Impacts of Urban Greenspaces on Stream Water Quality

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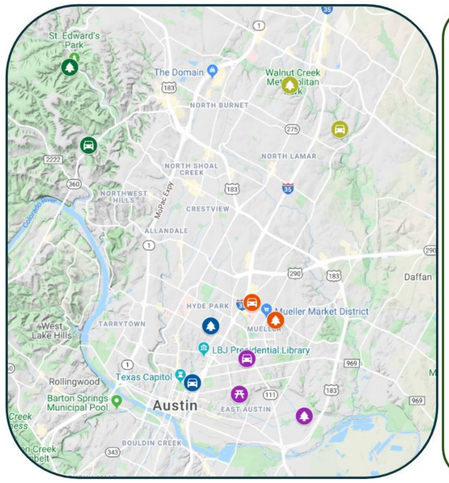
How Do Urban Greenspaces Impact Stream Water Quality?

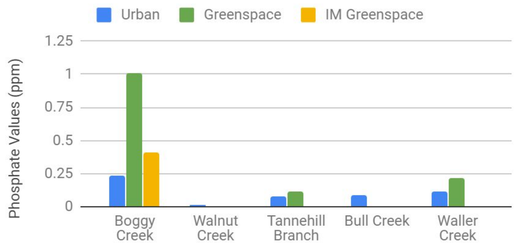


Map of Sampling Sites

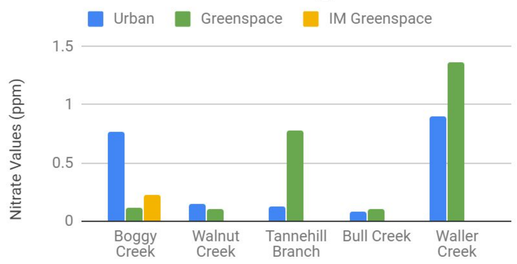
Site Type
- Urban
- Intermediate
- Greenspace

Creek
- Waller Creek
- Boggy Creek
- Tannehill Branch
- Walnut Creek
- Bull Creek

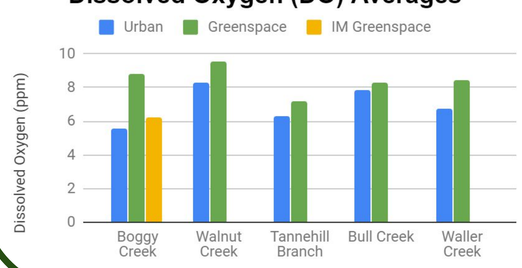
Phosphate Averages



Nitrate Averages



Dissolved Oxygen (DO) Averages



Nutrients: Water samples from each site were tested for phosphates, nitrates, and dissolved oxygen using chemetrics test kit reagents and a V2000 spectrophotometer. Generally two samples were taken per chemical and averaged for each site. For each creek the averages for the urban and greenspace locations were compared to each other using a Student's T-test. No significant differences ($p<0.05$) were found.

- With the exception of *E. coli*, conductivity, and qualitative habitat assessments (data not shown), no significant difference was found between stream ecosystems in urban versus greenspace environments.
- When there is a difference, no pattern is discernible to which location had higher/lower values (except for *E. coli* counts).

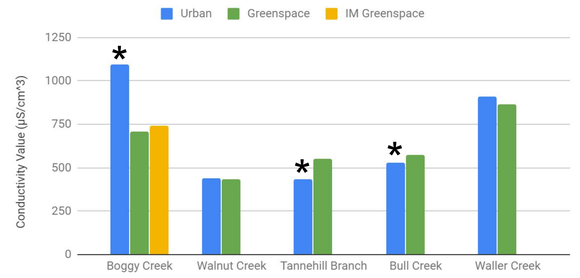
Therefore-

- The surrounding terrestrial environment has a limited impact on stream ecosystem health.
- To improve urban stream water quality other measures are necessary such as decreasing impervious cover, reducing stormwater runoff, restoring riparian habitat, and/or increasing creek flow heterogeneity.

- This is preliminary data from summer 2019, and additional data is currently being collected.

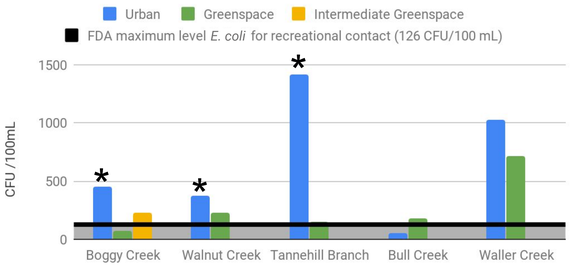
Urban greenspaces are not sufficient for improving water quality.

Conductivity Averages



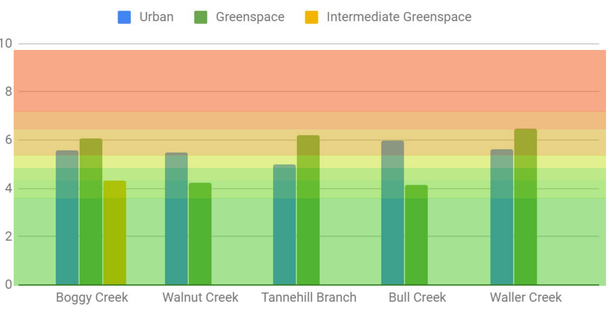
Conductivity: Two to three conductivity readings were collected per site using a YSI (MPS 556) meter. Average values are shown above. For each creek the averages for the urban and greenspace locations were compared to each other using a Student's T-test. Each statistically significant ($p<0.05$) difference is marked with an asterisk.

E. coli Counts



Bacteria: *E. coli* in the creek water were quantified using petrifilm count plates (3M). Average values for *E. coli* are shown above as Colony Forming Units (cfu)/100mL. For each creek the averages for the urban and greenspace locations were compared to each other using a Student's T-test. Statistically significant ($p<0.05$) differences are marked with asterisks.

Hilsenhoff Biotic Index



Macroinvertebrates: Benthic macroinvertebrates were collected via surber net and composited from three separate locations within each site. All aquatic insects (excluding chironomidae) were identified to genus. Non-insect organisms were identified to order or family (rarely genus). Pollution tolerance values were used to calculate a Hilsenhoff Biotic Index for each site. No correlations were observed between site status and ecosystem health, with greenspace sites harboring both comparatively tolerant and intolerant macroinvertebrate populations. These data suggest that greenspace locations have limited, if any, function in improving aquatic ecosystems in urban streams.

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