

Nature's Urban Allies: The Benefits of Beavers In Cityscapes

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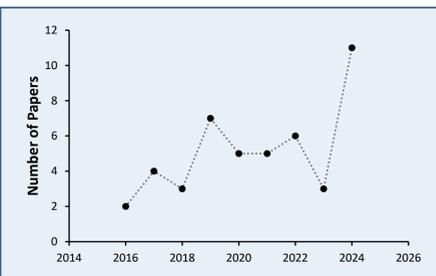
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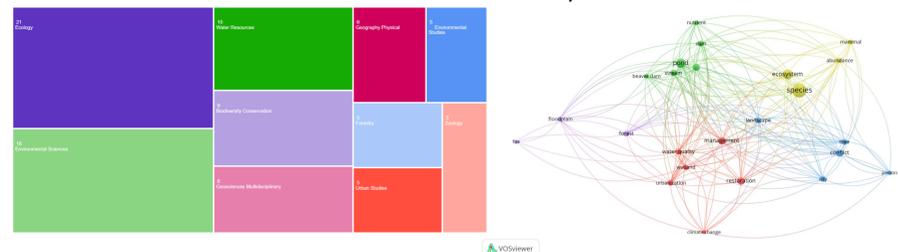


THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL



1. Beavers in Urban Areas:

Beavers are increasing across all landscapes and are now common in many cities. The number of papers (Web of Science) that have some *direct* or *indirect* focus on urban beavers has increased since 2014 but still represent a small fraction of beaver research. These peer-reviewed articles are interdisciplinary and reflect a diversity of topics. There are **8 (out of 126) papers** at this conference that have some focus on urban systems.



2. Study Sites:

We studied urban beaver and stormwater ponds across 3 metropolitan areas in the southeastern United States to better understand the role of beaver ponds to provide ecosystem services.

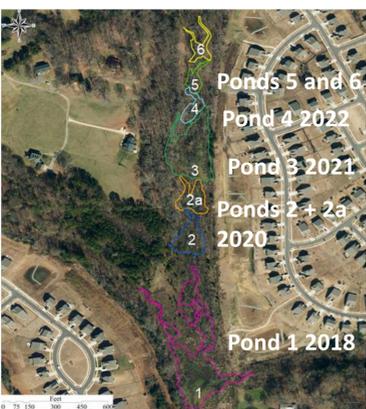


Urban beaver pond in Huntersville, NC, USA (~20 km north of Charlotte, NC).



Urban beaver and beaver pond in Atlanta, GA, USA.

(Figure by K. Whitmore, Ph.D. UNC Chapel Hill, 2025)



3. Retention:

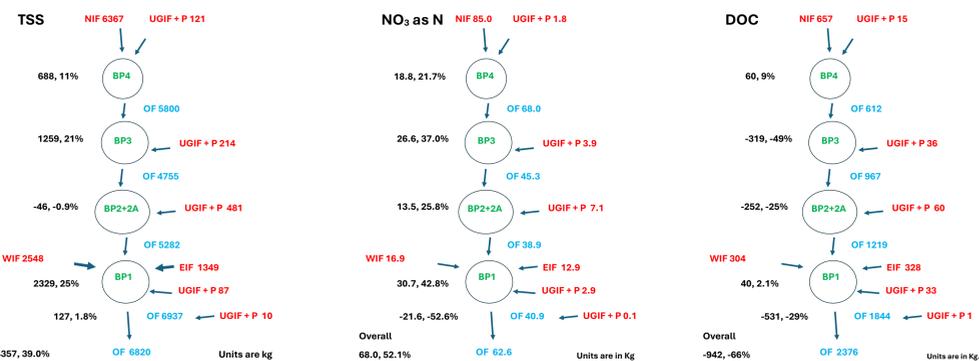
Urban beavers build complex pond and wetland systems that can be a source or sink for nutrients. This complex in Huntersville, NC (near Charlotte) is a sink for nitrate and TSS but a source for DOC. Prior to beavers, residence time for the watershed was 3 hours and 40 minutes.

	Area (ha)	Mean Depth (m)	Volume (m3)	Residence Time (days)		
				Max	Min	Mean
BP1	0.89	0.81	7161	16.5	1.7	6.8
BP2+2A	0.37	0.64	2362	7.8	0.8	4.1
BP3	0.54	1.20	4447	16.2	1.5	8.5
BP4	0.09	0.30	275	1.1	0.1	0.6
BP5	0.08	?	?	?	?	?
BP6	0.09	?	?	?	?	?



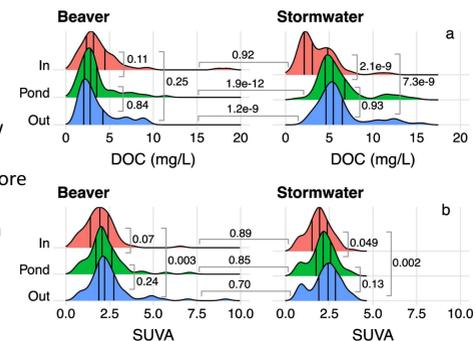
J. Millner. 2024. MS Thesis. UNC Charlotte.

Inputs
Outputs
Retention



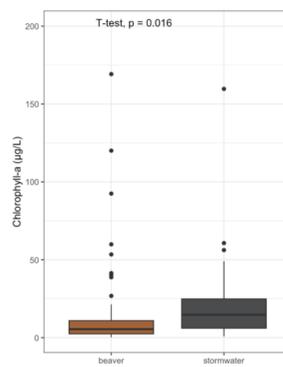
4. Stormwater vs Beaver DOC:

DOC concentrations are higher in stormwater ponds and outflow water compared to beaver ponds. Aromaticity (SUVA) increased in outflow from both stormwater and beaver ponds. Downstream microbial communities may be more limited by labile DOC in beaver compared to stormwater systems. Sheppy et al. 2024. *Urban Ecosystems*, 27(5):1477-1491. <https://doi.org/10.1007/s11252-024-01536-y>

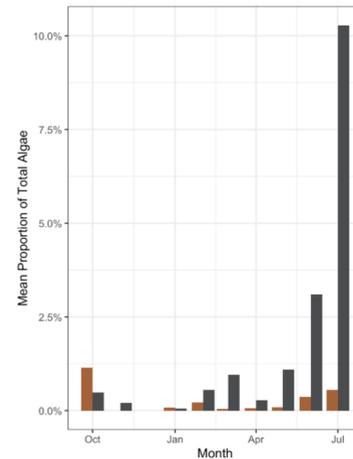


5. Stormwater vs Beaver Chl a and TP:

Algal biomass (chl a) and total phosphorous (TP) concentrations are higher in stormwater compared to beaver ponds. Overall, the proportion of total algae as blue-greens is also higher which can contribute to poorer water quality in human-made ponds.

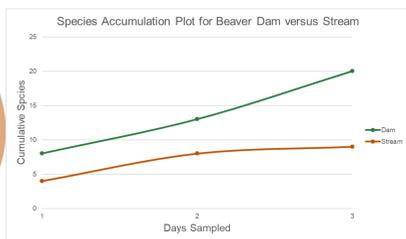
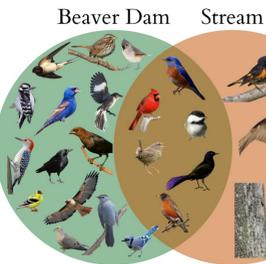


E. Lacy, MS Earth Sciences, UNC Charlotte, in progress.



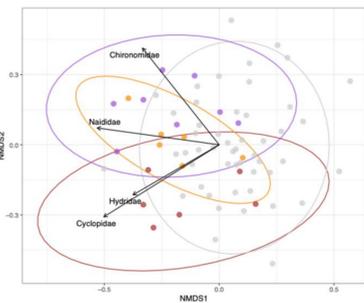
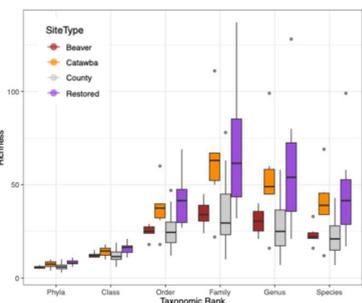
6. Biodiversity:

Urban watersheds have lower biodiversity compared to non-urban systems. Beaver ponds and wetlands provide habitat complexity that adds species at the watershed scale. Multiple species including river otters, muskrat, deer, raccoons have also been observed at beaver dam sites.



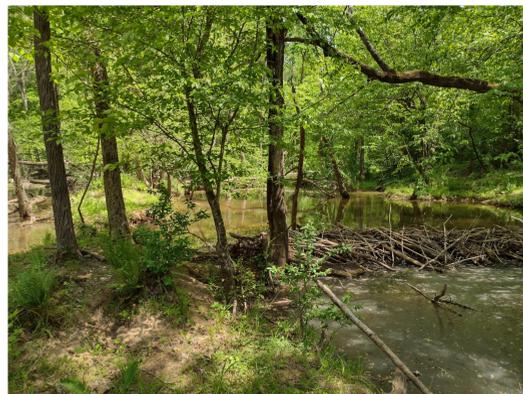
Bird species were identified at a beaver pond and nearby restored urban stream. While there were 6 species in common, the beaver site had higher total number of species compared to the stream and included 14 species not identified at the stream site.

C. Brabberose, 2022. PhD candidate Biology, UNC Charlotte Ecosystem Restoration course.



Invertebrate species were identified using eDNA and includes insect and non-insect taxa. Richness is higher ($p < 0.05$) at the family, genus, and species levels at Charlotte beaver sites compared to stream sites **but not** compared to forested and urban restored sites. Beaver sites had **different communities** that included more meiofaunal taxa (e.g., cyclopoids), worms, amphipods, snails, and clams.

R. Rowe, 2022. MS Thesis, UNC Charlotte.



7. Summary:

Beaver ponds function as nature-based solutions for urban ecosystems. Beavers create natural ponds and wetlands that can improve water quality, impact groundwater-surface water interactions, increase watershed biodiversity, and provide climate resilience. We need to change the narrative in the southeastern United States, where beavers are considered a nuisance species, to begin including beavers and beaver-based restoration into watershed planning and conservation.



(Microsoft Copilot generated image)