Trash in Creeks

A Field Survey
of
Volume and Source Types
in
Austin, Texas, USA

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Objective: accountability pie chart

Overflowing dumpsters?

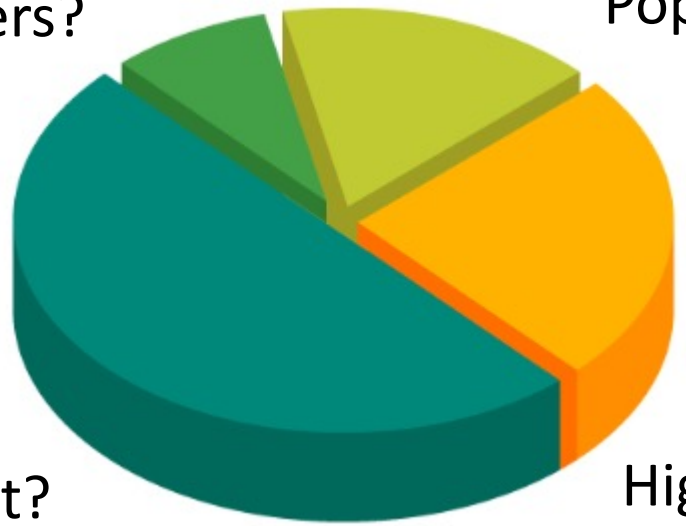
Illegal dumping?

Parks?

Encampments?

Historic landfills?

Property management?



Population density?

Apartments?

Businesses?

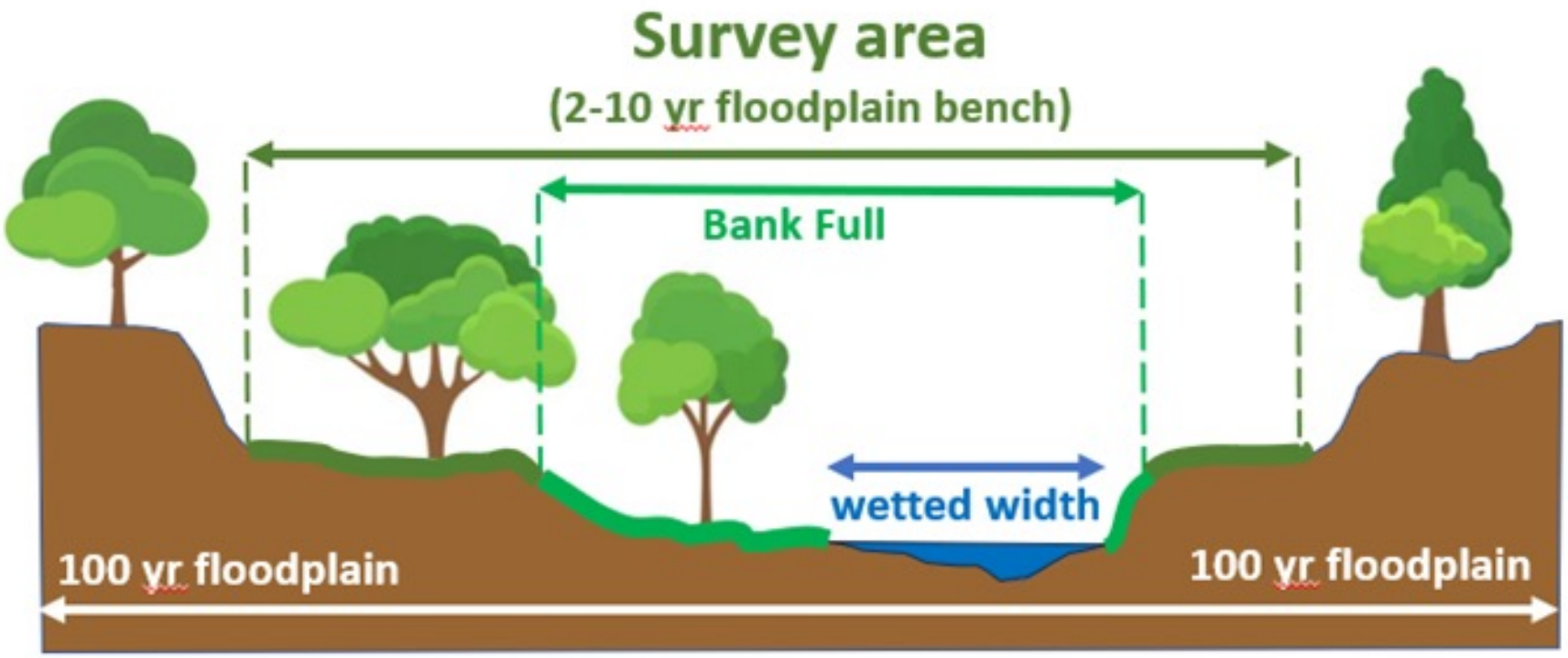
Roadways?

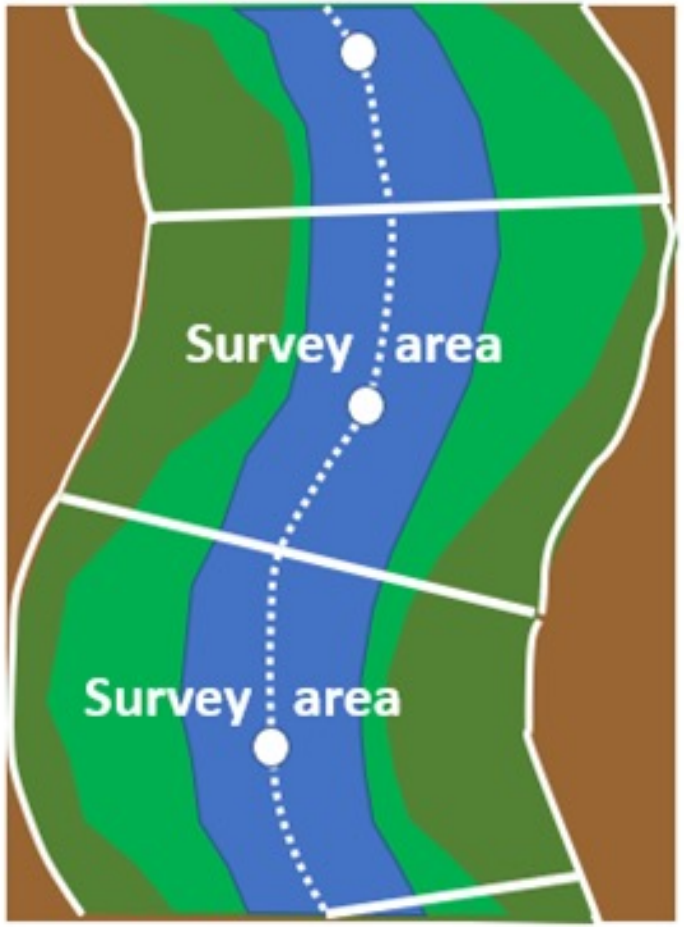
Residential?

High impervious cover?

Adjust strategies for maximum effectiveness!

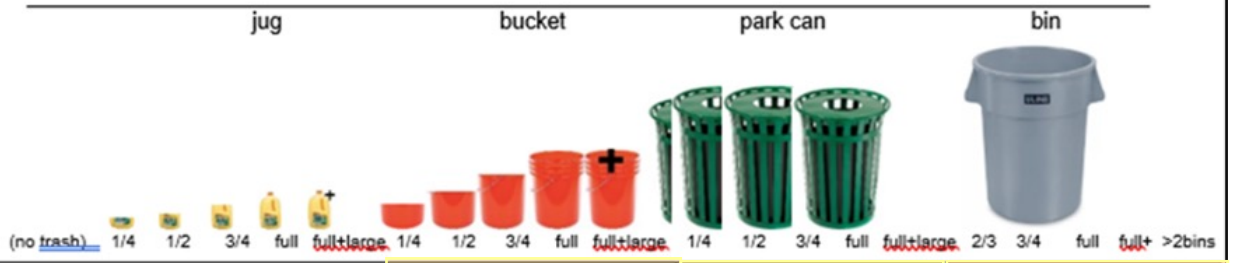
- Winter survey (leaf off, storms unlikely)
- Observation points every 9 meters for selected network
- Width = lower floodplain bench (~10yr storm event)





Visual Trash Intensity Rubric for Creek Walk

1) Score is recorded at the center of a 30ft creek segment (15ft upstream and 15ft downstream of point)
2) Survey area extends outward to the high bank (perceived floodplain) visible from the channel banks, to include areas that trash will imminently reach the stream in a storm event even if above high bank
3) Accumulations of dead vegetation will not be considered trash, however if contained in bags, the bags will be considered trash (presume the bag is separated from leaves). Same with sandbags.
4) Immobile abandoned infrastructure (e.g., pipelines in channel, large blocks of concrete) will not be considered trash if infeasible (without heavy equipment) to remove/cleanup by hand), however, portions that could be easily cut off with hand tools (exposed rebar, cables, etc.) and removed will be considered trash. Small construction debris (bricks, cinderblocks, asphalt etc.) that can mobilize during storm events are considered trash. Materials that are in-place but failing are not considered trash (fence sagging, erosion matting dangling, etc.), but can be considered trash if no longer in-place and mobile



	Minimal					Apparent					Abundant					Dense				
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No litter observed within survey area	**Description:** "good" Few items here or there but not very noticeable. If noticeable, few **Volume**: The cumulative amount could easily fit within a 1-gallon milk jug, however, a single item that is larger than a milk jug (but still fits in a 5-gal bucket) can still be in this category **Effort:** Site could be easily and quickly cleaned by one person (<5 minutes)					**Description:** "not bad" Trash is noticeable but doesn't define the site **Volume**: The cumulative amount could easily fit within a 5-gallon bucket, however, a single item that is larger than a bucket (but still fits in a 25-gallon can) can still be in this category **Effort:** Site could easily be cleaned by one person but not quickly (~5-15 minutes)					**Description:** "bad" Site has obvious and salient accumulation. "Trashy" is forefront **Volume**: The cumulative amount could easily fit within a 25-gallon park trash can, however, a single item that is larger can still be in this category **Effort:** Site looks like a two-person job but could be cleaned by one person (~15-30 minutes)					**Description:** "horrible" Trash defines the site and offends the visitor. Desire for cleanup is overwhelming **Volume**: The cumulative amount requires the big 55-gallon bin(s) **Effort:** Site would take a long time for one person, (~30+ minutes) but site is better suited for a team				

Each observation reach:

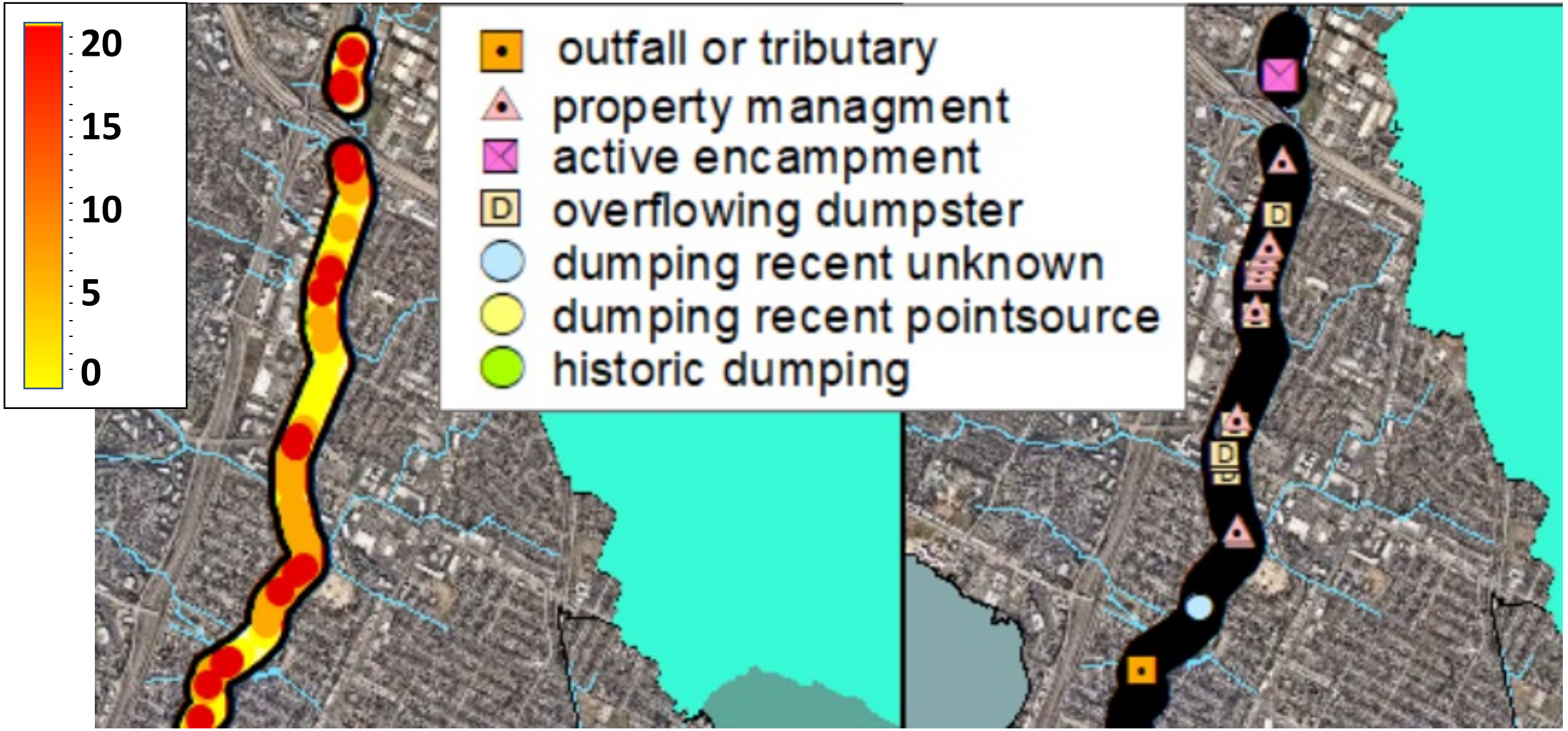
Trash intensity score 0-20

- one of four descriptive bins
- based on perceived volume and level of effort

Sources (presence/absence):

- Overflowing dumpster
- Outfall/tributary
- Encampment
- Property management
- Dumping, historic
- Dumping, point source
- Dumping, unknown

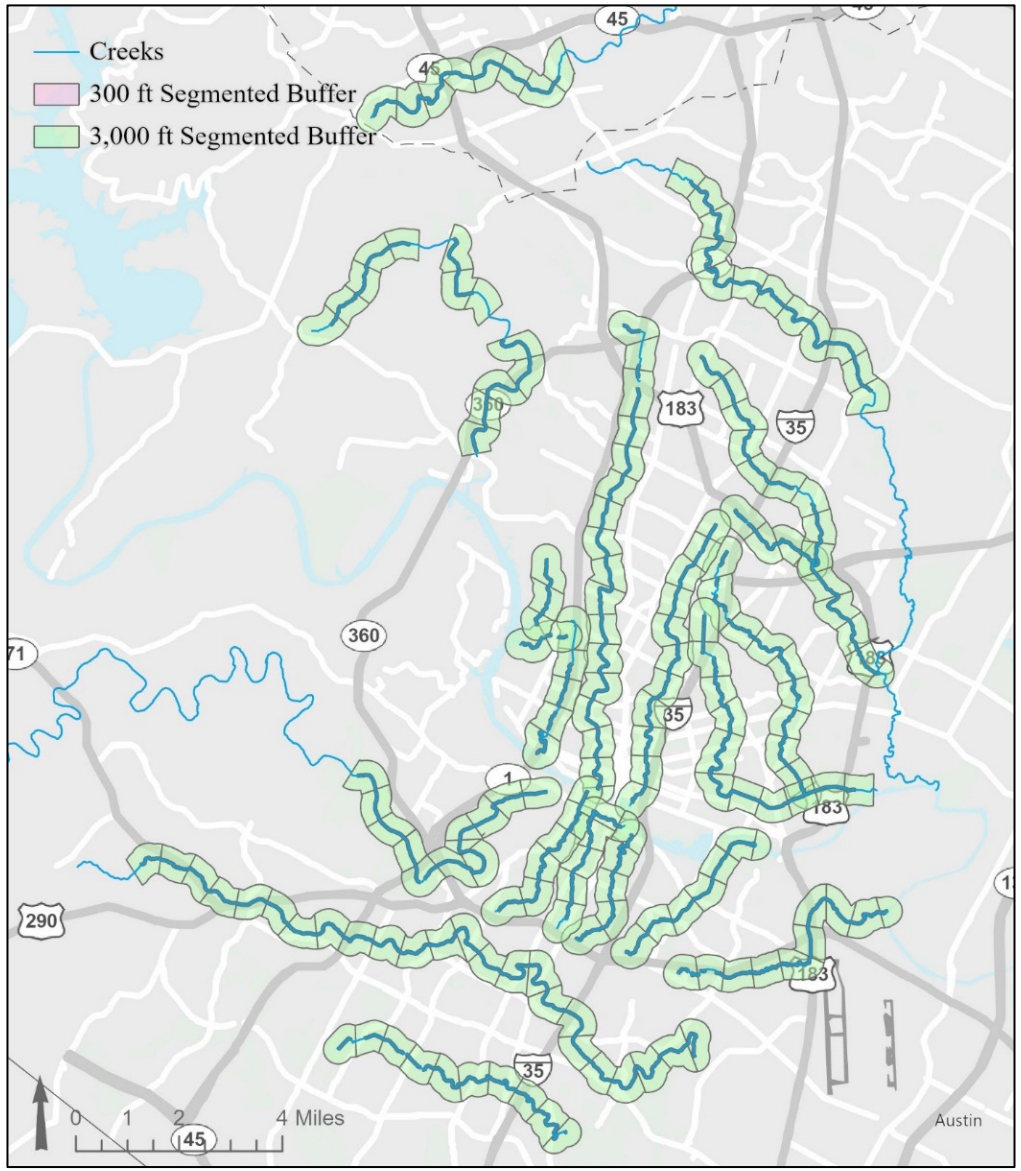
Result: Map of intensity matched with sources

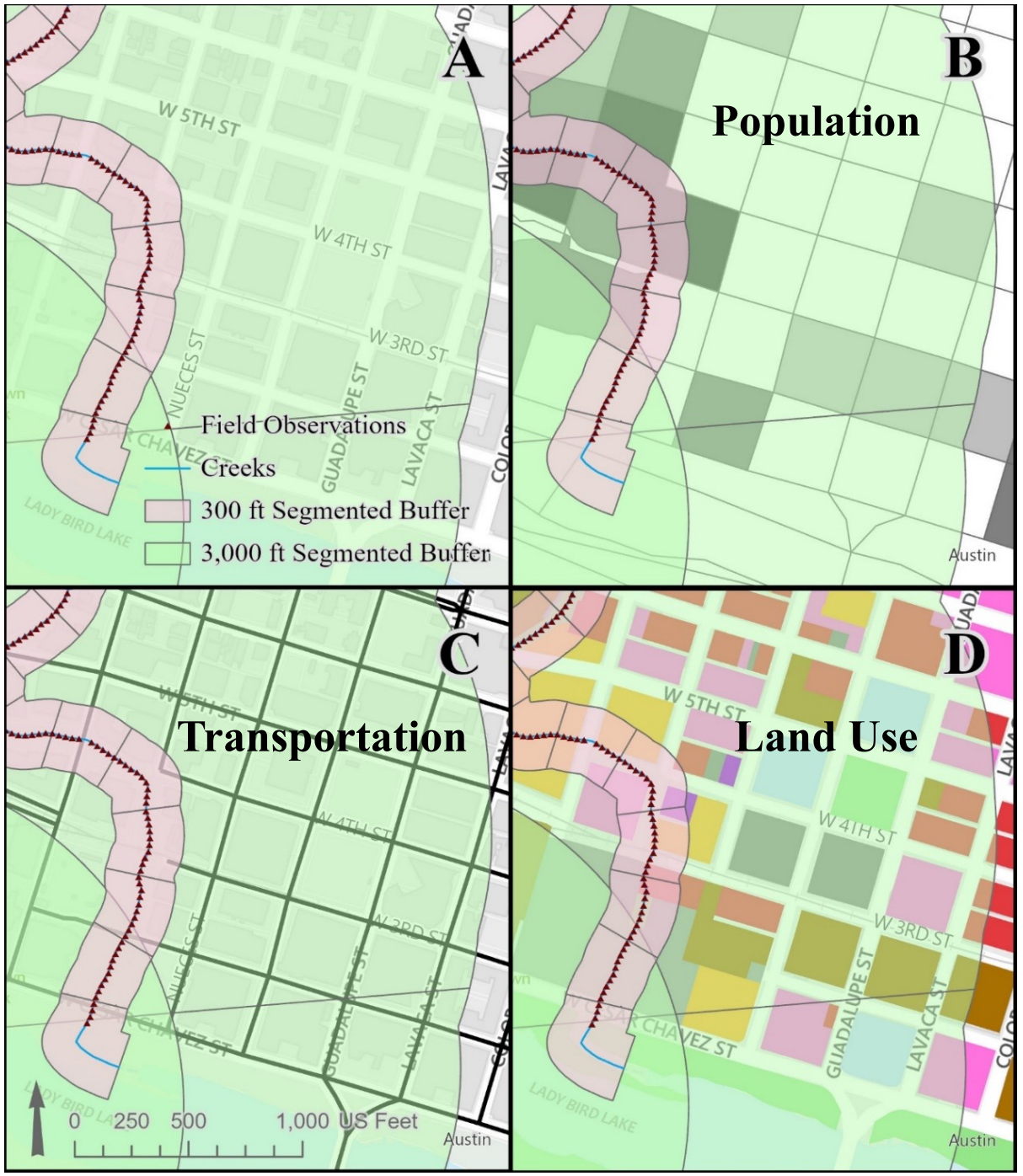


intensity

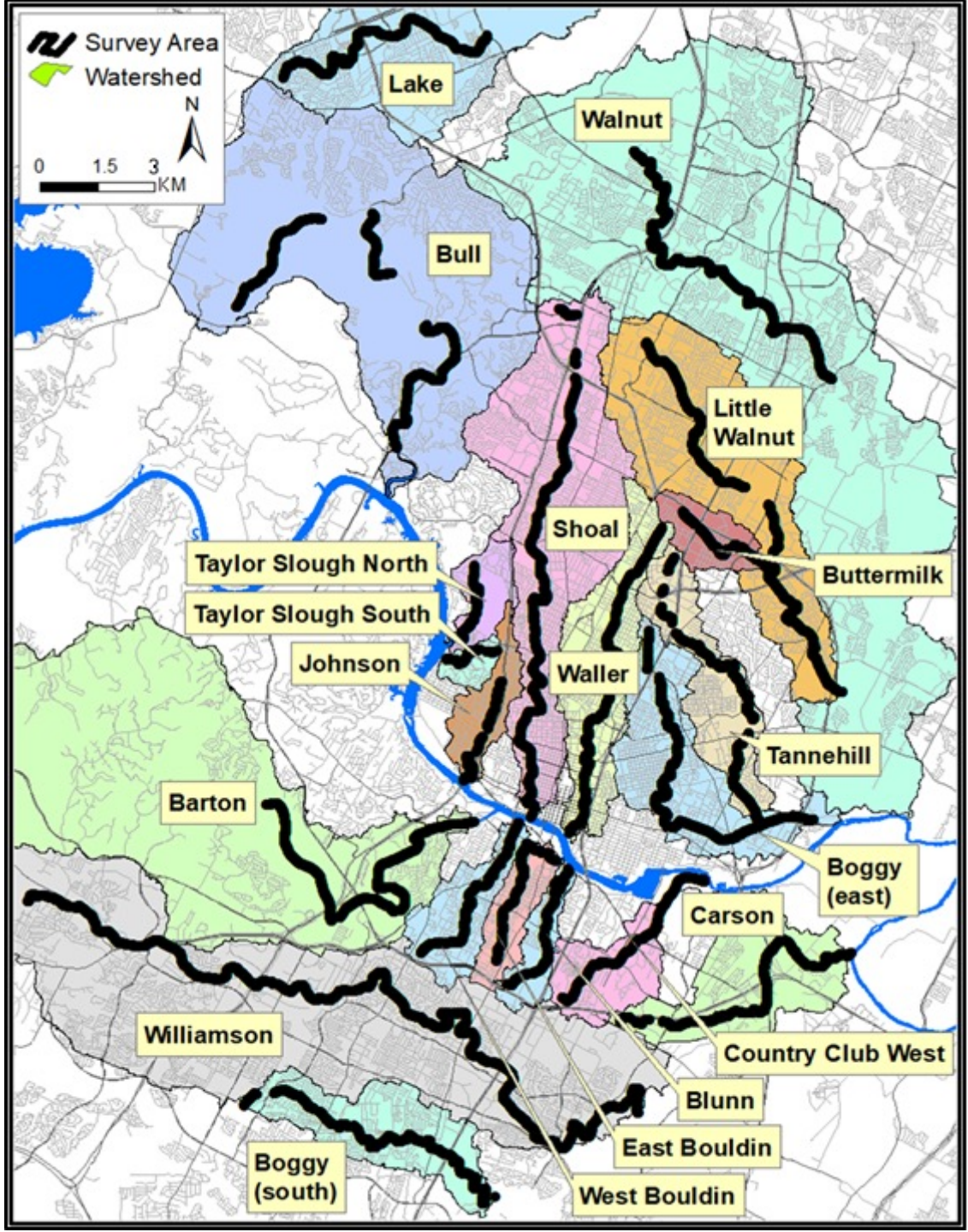
sources

Geospatial: 300’ and 3000’ buffers

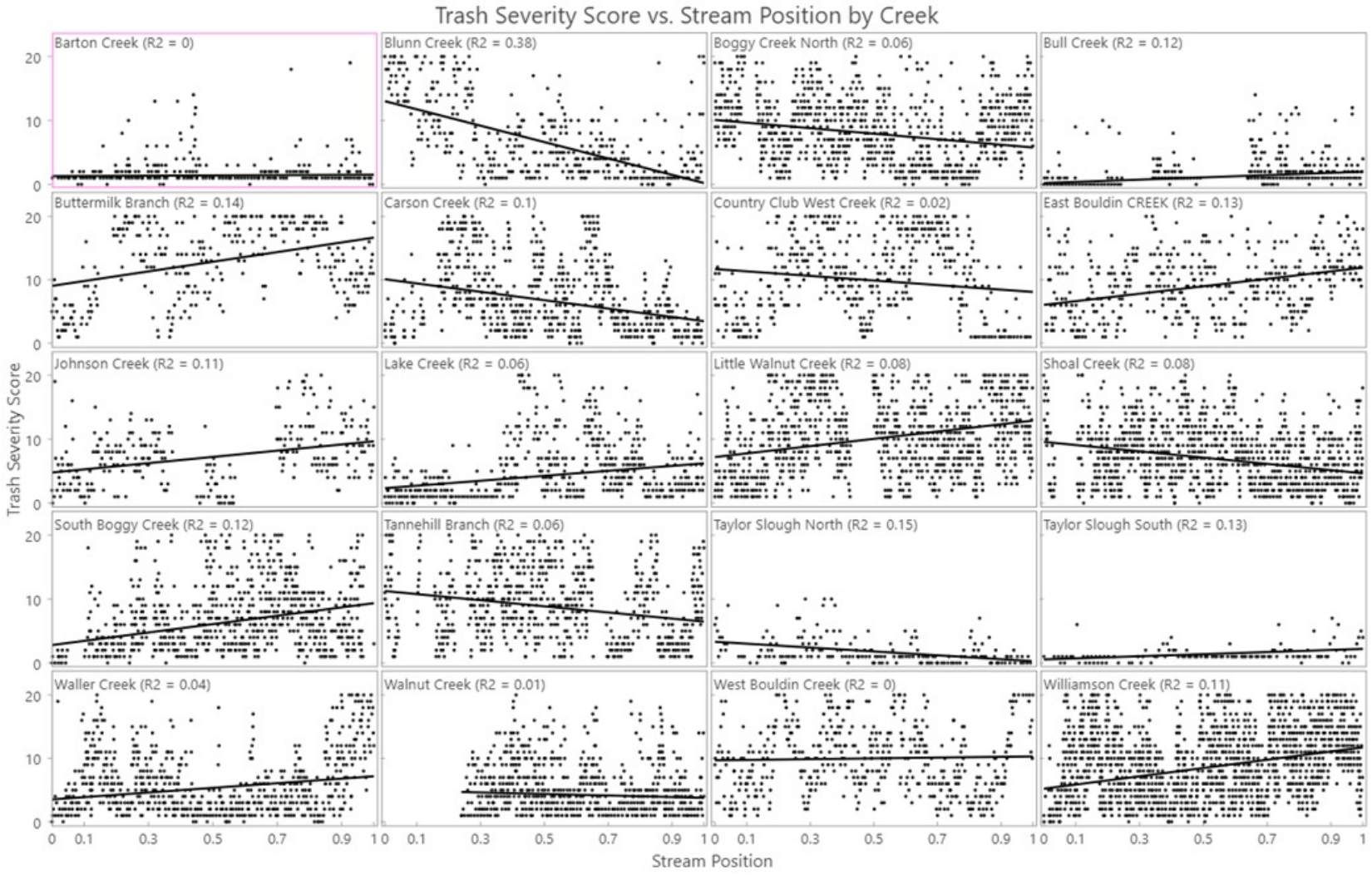




- Central city creeks (277 km!)
- 20 Watersheds
- Data point every 9 meters
- **<u>19,467</u>** data points!



Takeaway # 1 No consistent Upstream-to-downstream pattern



8 creeks increased in trash downstream

6 creeks decreased in trash downstream

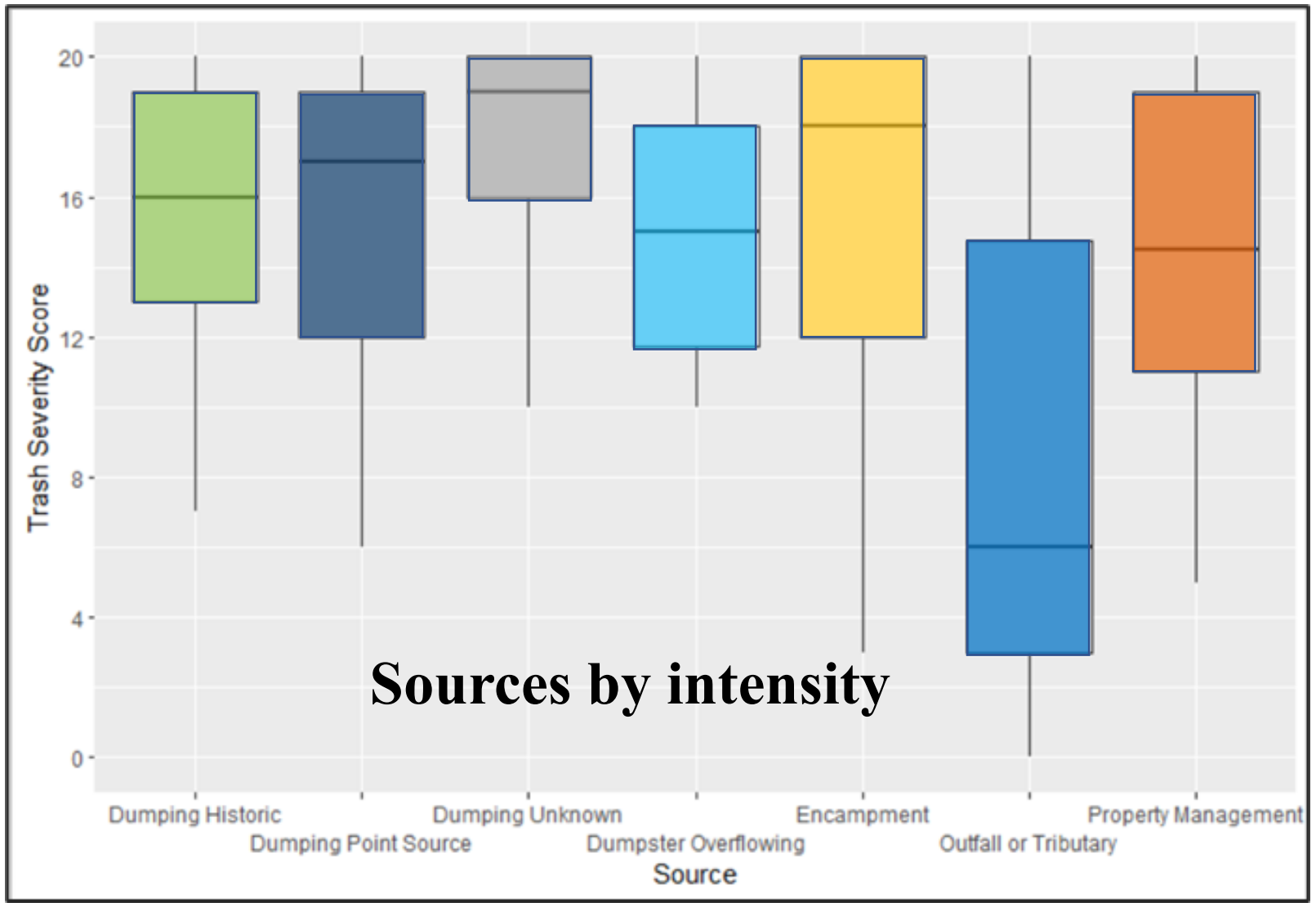
6 creeks no discernable trend

Why doesn’t upstream/downstream comparison work?
Trash doesn’t move through the system evenly

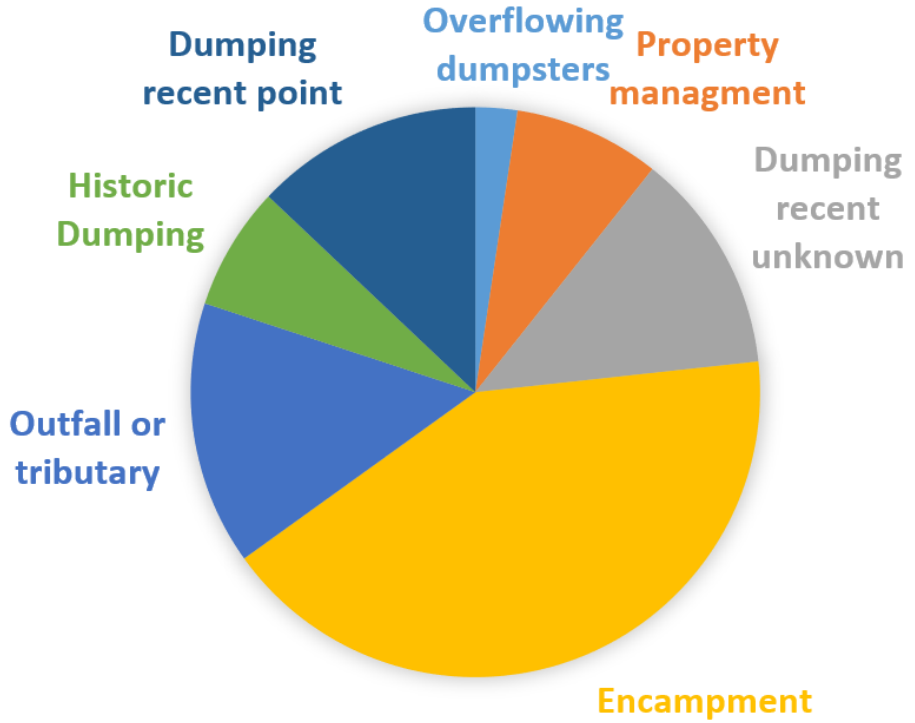

storm intensity


stream roughness

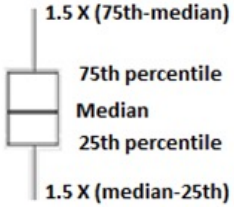

item mobility



Sources by intensity

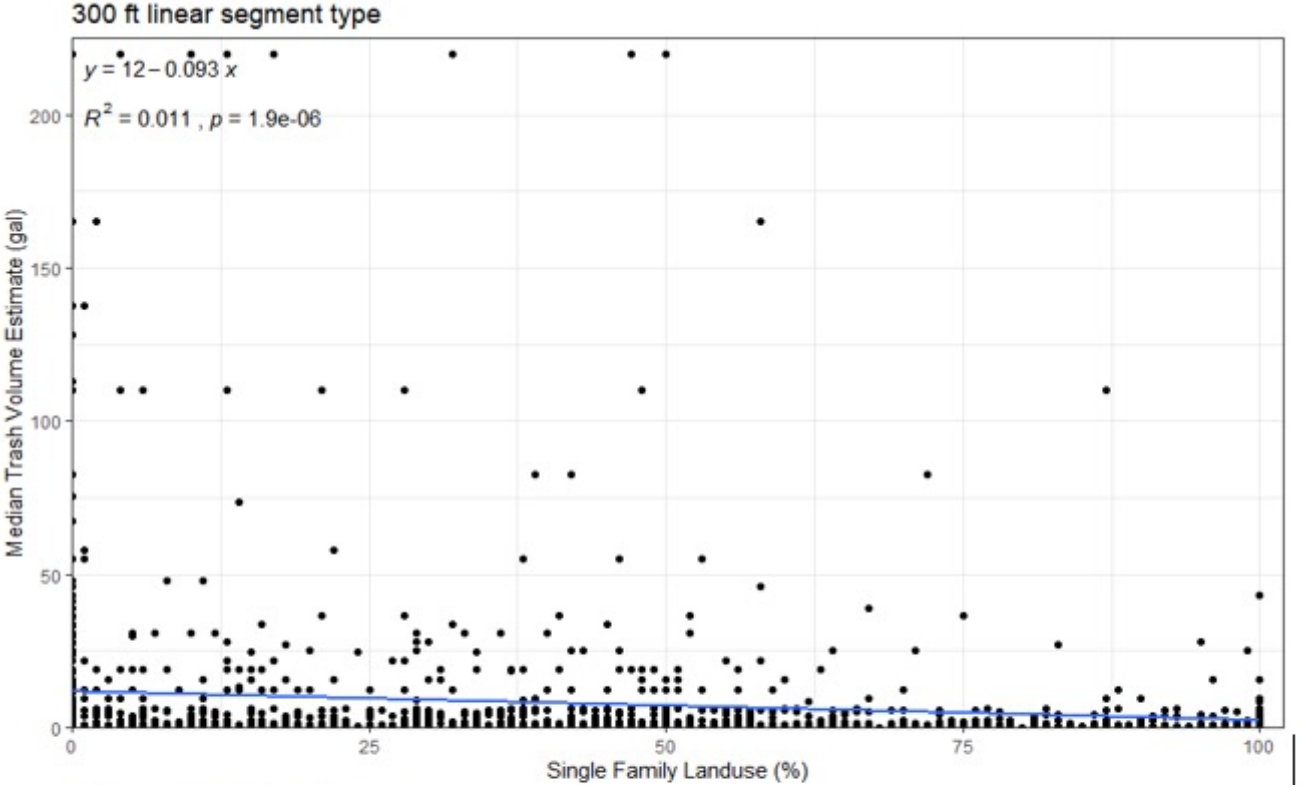


Sources by occurrence



Takeaway # 2

Encampment was the most commonly-observed source,
but was similar in intensity and range to most other sources



Takeaway # 3

No correlations between trash intensity and:

- Imp cover,
- Land use,
- population,
- parks,
- roads, etc.

Independent Variable	3,000 ft reach length		300 ft reach length	
	R^2	p-value	R^2	p-value
Single Family Landuse	0.026	0.03	0.011	0.0000015
Multifamily Landuse	0.029	0.46	0.011	0.0000034
Commercial Landuse	0.015	0.09	0.011	0.0000013
Parks Landuse	0.007	0.25	0.002	0.029
Undeveloped Landuse	0.008	0.23	0.004	0.0031
Impervious Cover	0.006	0.29	0.003	0.022
2020 Population	0.012	0.13	0.008	0.000061
Road area (%)	0.0003	0.94	0.002	0.065

Takeaway # 4

Virtually anything can be found in creeks, but

single use plastics were the most common item

clothing, tents, bedding

recreation items, toys

erosion matting, silt fences

packaging, shipping

office, household

lawn tools, mulch bags, garden hoses, appliances

medical, electronics, textiles, hardware

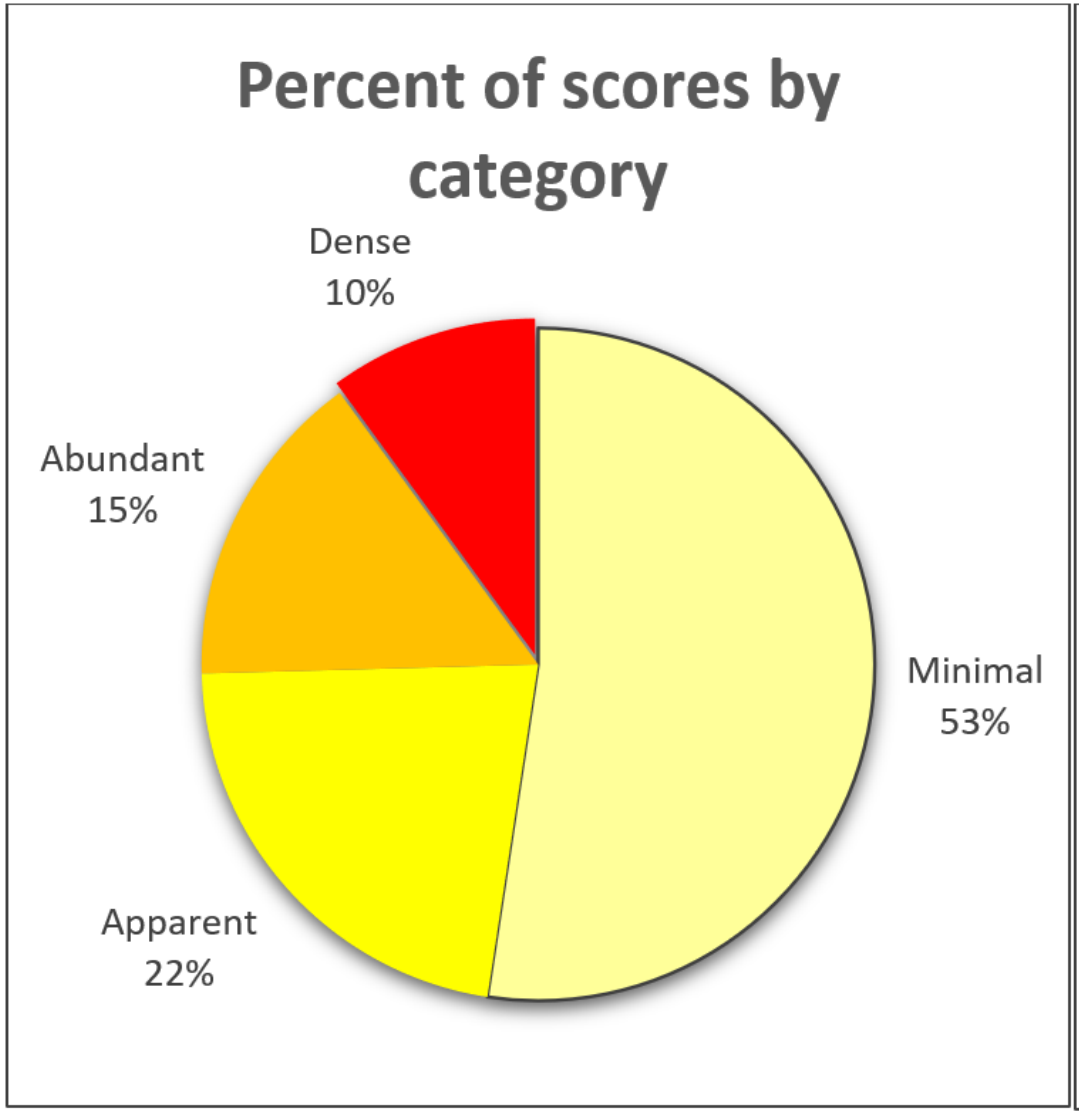
traffic cones, barriers, safety

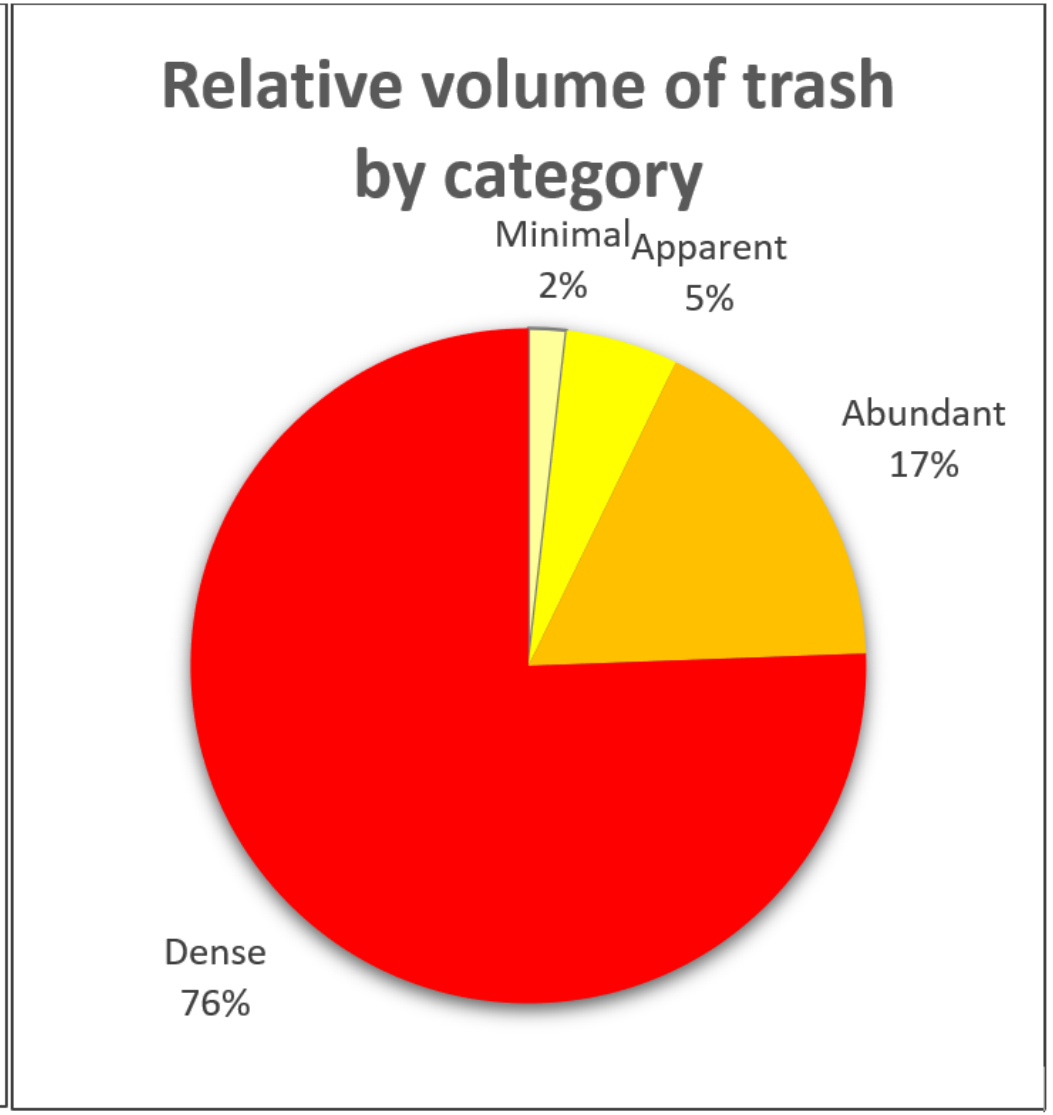
construction materials, asphalt, lumber

Telecommunication cables, displaced infrastructure

>500 shopping carts!

Takeaway # 5 76% of the trash is found in 10% of the area





This presents an opportunity for strategic site selection for cleanups by City and partners

Bottom Line

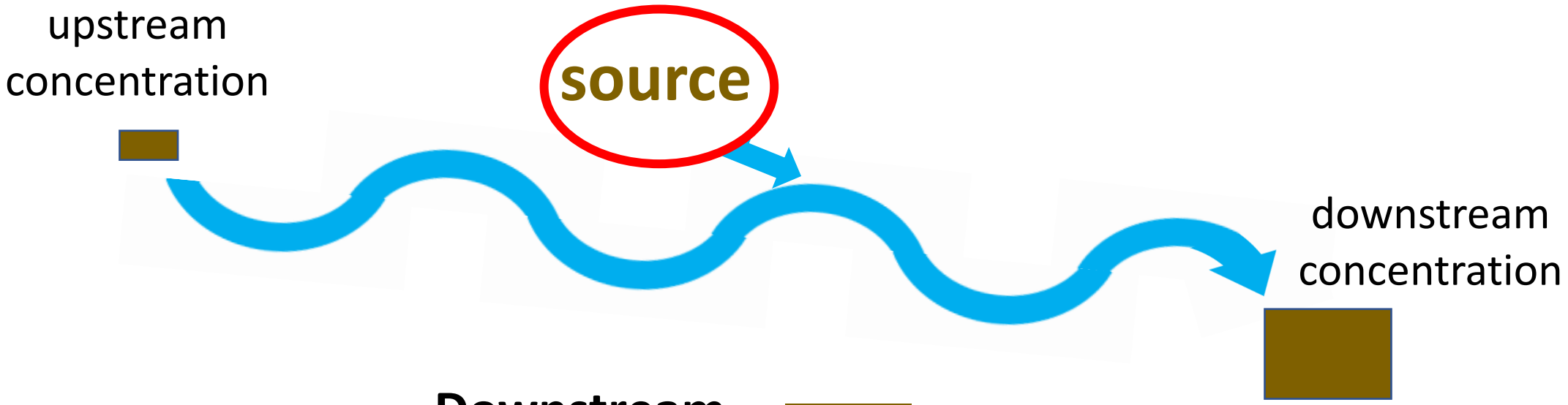
Trash in creeks comes from the entire community; no scapegoats (and no source pie chart).

Opportunities that may work in Austin

- Shopping cart retention (low-hanging fruit)
- limiting polystyrene container use/sales
- Improve rules/enforcement for dumpster capacity/containment
  (especially apartments, food trailer courts, etc)
- Improve enforcement: strengthen and diversify penalties
- Retrofit SCMs to better retain floatables
- Review/improve street sweeping effectiveness


Questions?
/www.austintexas.gov/watershed_protection/publications/document.cfm?id=401607
www.austintexas.gov/watershed_protection/publications/document.cfm?id=401606

Typical pollutant loading assessment:



Downstream concentration

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Upstream concentration

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Source concentration