

# Methods and Data Analysis in Determining the Effects of Development on First-order Streams

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# Overview

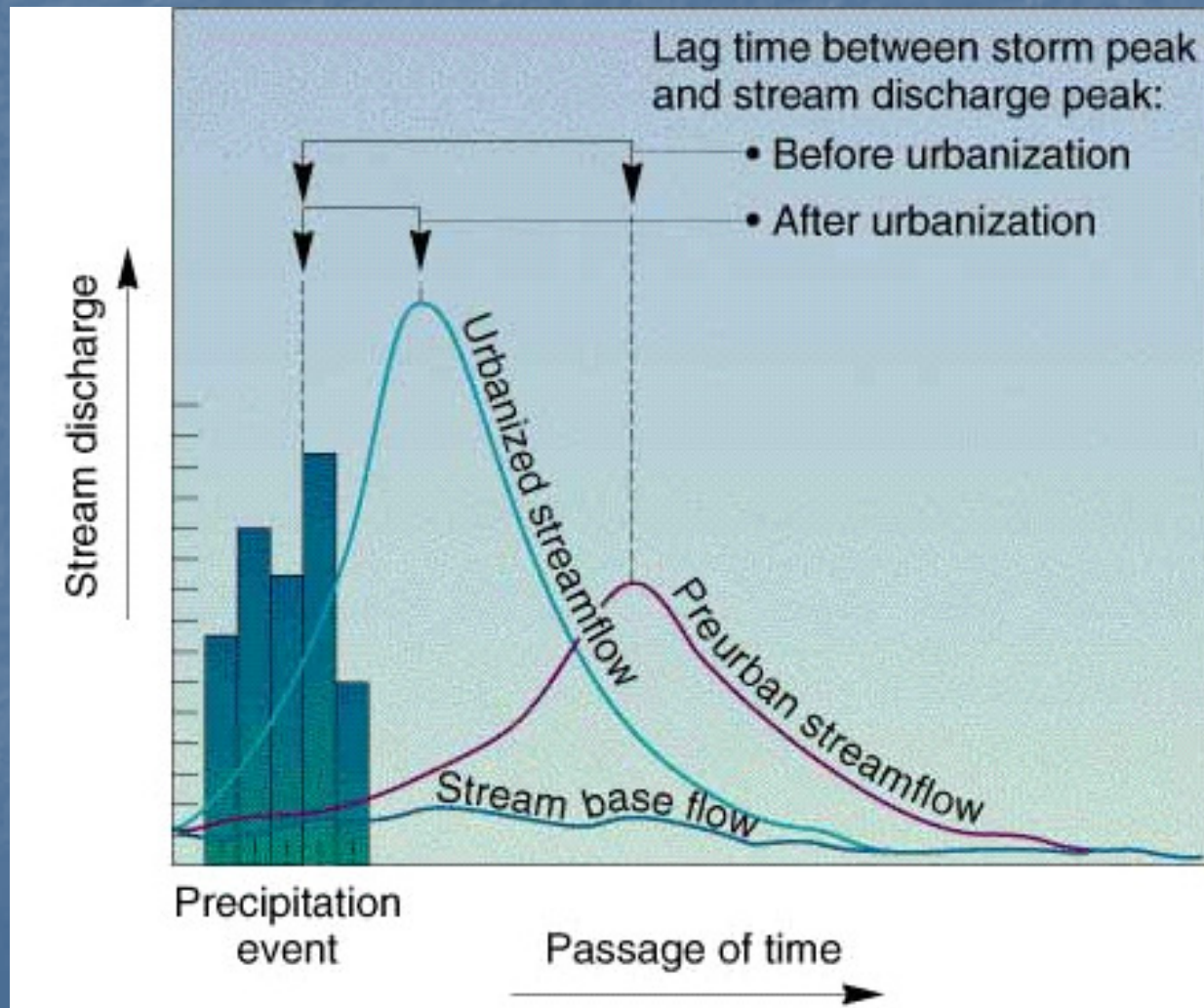
- Urbanization & hydrograph summary
- Significance & what's being done
- BMP designs and faults
- Our research questions
- Study sites
- Methods
- Data Analysis

# Urbanization and development



- Urbanization and sprawl affect surrounding “natural environment”
- Chemical and biological degradation well-recognized
- What about physical changes?

# Urban vs. Natural hydrographs



# Why the change in hydrographs?

- Impervious surfaces impede infiltration
- Runoff pathways altered
- Water delivered to streams more quickly



# Significance (Why should I care?)



- Channel erosion leads to property & vegetative loss
- Increased impervious area degrades stream health—chemically and biologically

# What we do about it--BMPs

- “Best Management Practices”
- Structural devices designed to mimic nature in retaining and releasing storm water
- County requirements for new developments—all must utilize BMPs



Spillway

Outflow 2

Outflow 1

Lowe's Wet Detention Pond BMP

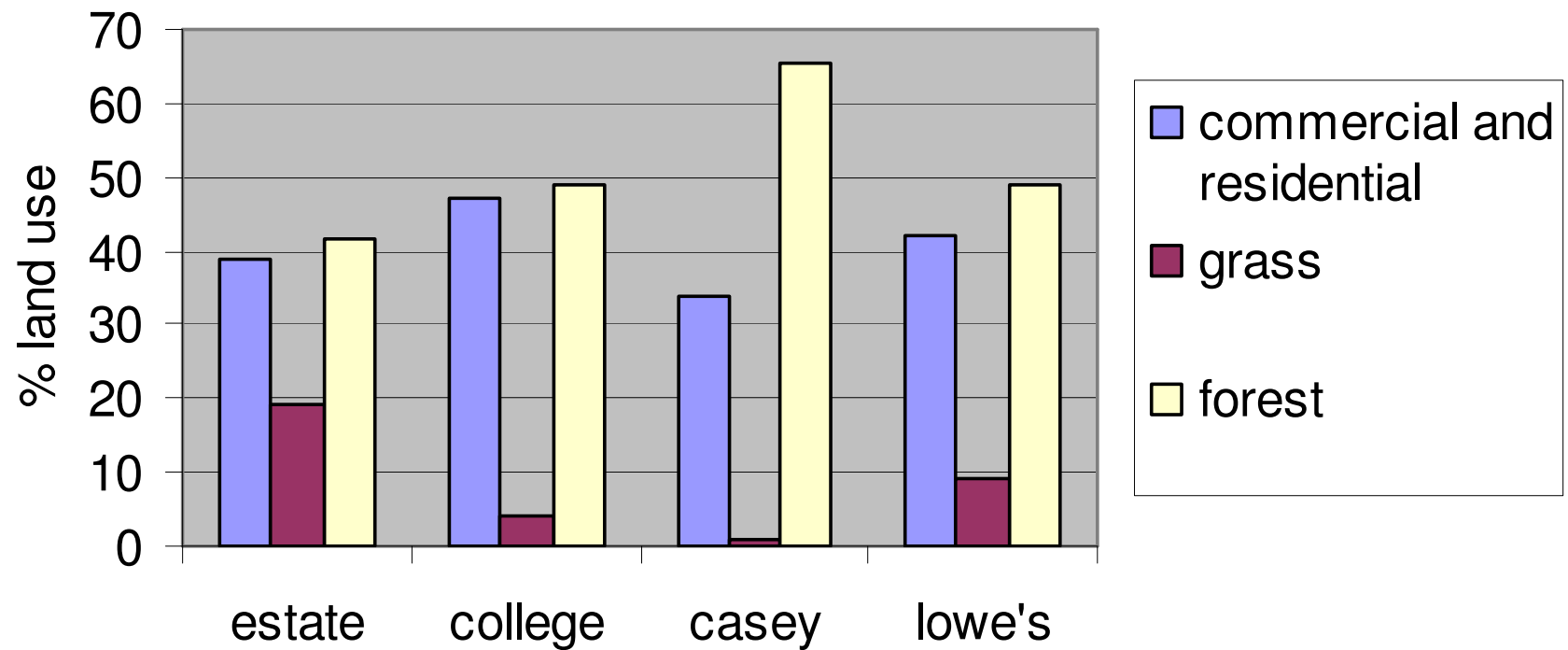
# Problems with BMPs

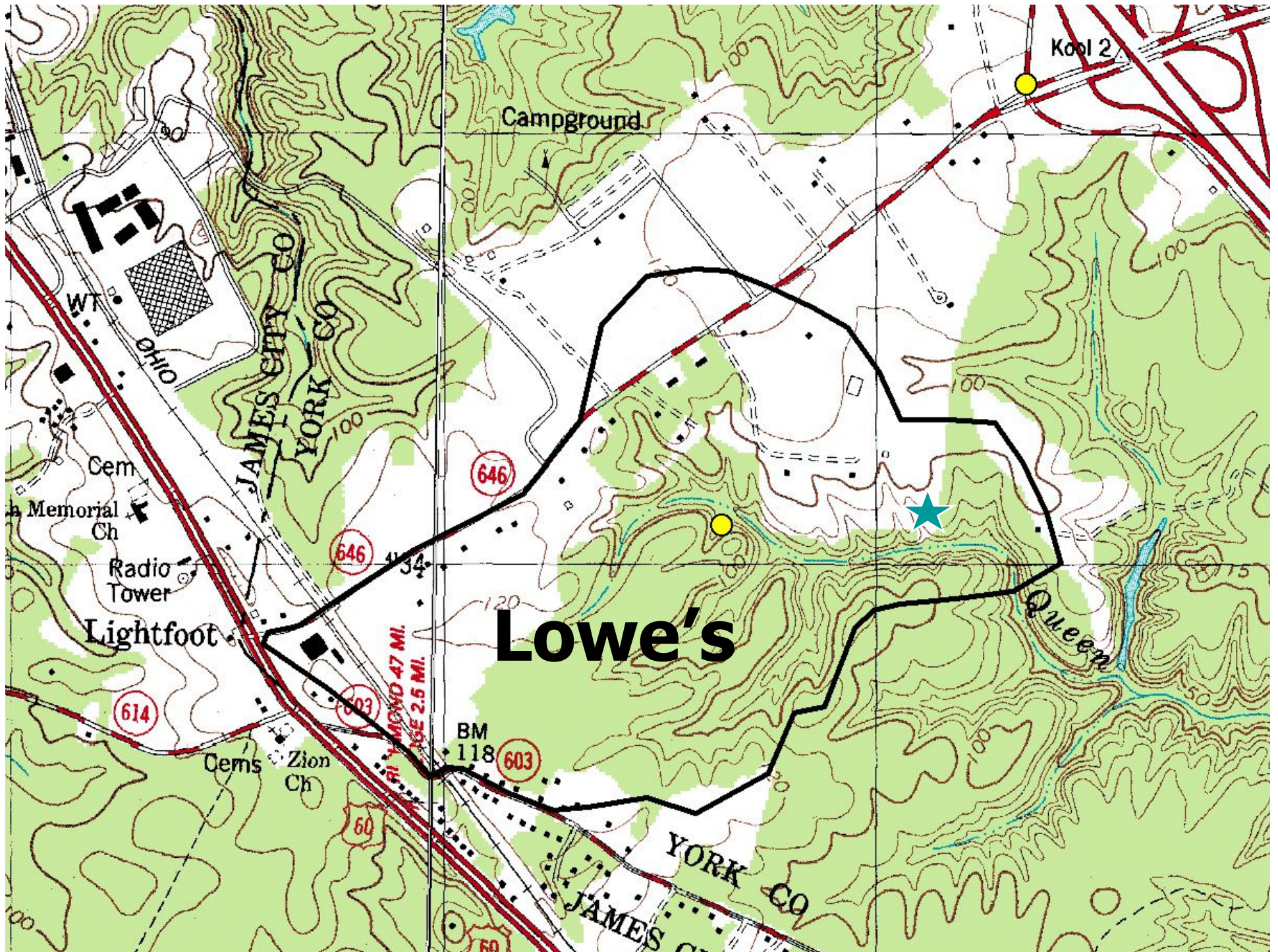
- maintained properly?
- work as intended?
- follow-ups on effectiveness?
- **Research questions:**
  - What are the hydrologic differences between basins with varying degrees of development
  - What difference do BMPs make?

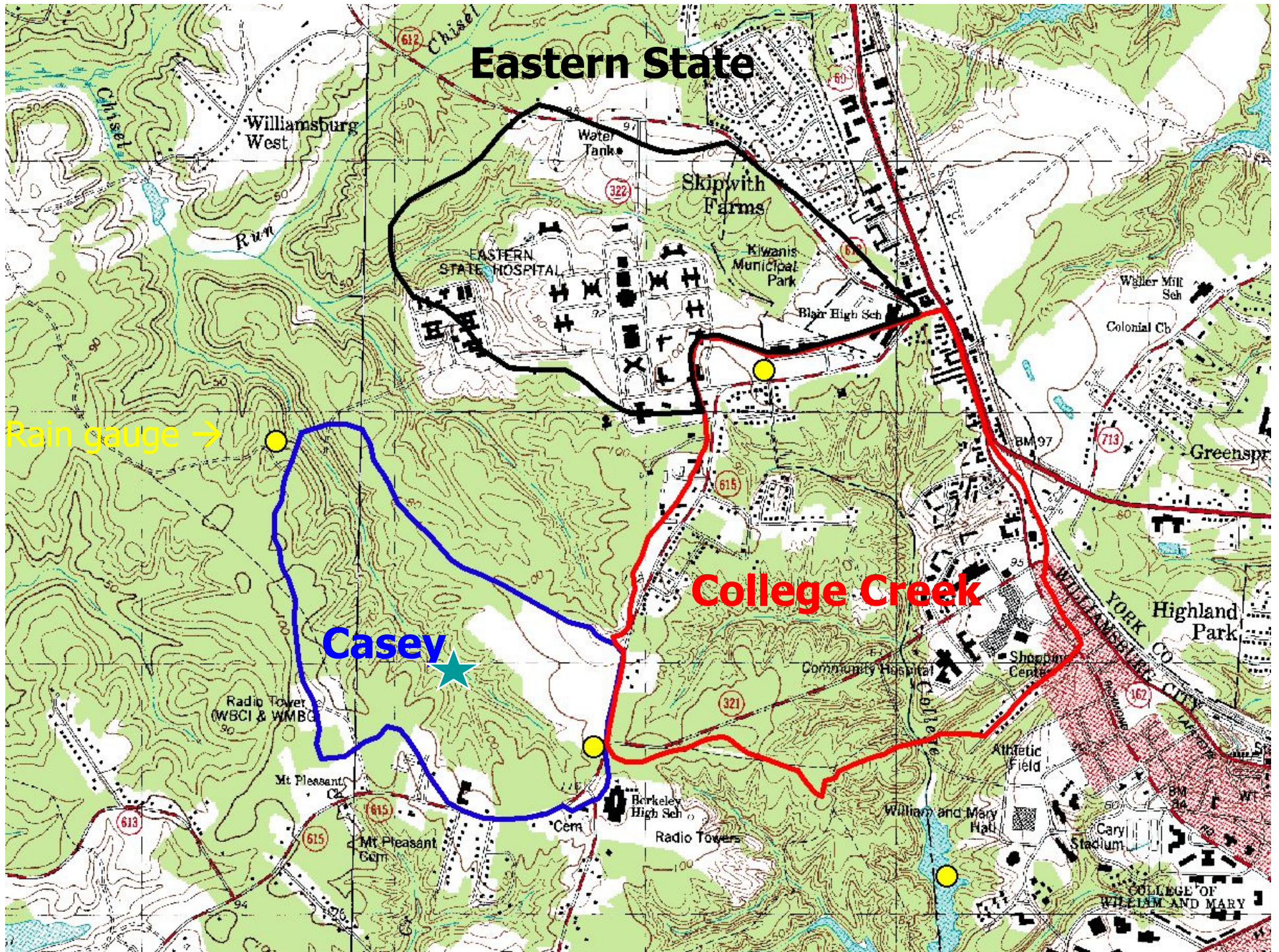
# Study Sites—General

- Williamsburg area
  - Casey property (small BMP)
  - Lowe's (large BMP)
  - College Creek
  - Eastern State
- All basins 1-2 km<sup>2</sup>, first-order streams
- Basin makeup using GIS

## Land Use in Study Sites







**Eastern State**

**College Creek**

**Casey**

Rain gauge →

Williamsburg West

EASTERN STATE HOSPITAL

Skipwith Farms

Kiwanis Municipal Park  
Blair High Sch

Waller Mill Sch  
Colonial Cl

Greenspr

Highland Park

Radio Tower (WBCI & WBNC)

Mt Pleasant Ck

Mt Pleasant Cem

Berkeley High Sch

Cem  
Radio Towers

Community Hospital  
College

Shopping Center

Athletic Field

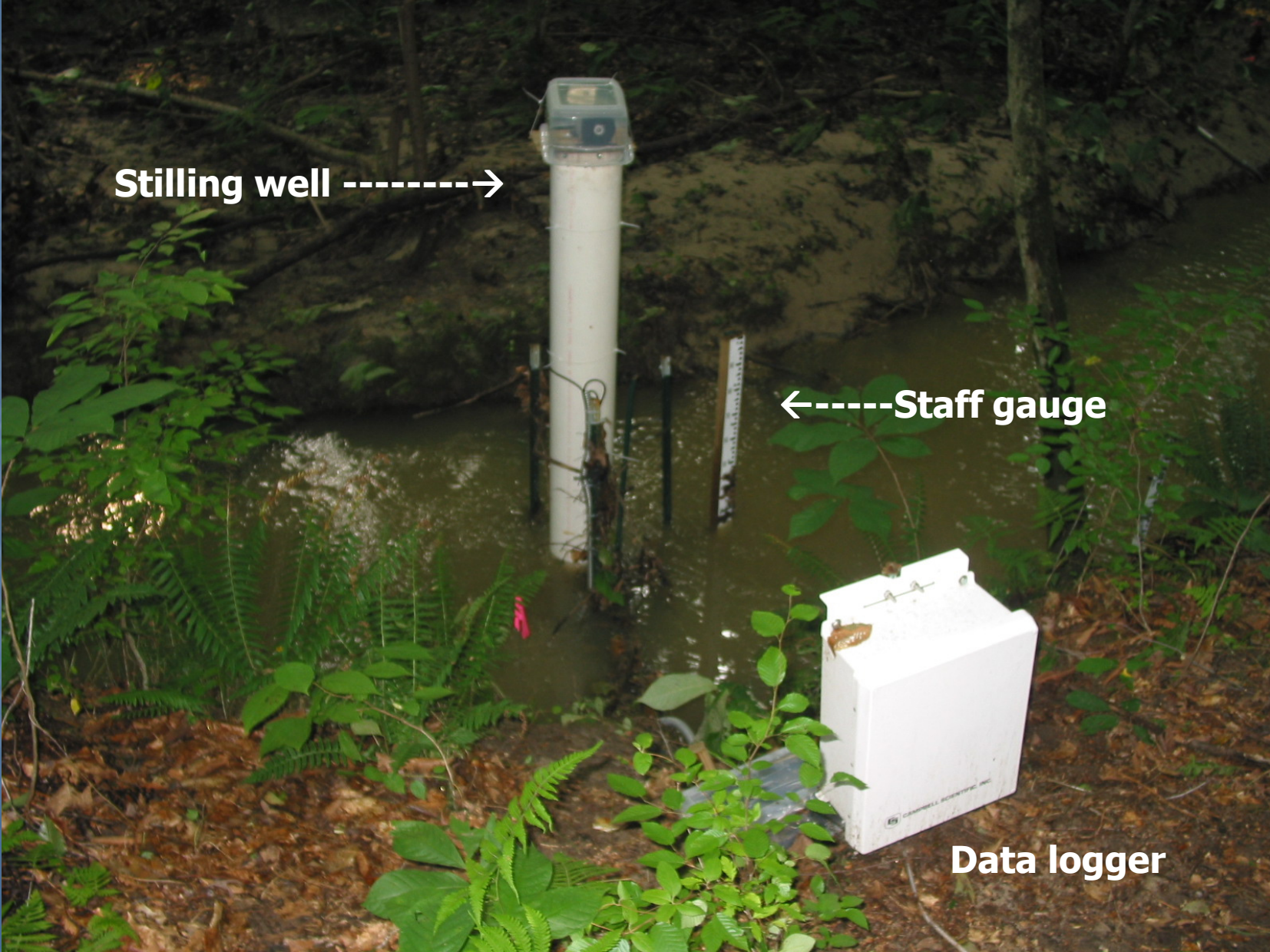
William and Mary Hall

Cary Stadium

COLLEGE OF WILLIAM AND MARY

YORK CO  
WILLIAMSBURG CITY

# Equipment Setup



Stilling well ----->

<-----Staff gauge

Data logger

# Data Analysis

- Weighted Rainfall
  - Two-axis method
  - Determining representative rainfall amounts for each basin
- Getting Discharge
  - Salt dilutions
    - Using concentration to determine discharge
  - Cross sections and velocity measurements

We have all the data...  
Now what??

Stay tuned for  
Jerod's presentation!