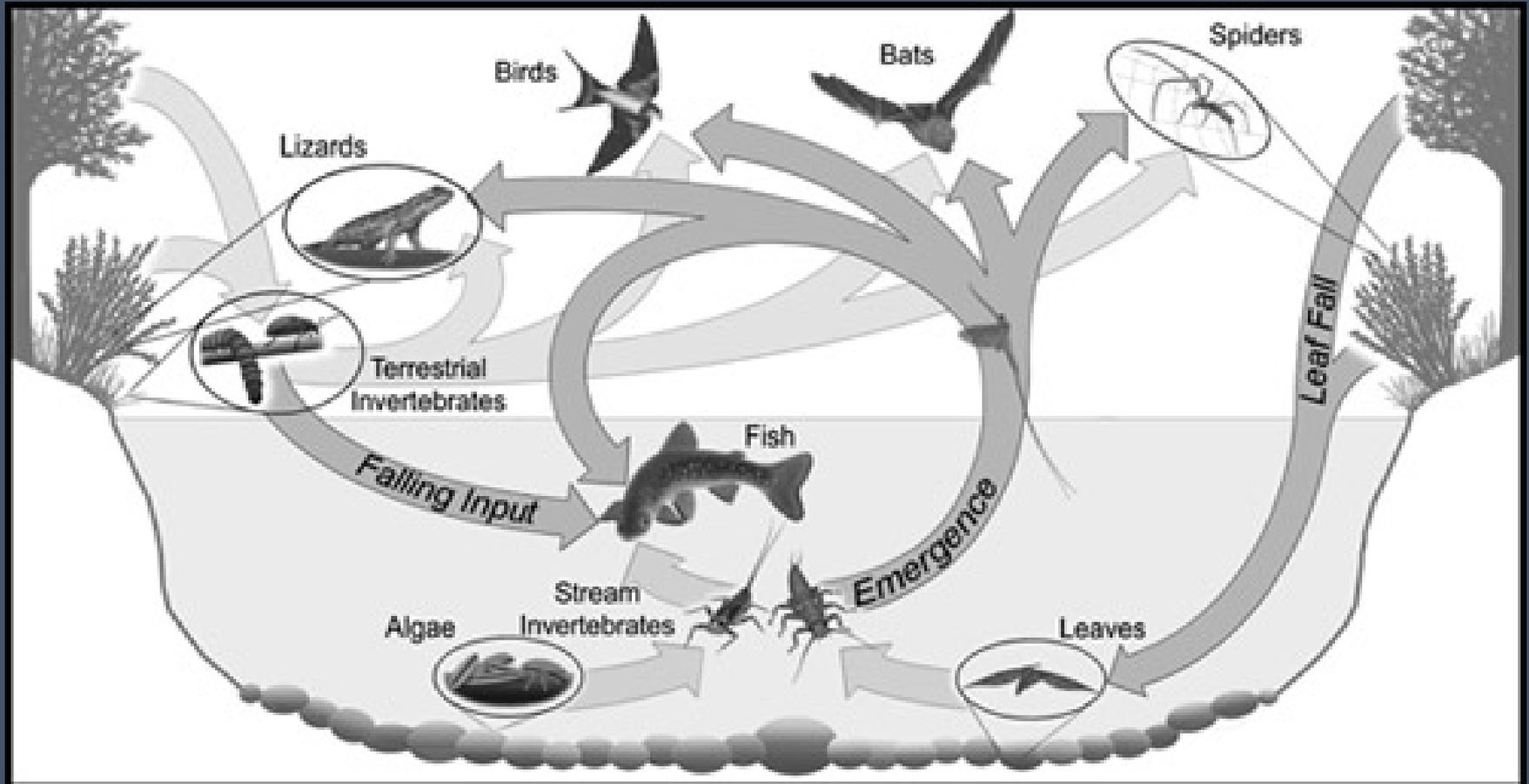
- Increased longitudinal connection can impair lateral connectivity
 - High storm flows
 - Incised channels
- Disconnect channel from floodplain
- Lower water tables
- Drier riparian soils



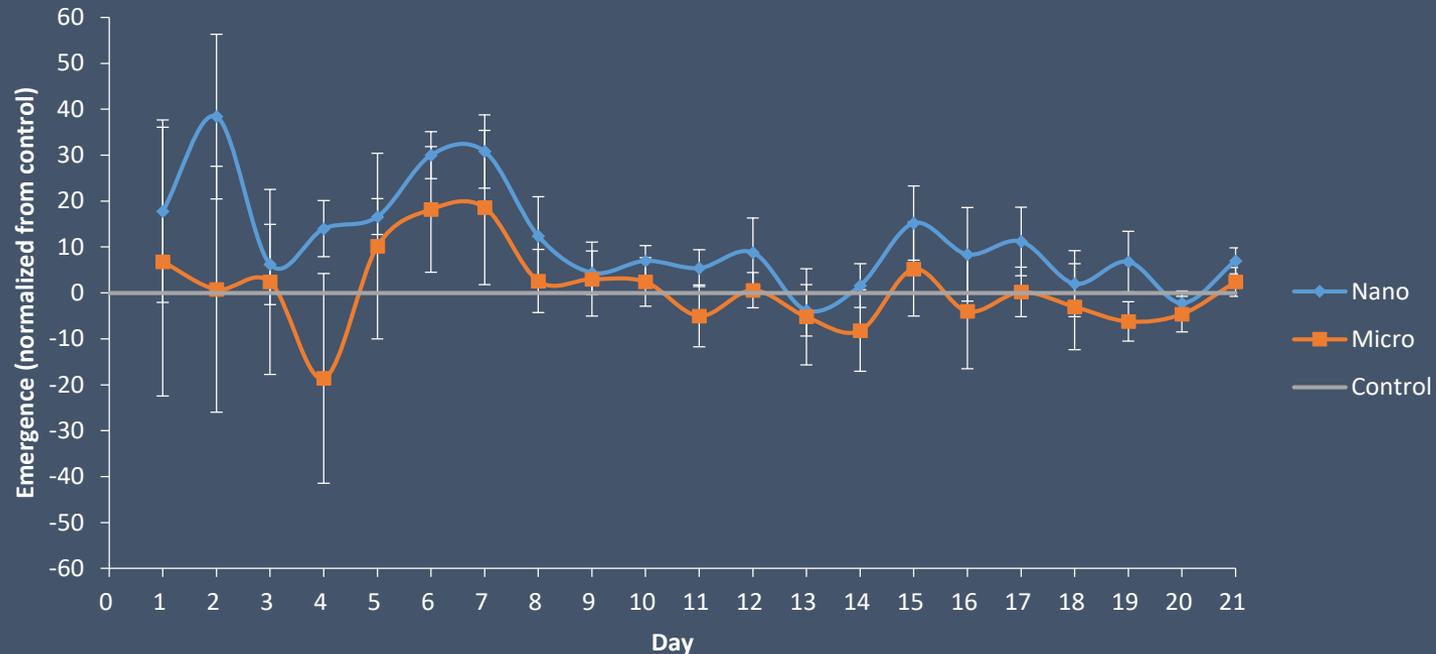
Vertical connectivity



Reciprocal connectivity



Contaminant effects on reciprocal connectivity



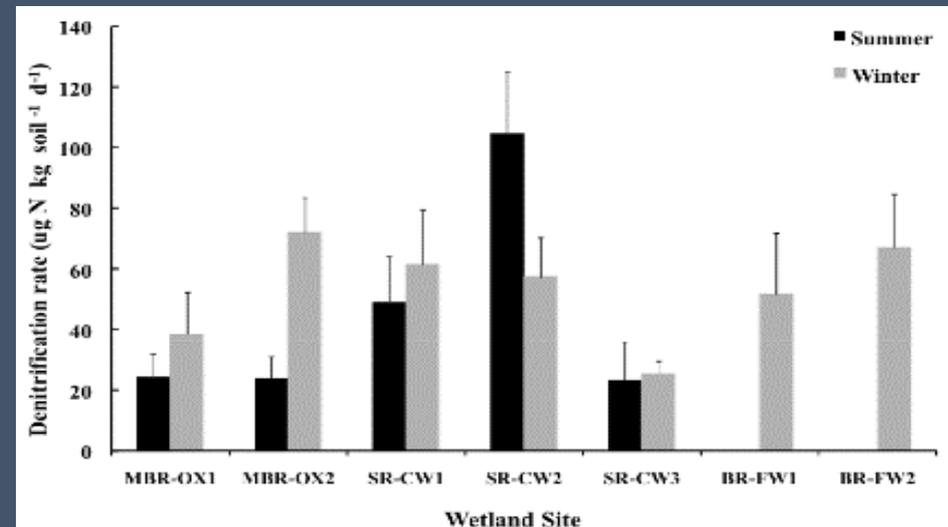
- Environmentally relevant conc (20ng/L) Prozac increased dipteran emergence 18%
- No change in stream community comp

Do constructed wetlands increase biogeochemical cycling?

- Rehabilitation increases connectivity
- Harrison et al. (2011) measured *in-situ* denitrification in constructed and relict urban wetlands
- Constructed and relict wetlands were major N sink; N_2 was dominant end-product

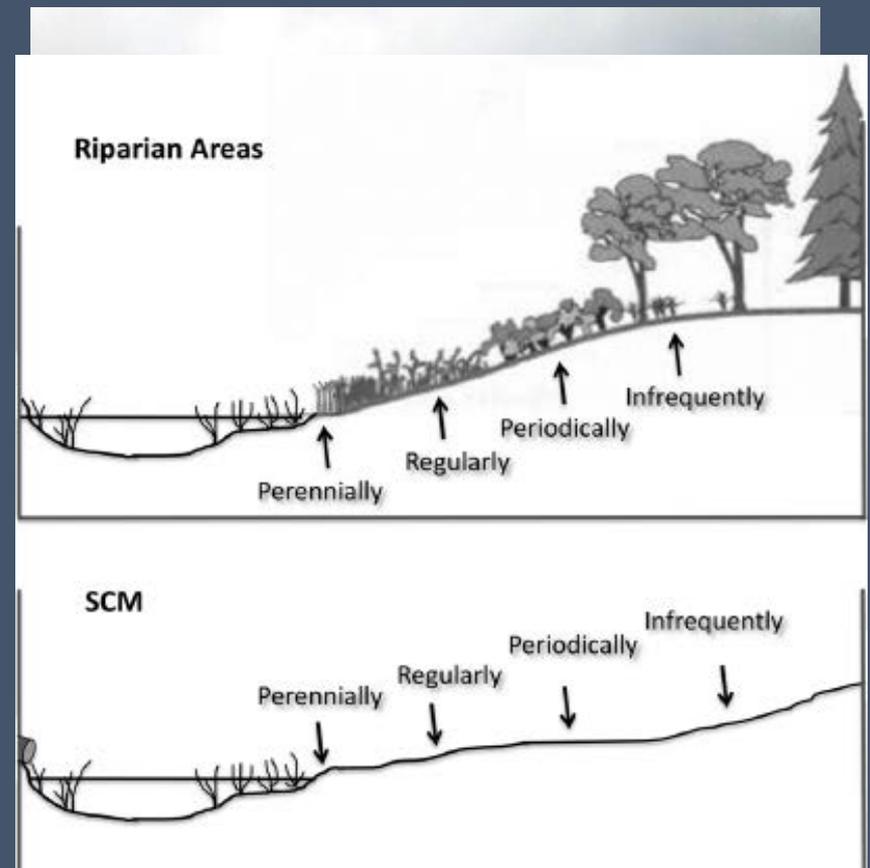


'Relict' Constructed Reference

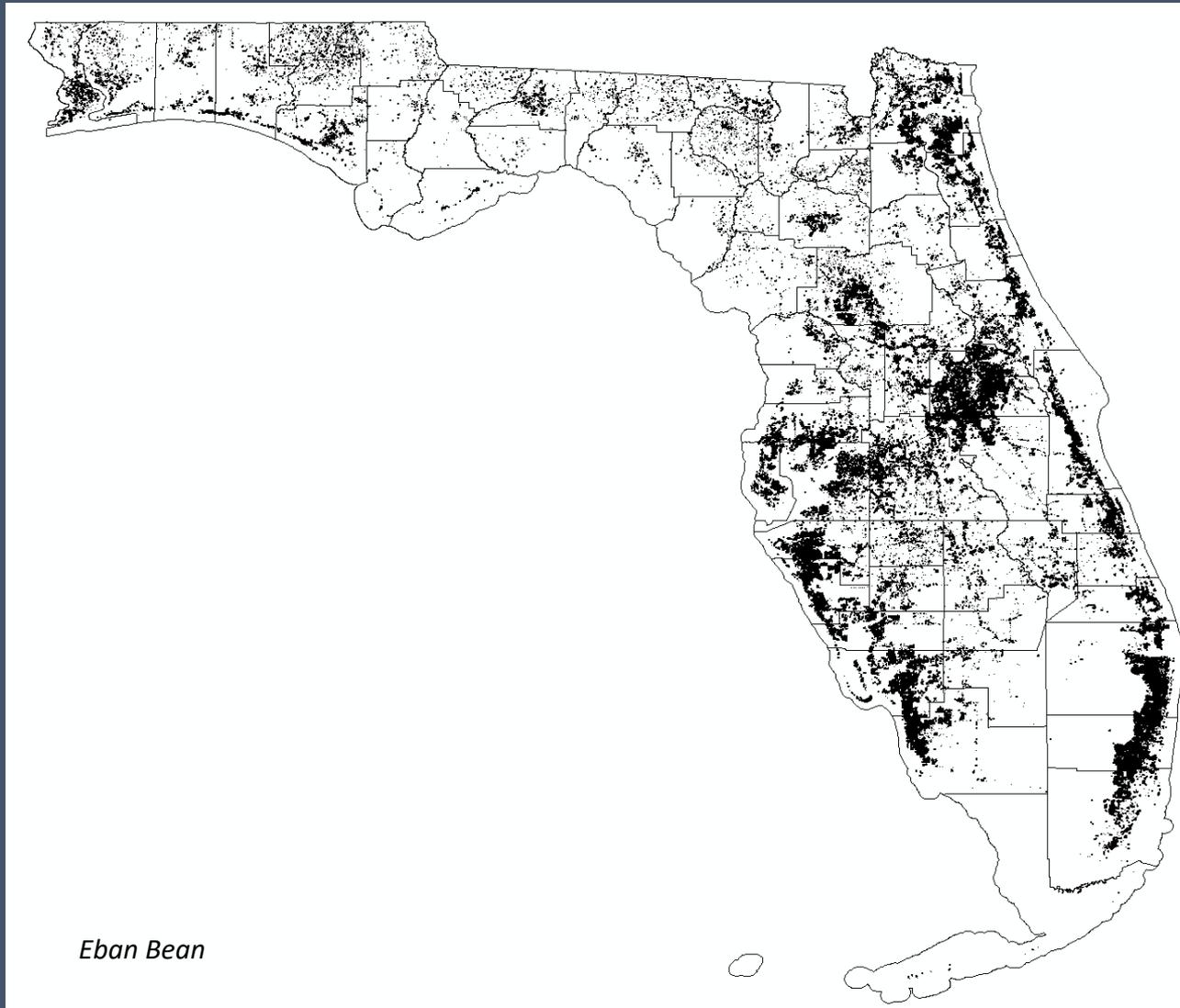


Are stormwater ponds the new riparian zone?

- Stormwater control measures are engineered to lessen impact of impervious surface cover on stream flow
- Provide similar services as riparian zones
 - Infiltration
 - Erosion control
 - Denitrification



Stormwater ponds in Florida



Summary and Conclusions

- Urbanization alters all three dimensions of connectivity
- Urban contaminants can alter reciprocal connectivity
- Rehabilitation efforts alter/increase connectivity, enhancing ecological functioning



Challenges of connectivity within urban landscapes



Questions?



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