

# Effects of Urban Stormwater Infrastructure on Dissolved Nutrient Export and Runoff from Semi-Arid Urban Catchments



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## Research Questions

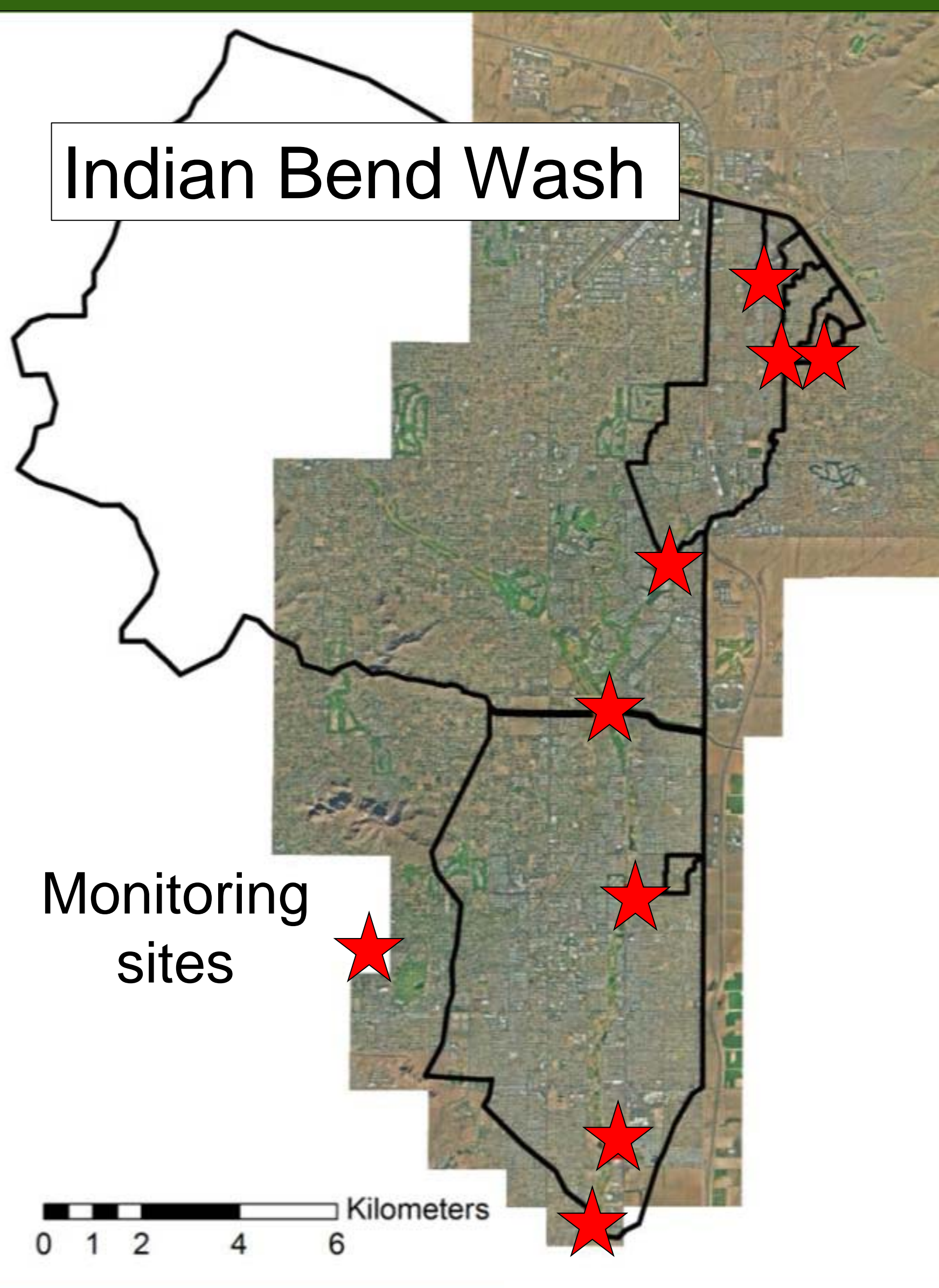
How does drainage infrastructure affect the export of water and nutrients from urban watersheds?

1. Total loads for a storm season
2. Distribution of nutrient export across storms
3. Distribution of nutrient export within storms

## Study Design

11 nested urban catchments

- Vary stormwater infrastructure and scale
- Control land use: med density residential



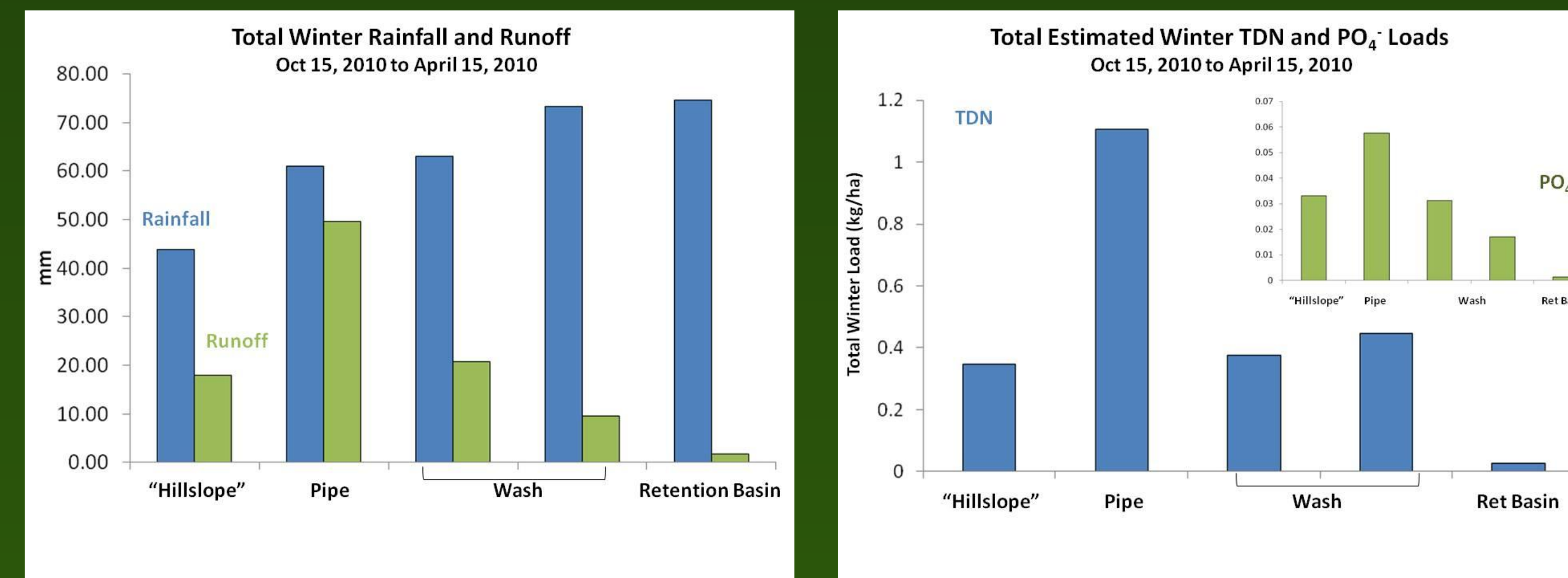
## Methods

Ephemeral storm flow – all events

- Automated ISCO samplers
- Discharge and precipitation
- All major cations & anions
- Focus here: dissolved TN and PO<sub>4</sub><sup>3-</sup>

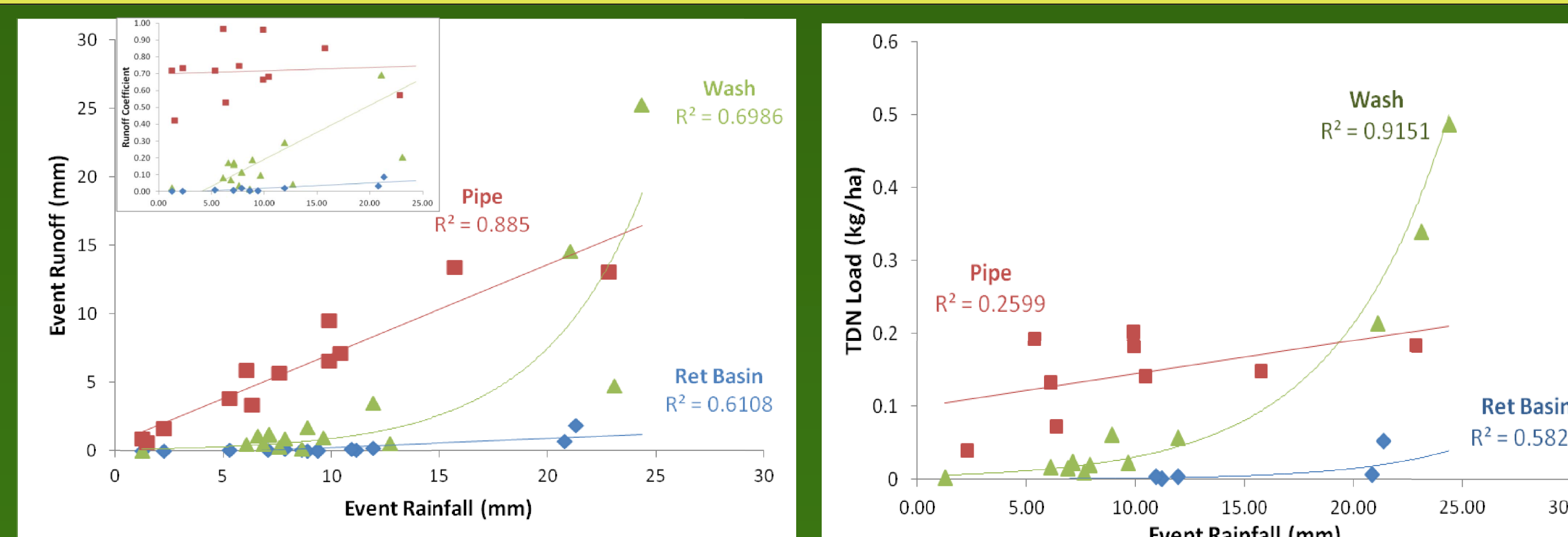


## Q1. Seasonal Patterns



- Total Seasonal TDN export from watersheds is correlated with seasonal discharge
- Retentive infrastructure exports less water and nutrients.

## Q2. Patterns Across Storms



Hydrology

- Strong rainfall-runoff relationship all sites
- Nonlinear for wash and ret basin (↑RC with rainfall)

Nutrient Export

- Ret structures: nonlinear, rainfall strong predictor
- Pipes: linear, rainfall weak predictor

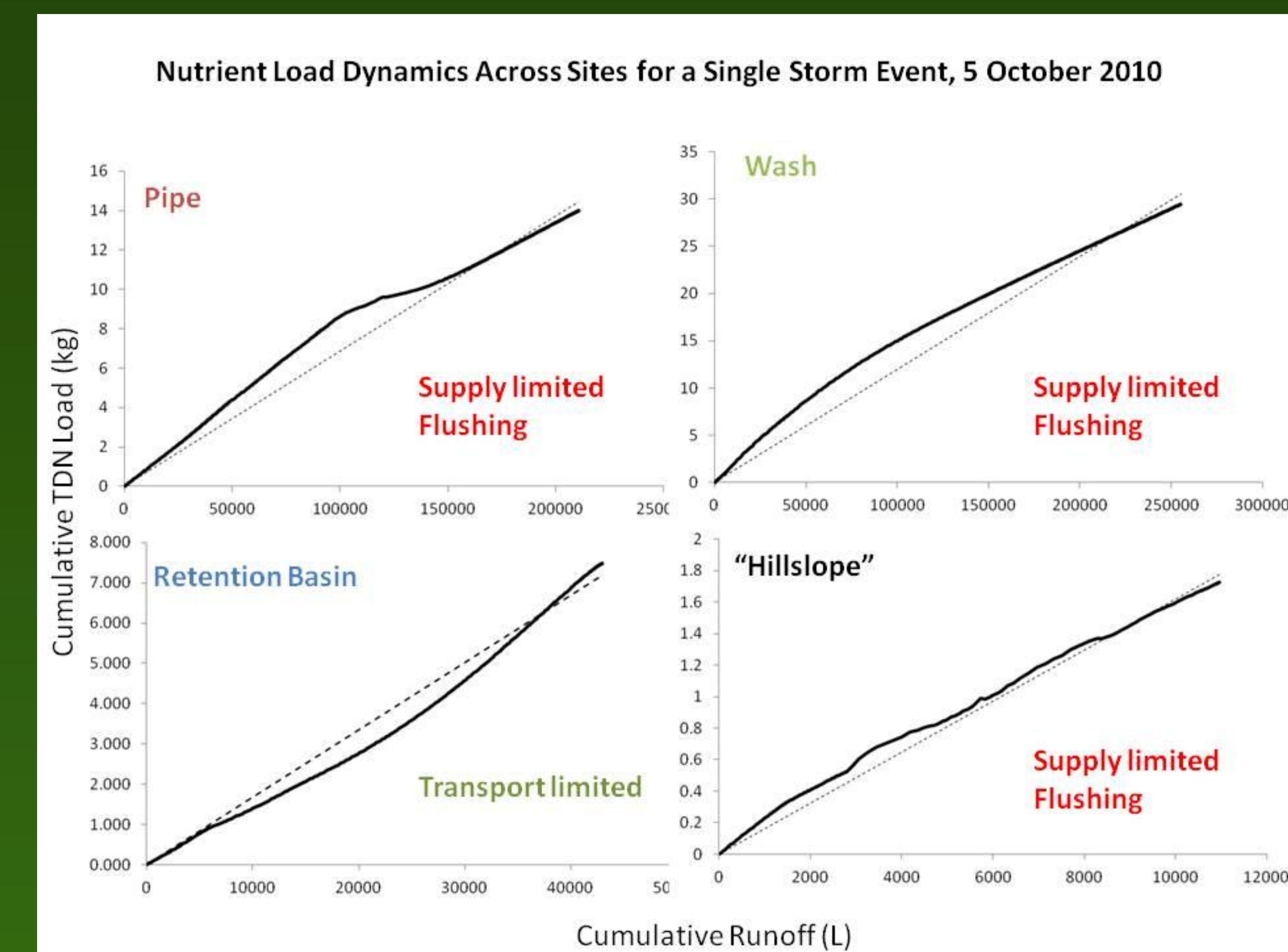
## Acknowledgments

Kate Elrod, Cathy Kochert, Nich Weller, Sarah Moratto, Danielle Shorts, Emma Holland, Quincy Stewart, Roy Erickson, Olga Epshtein for lab and field help.

City of Tempe and City of Scottsdale

This material is based upon work supported by the National Science Foundation under Grant No. 0504248, IGERT in Urban Ecology, Grant No. 0423704, Central Arizona-Phoenix LTER, and Grant No. 1063362, Impacts of urbanization on nitrogen biogeochemistry in xeric ecosystems. Any opinions, findings and conclusions or recommendation expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).

## Q3. Patterns Within Storms



Within a storm, between-site variation in nutrient export behavior

- Supply-limited “flushing” – classic urban response
- Transport-limited – indicates export determined by ability of water to move materials through watershed

Within a site, between-storm variation in nutrient export behavior (data not shown)

- behavior not consistent within sites, may be related to storm characteristics (rainfall volume, rainfall intensity)

## Conclusions

- Retentive infrastructure decreases average and seasonal loads, while increasing variability between storms (load and behavior)
- Implications for modeling runoff/nutrient export, risk assessment and climate change vulnerability