



Urban Stream Syndrome

ZAP

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Executive Summary

Urban Stream Syndrome is the cascade of environmental degradation of waterways resulting from development

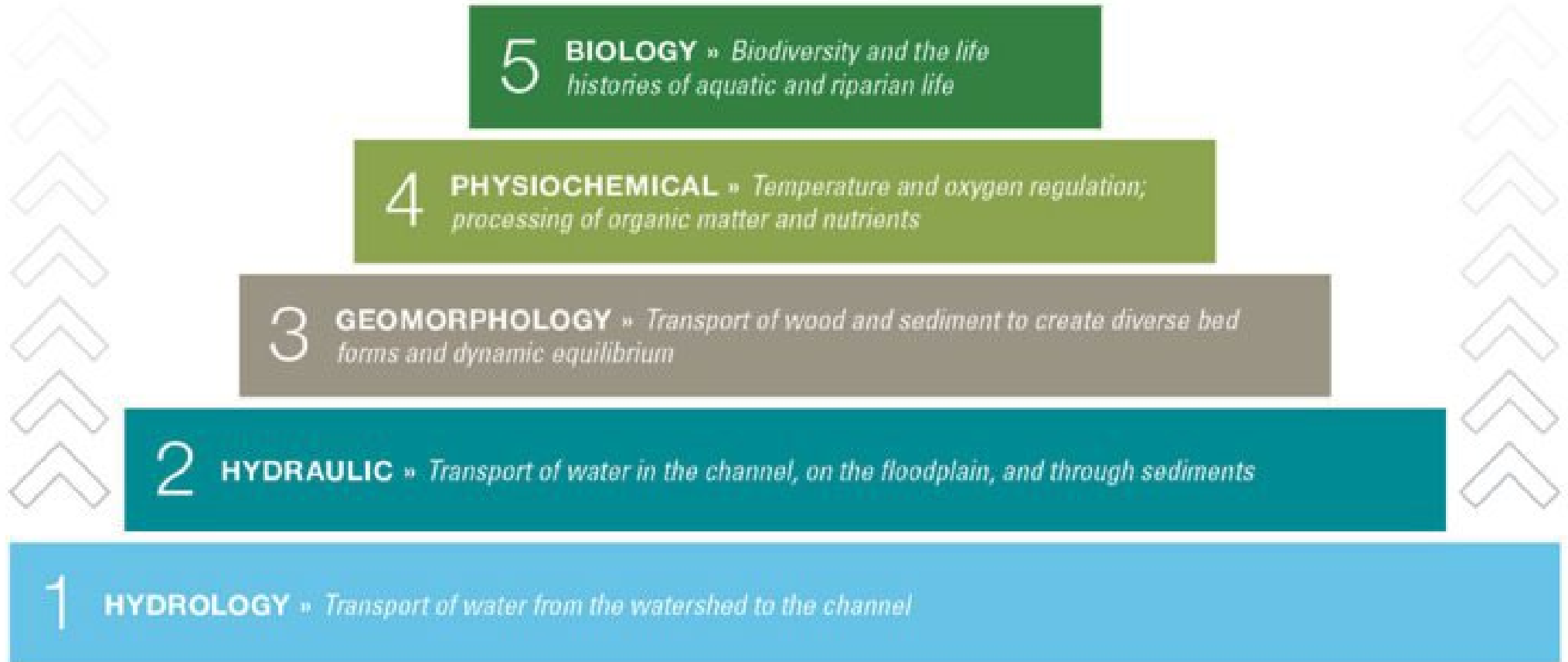
Impervious cover causes erosion, incision and loss of habitat through significant changes to the hydrograph because of:

- limited infiltration decreasing baseflow
- rapid runoff increasing stormwater velocity
- increased volume exacerbating flood frequencies and levels

Pollutants and reduced biological complexity of the landscape alter stream ecology by reducing diversity and resiliency



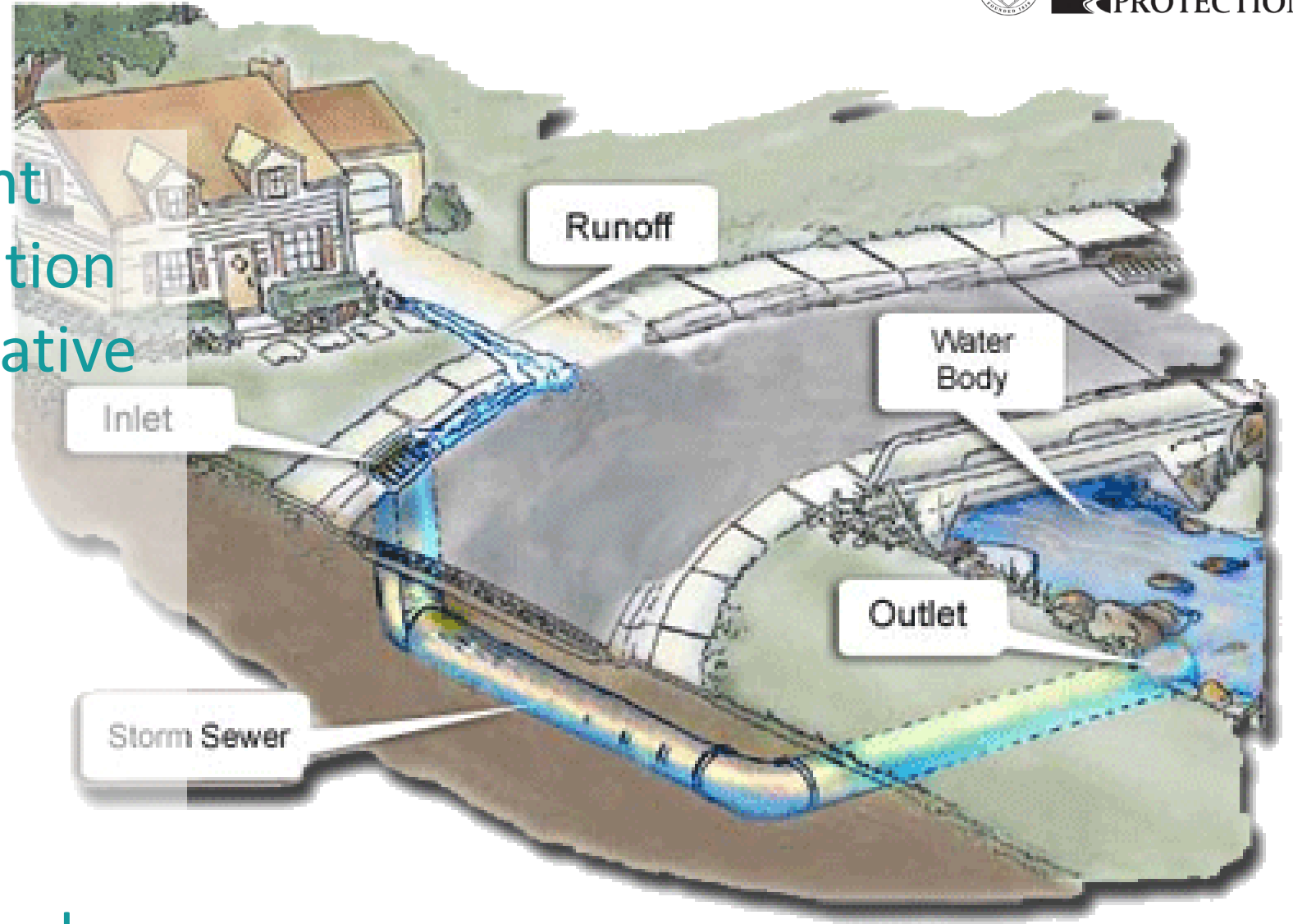
Stream Functional Pyramid





Drivers

1. Land use/management
2. Loss of natural vegetation
3. Introduction of non-native species
4. Impervious cover
5. Efficient stormwater system
6. Stream channel modification
7. Increased pollutant load





Symptoms



1. Increased frequency and severity of flooding
2. Incision/downcutting of channels
3. Disconnected from floodplain and riparian zone
4. Baseflow recession
5. Simplified riffle/run/pool structure
6. Lack of suitable habitat in streams
7. Loss of sensitive flora and fauna
8. Reduced ecological function
9. Bacteria and nutrient problems



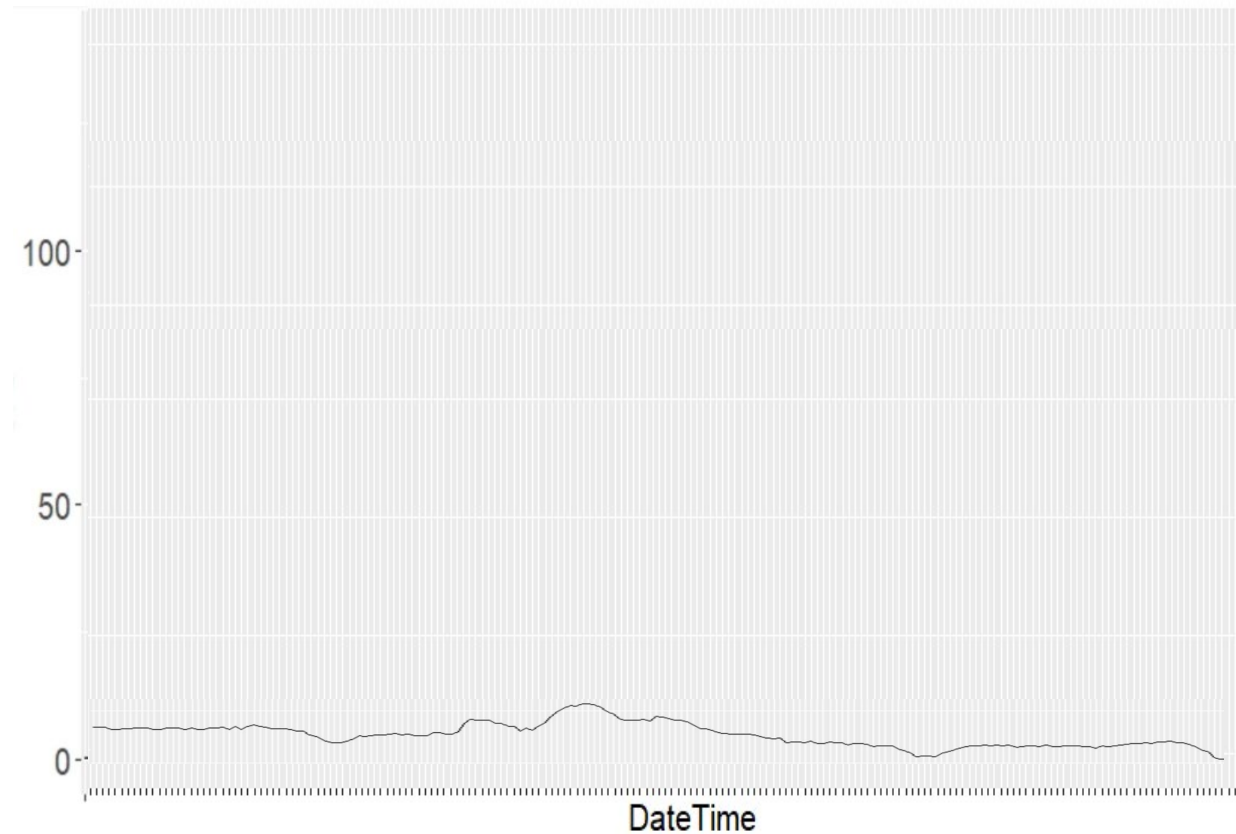
Buttermilk Creek



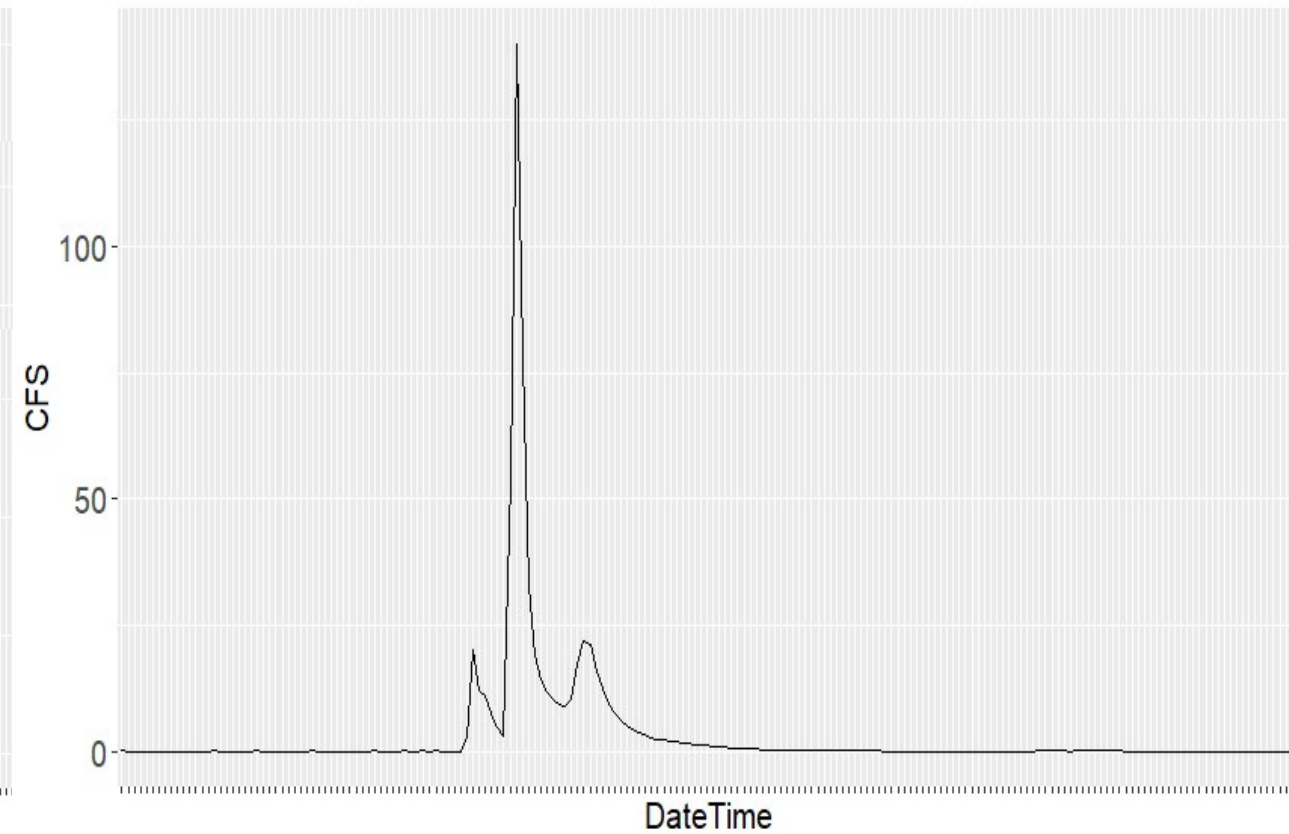
One storm, different hydrographs



Bear at Spillar Ranch, 12/17/2021 - 12/20/2021
DA = 20.4 square miles



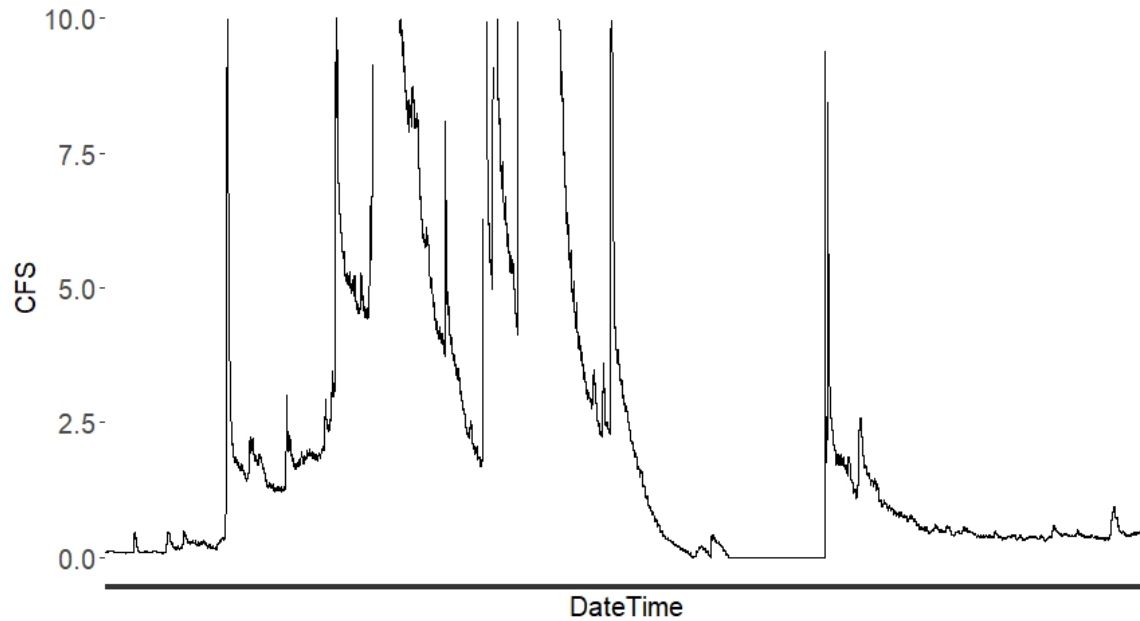
Waller at Koenig, 12/17/2021 - 12/20/2021
DA = 1.09 square miles



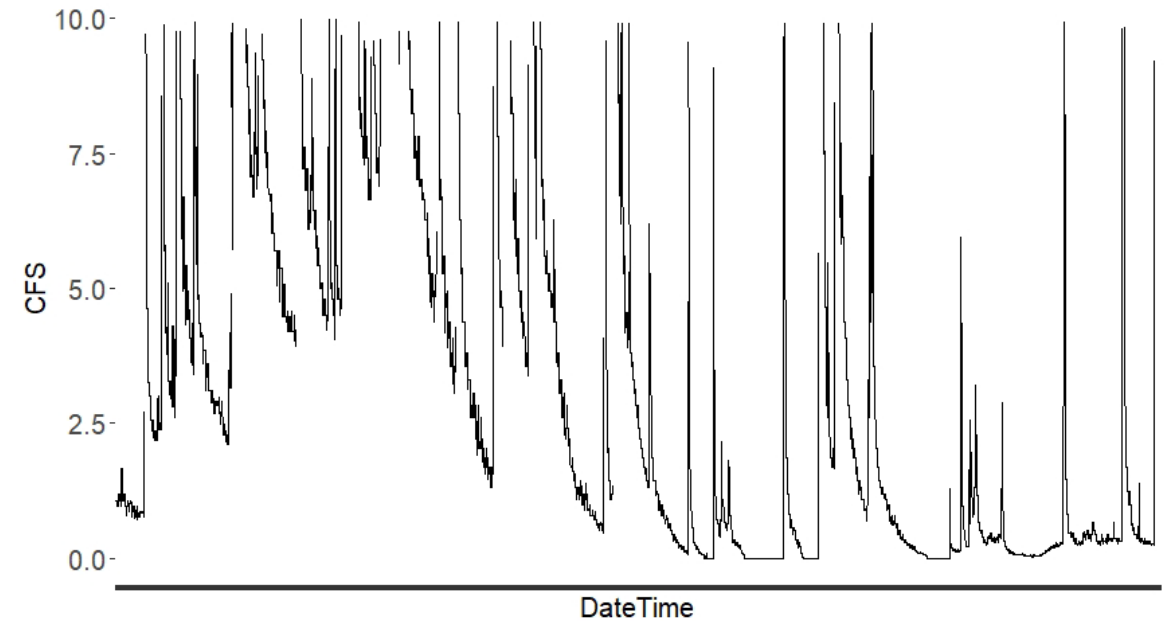


Frequency of flashiness

Bear at Spillar Ranch, 01/01/2020 - 01/01/2021
DA = 20.4 square miles

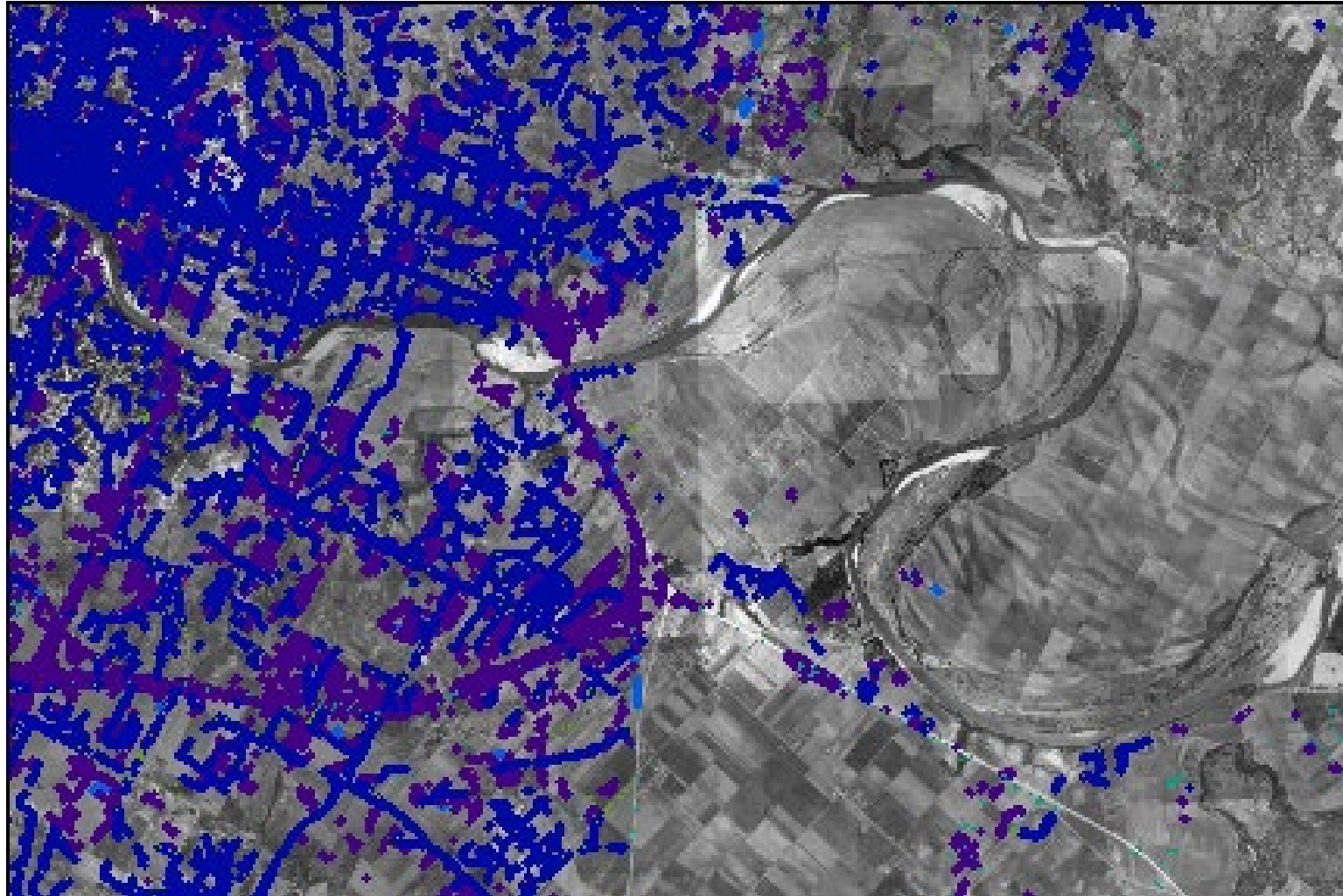


Walnut at Dessau Rd, 01/01/2020 - 01/01/2021
DA = 26.2 square miles





Storm Sewer Systems





Delivering with efficiency



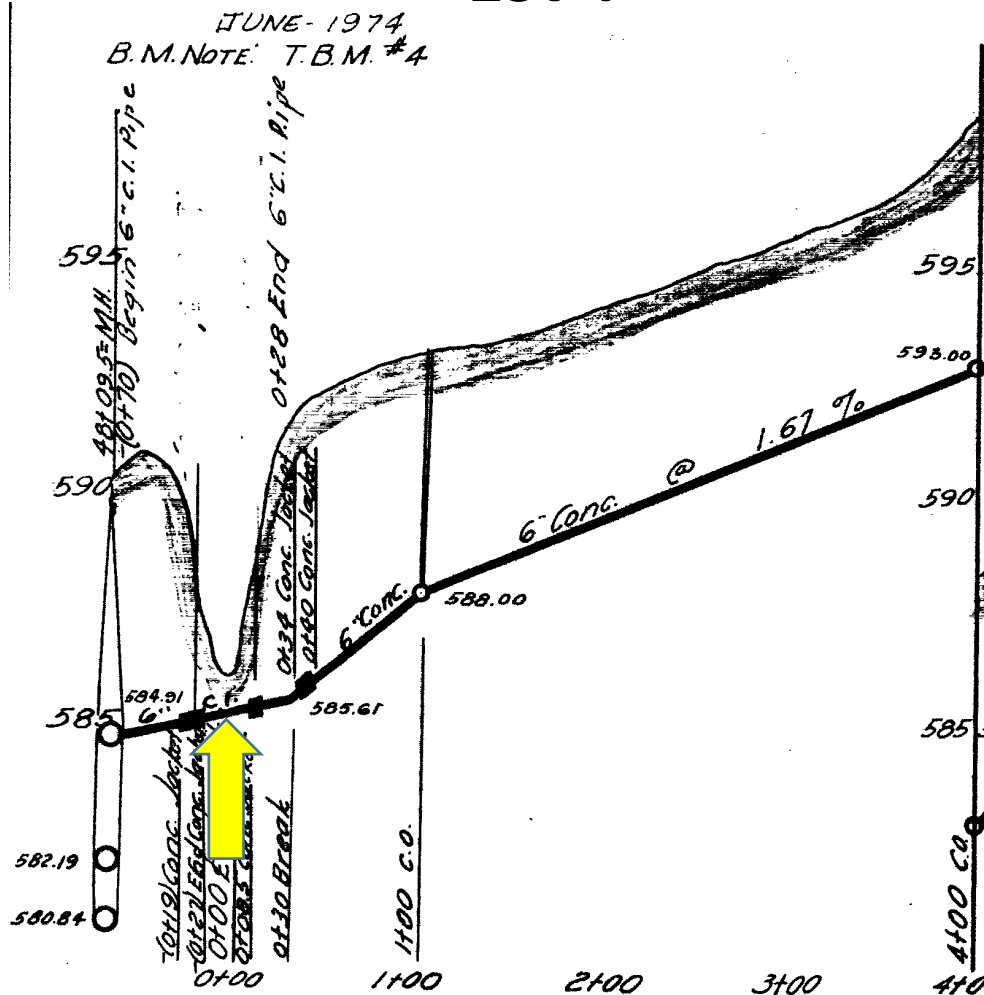


Stream impact?



WATERSHED
PROTECTION

1974



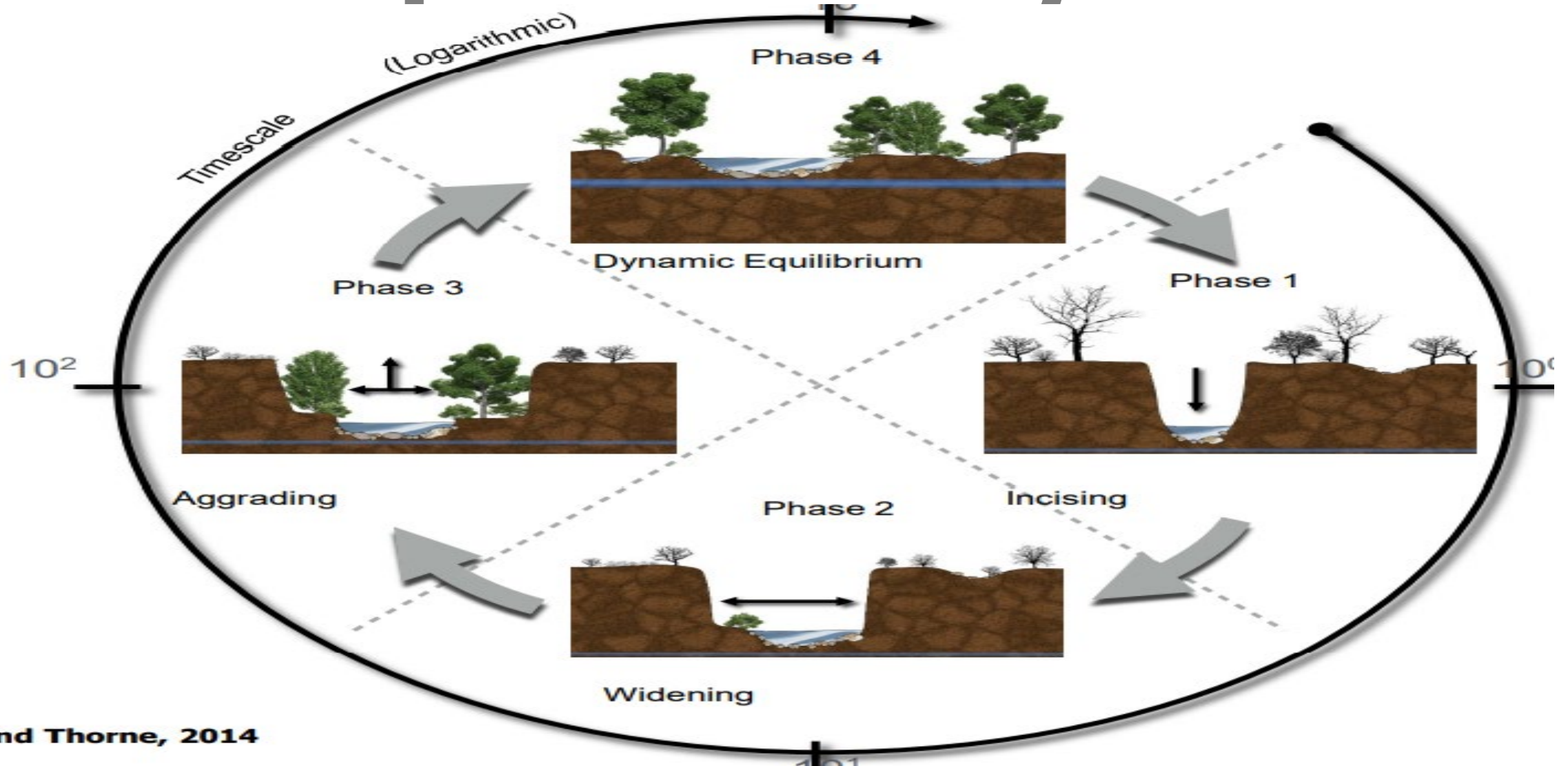
2002



Upper Boggy Creek



Incision process theory



Cluer and Thorne, 2014



Incision process reality



Unknown



Boggy at Nile



Added pollutants



**WATERSHED
PROTECTION**





Untreated delivery system (water quality)





What are we doing about it?



municode





Things to consider

- Once in the channel we can't do much about stormwater
- We CAN modify hydrology to meet the needs of the stream but we can't modify the stream to match hydrology
- We CAN shift this paradigm with better regulation, more incentives, and education

What are our goals for our streams?



Goals, thanks for asking

- Fishable
- Swimmable or wadable
- Ecologically functional
- Beautiful and lovable
- More natural baseflow



Means to achieve goals

- Stormwater treatment on infill development
- Progressive stormwater controls (SCMs)
- Green stormwater infrastructure
- Changes in values and behavior (education and outreach)



So what will our legacy be?





City of Creeks Video Series

<https://www.youtube.com/playlist?list=PL6BHKl7gdqeyBDHZhnuY-hLQZCJcCPlX8>

1. **Urban Watershed Function**
2. **Urban Stream Syndrome**
3. **Stormwater Control Measures**
4. **Proactive Programmatic Solutions to Protect our Watersheds**
5. **Salamanders in the City**
6. **The History of Austin's Watershed Protection Ordinances**
7. **Geologic Drainage Systems**
8. **Trash in Creeks Study**



Austin's Major Watershed Ordinances

1. 1974 Waterway Ordinance
2. 1980 Lake Austin/Barton/Williamson Ordinances
3. 1983 100-Year Floodplain Ordinance
4. 1986 Comprehensive Watersheds Ordinance (CWO)
5. 1992 Save Our Springs (SOS) Ordinance
6. 2013 Watershed Protection Ordinance (WPO)
7. 2019 Atlas 14 Floodplains Ordinance
8. Phase 1 Ordinance requiring Green Stormwater Infrastructure for most site plans and subdivisions

Honorable Mention: 1982 Landscape Ordinance; 1983 Tree Ordinance; 1991 Urban Watershed Ordinance (UWO); 1911 Maximum Flood Ordinance