Indian Creek Sediment Allocations Update Webinar

Jennifer Sincock
U.S. Environmental Protection Agency
February 11, 2016

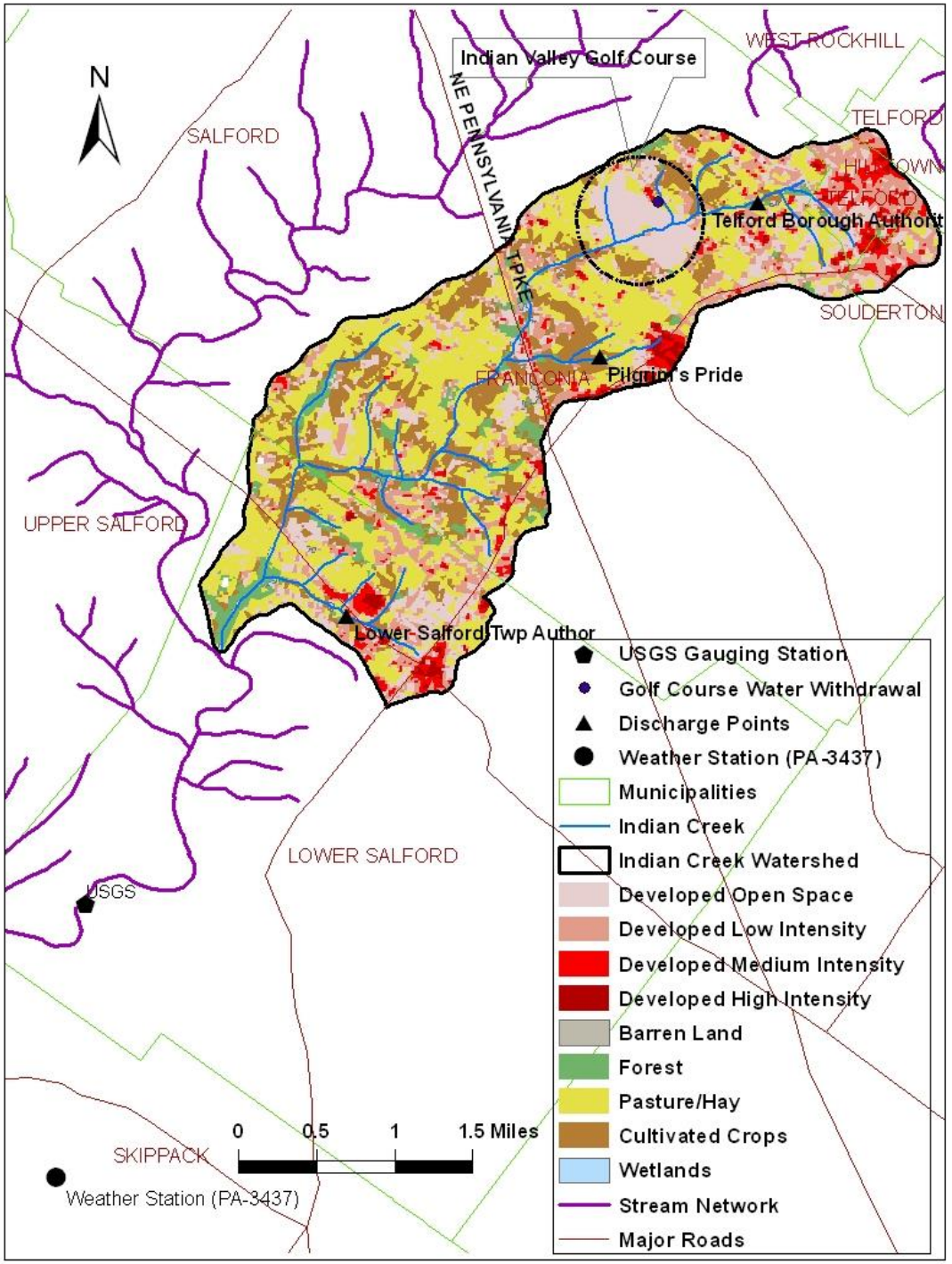
Overview

- Welcome
- Background
- Project Plan Update
  - Reference Watershed
  - Stream Channel Survey
- Data Needs
- Questions?

Background

- June 30, 2008 – EPA established Indian Creek TMDL for nutrients and sediment.
- March 21, 2014 – EPA reconsideration decision regarding the Indian Creek Sediment TMDL
  - Confirmed concerns that the reference watershed approach and sediment loading rates should be revisited.
- April 3, 2014 – Voluntary remand of Indian Creek Sediment TMDL granted.

Indian Creek Watershed



Indian Creek is impaired for sediment

- All data to date support PADEP's identification of siltation (sediment) impairment in Indian Creek
- Since Pennsylvania does not currently have numeric criteria for sediment, EPA interpreted Pennsylvania's existing narrative standard at 25 PA Code Section 93.6(a) & (b):

  Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life; and In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances which produce color, tastes, odors, turbidity or settle to form deposits.

Sediment Allocations Project Plan

- Generalized Watershed Loading Function (GWLF) model
- Reference watershed approach
- Use local data (as available)
- Seek feedback on approach/assumptions with stakeholders

Key Areas for Consideration

- Accounting for stream bank erosion
- Determining an appropriate reference stream
- Updating land use data
- Refinement of MS4 allocations

The GWLF Model

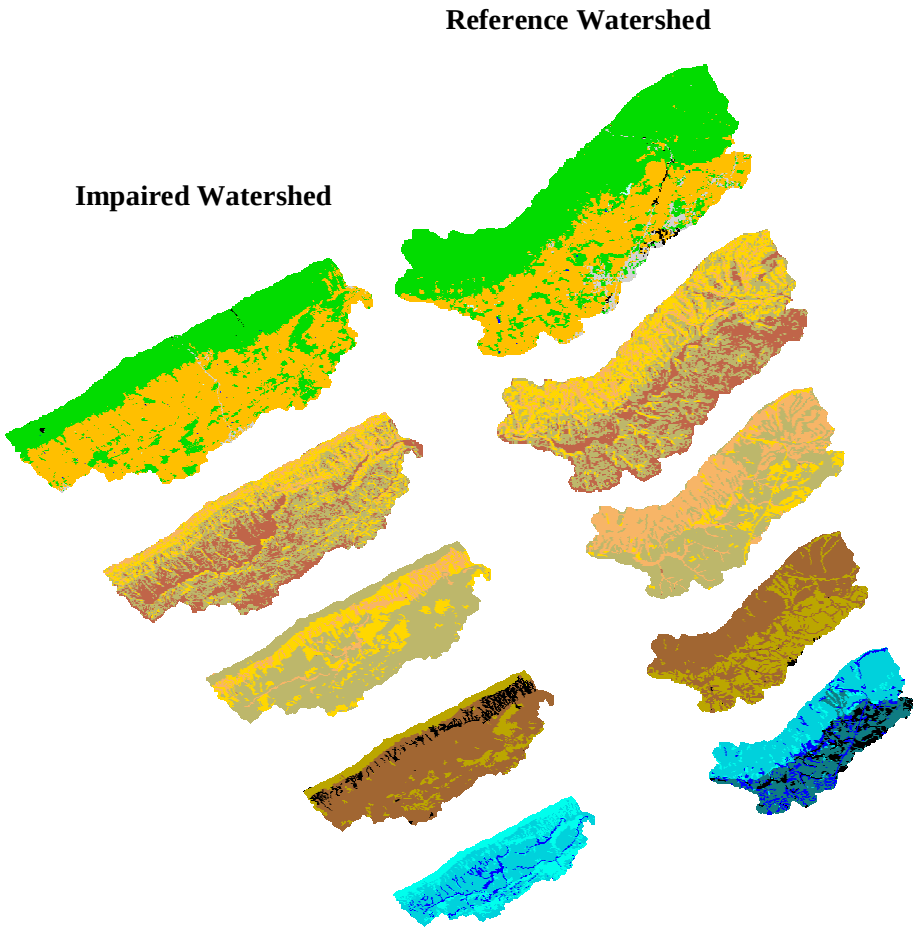
- Widely accepted model for sediment loads in streams
- Capable of modeling streambank erosion
- Continuous-simulation
- Spatially-lumped
- Daily time step for water balance
  - Calibrated to monitored data
- Monthly time step for pollutant loading
  - Effective for modeling annual loads, but generally not possible to calibrate
- Consistency in modeling the target and reference watersheds is vitally important

Stream Bank Erosion in GWLF

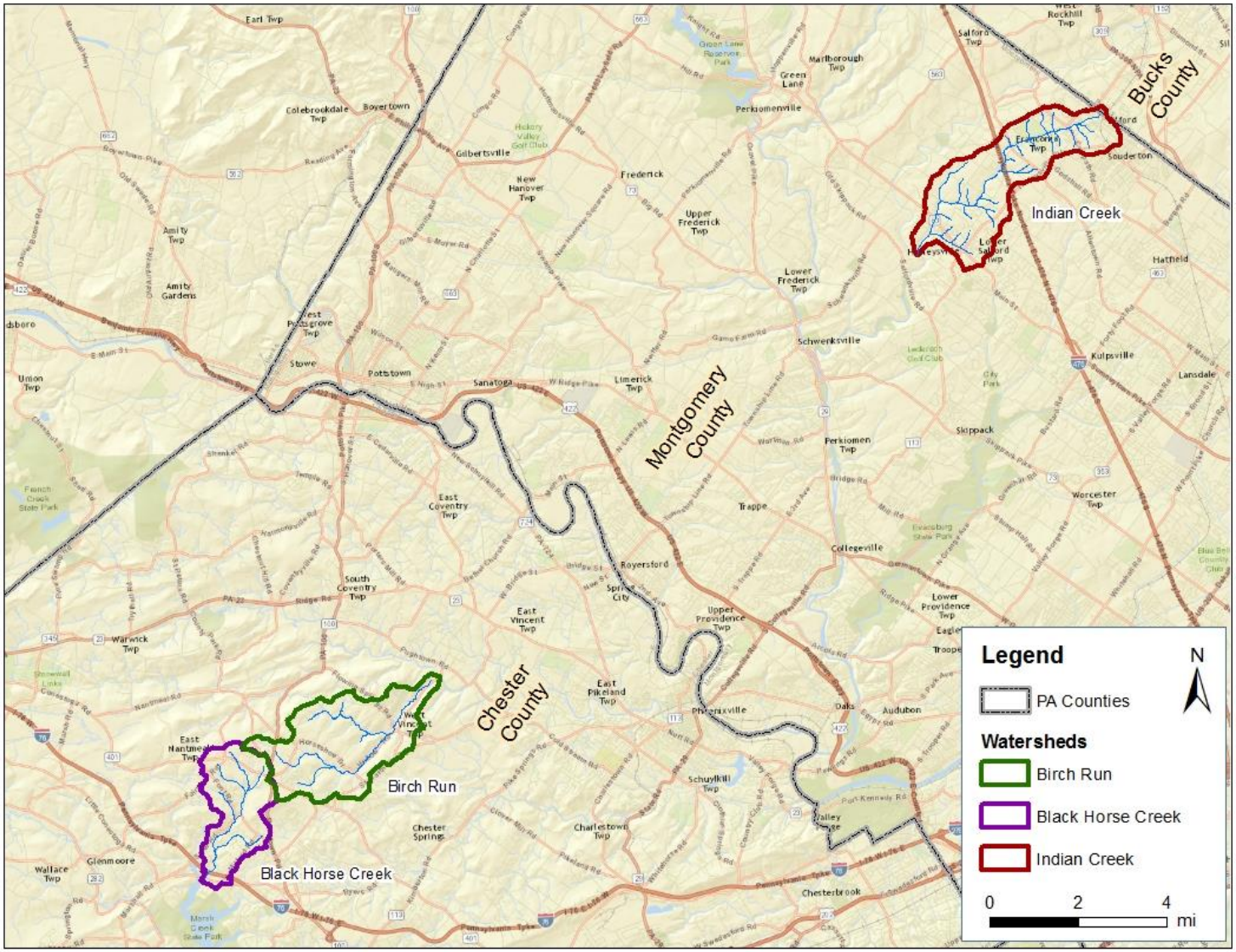
- Model inputs affecting stream bank erosion
  - Amount of developed land
  - Livestock density
  - Runoff potential (curve number)
  - Soil erodability
  - Slopes

Reference Watershed

- Non-impaired with similar characteristics
  - Land use
  - Watershed size
  - Soils
  - Topography
  - Stream order
  - Ecoregion
- Land use represents human impacts
- Other factors affect aquatic life potential



Reference Watersheds Considered



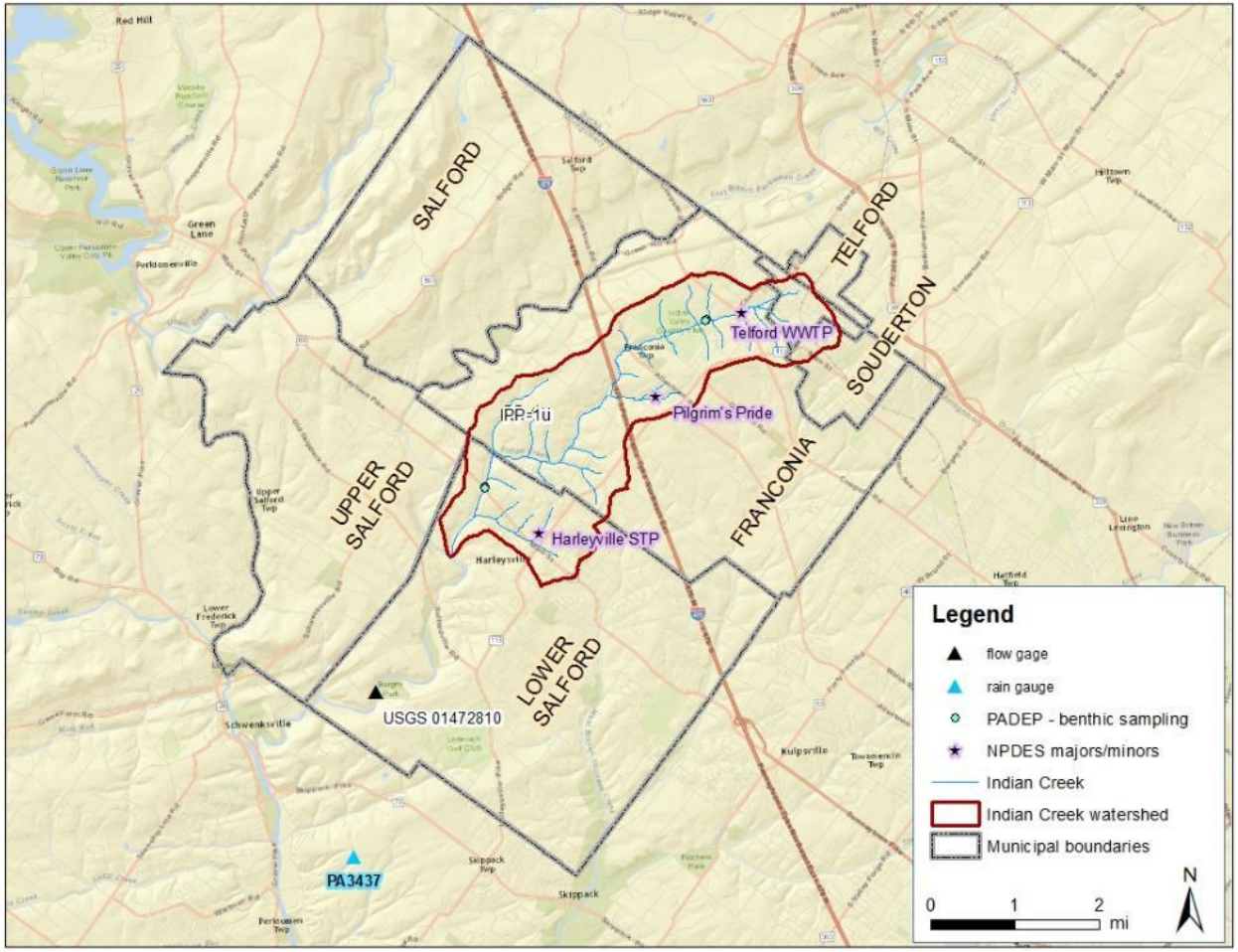
Reference Watersheds Considered

Watershed Properties	Indian Creek	Birch Run	Black Horse Creek
County	Montgomery	Chester	Chester
HUC	2040203	2040203	2040205
Discharges to Watershed	East Branch Perkiomen	French Creek	Marsh Creek
Square Miles	7	6.5	3.8
Benthic Macroinvertebrate IBI Score	30.3	74.6	62.3
IBI Date	9/6/2013	4/26/2012	4/22/2008
Watershed Characteristics:			
Stream Order	3	3	3
Slope (percent)	5.93	5.58	8.85
Aspect (degrees)	200.69	192.60	189.51
Soil Characteristics			
Hydrologic Group (avg)	2.75591	2.177083	2.177083
Erodibility Kf factor	0.30033	0.426898	0.426898
Available Water Capacity	0.116595	0.131346	0.131346

Reference Watershed Chosen

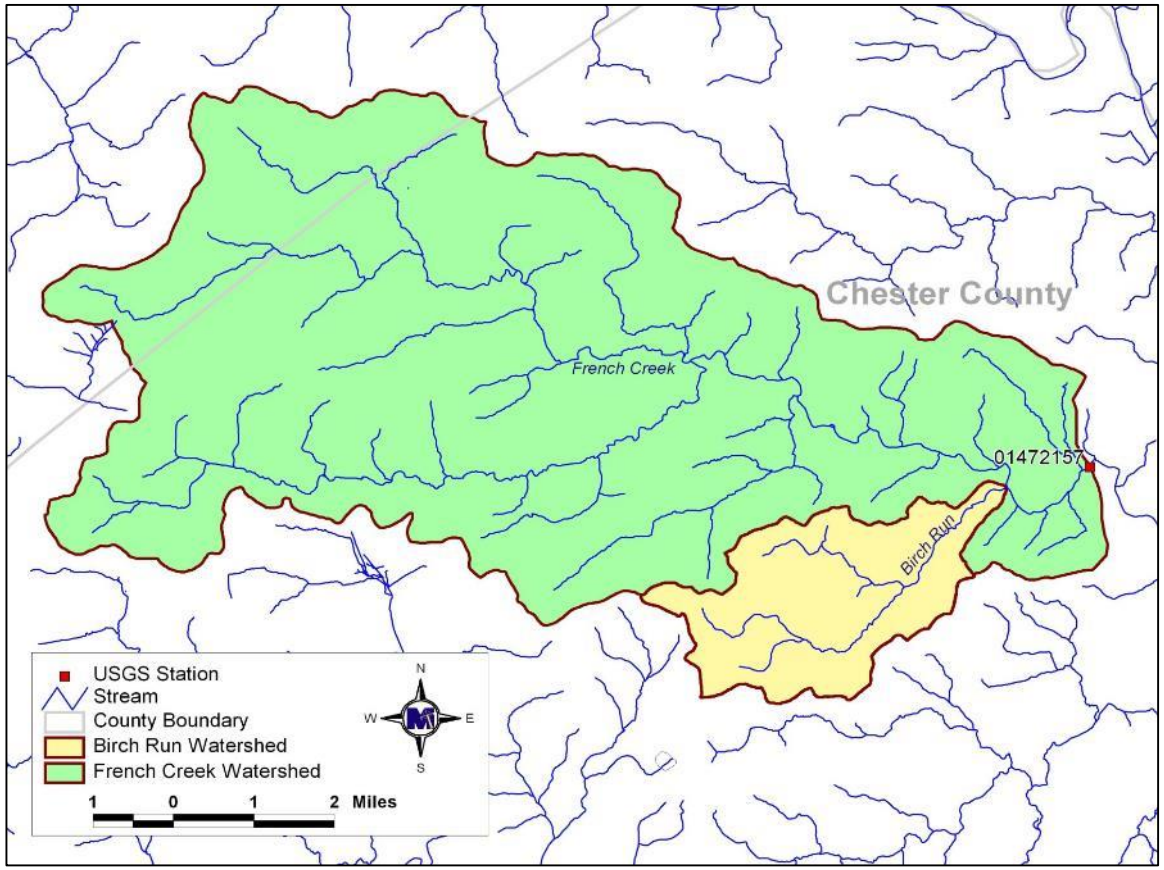
- Birch Run
  - Unimpaired
  - Similar in Size to Indian Creek
  - Same Eco Region
  - Similar Watershed Characteristics
  - Similar Soil Characteristics
  - Similar Landuses

Hydrologic Model Calibration



Indian Creek
USGS 01472810 located on East Branch Perkiomen Creek was used for hydrology calibration

Hydrologic Model Calibration



Birch Run
USGS 01472157 located on French Creek will be assessed for hydrology calibration

Local Data Needs

- MS4 boundaries
- Land use/cover
- Impervious surfaces
- Soils
- Topography
- Livestock numbers
- BMP data
  - Type
  - Location
  - Area treated
  - Efficiency

- In the absence of local data, the best available national/regional/state data will be used

Local Data Received

- GIS Information
- Maps
- Livestock Numbers
- Permit Information
- Photos
- Monitoring Data
- Watershed Plans
- BMPs Completed
- Conservation Tillage Data
- Stream Channel Surveys

Chester Co.
Chester Co. Cons. District
Conservation Tech. Info. Center
Franconia Township
Lower Salford Township
Montgomery Co. Cons. District
PADEP
PennDOT
PA Turnpike Commission
Telford Borough Authority
USEPA, Region III
USGS

Data Requested for Birch Run Watershed from Local Stakeholders

- Local land-cover data
  - Developed areas ***(GIS data layer or percentage of developed area in the watershed)***
  - Impervious Areas ***(GIS data layer or percentages of impervious area in the watershed)***
- BMPs
  - Area treated (drainage) ***(GIS data layer, or percentages of treated area)***
  - Outfall location ***(GIS data layer or a description of the location)***
  - Sediment trapping efficiency ***(A percentage load or concentration reduction for each/any BMPs that have been studied.)***
- Photos of streambank erosion in the watershed
- MS4 permits
  - Delineation/description of permit areas ***(GIS data layer or a narrative description)***
  - Delineation/description of contributing drainage areas ***(GIS data layer or drainage acreage(s) within the watershed)***
- Livestock numbers and locations (animal density is an input to the GWLF model for calculating streambank erosion)

Data Requested for Birch Run Watershed from PADEP

- Information on all permits, particularly those containing Total Suspended Solids (TSS) or Settleable Solids (SS) permit limits (*e.g.*, NPDES, general construction permits, single family home discharge permits).
  - Permit Number
  - Location
  - Permitted or design flow
  - Disturbed/controlled area, if stormwater related (*e.g.*, construction permits)
  - Permit limits on solids
  - Monitored data (*e.g.*, discharge monitoring report - DMR), if available
- MS4 monitoring data if any is available.
- Water quality monitoring data, specifically TSS data.
- Recent benthic macroinvertebrate sampling data.

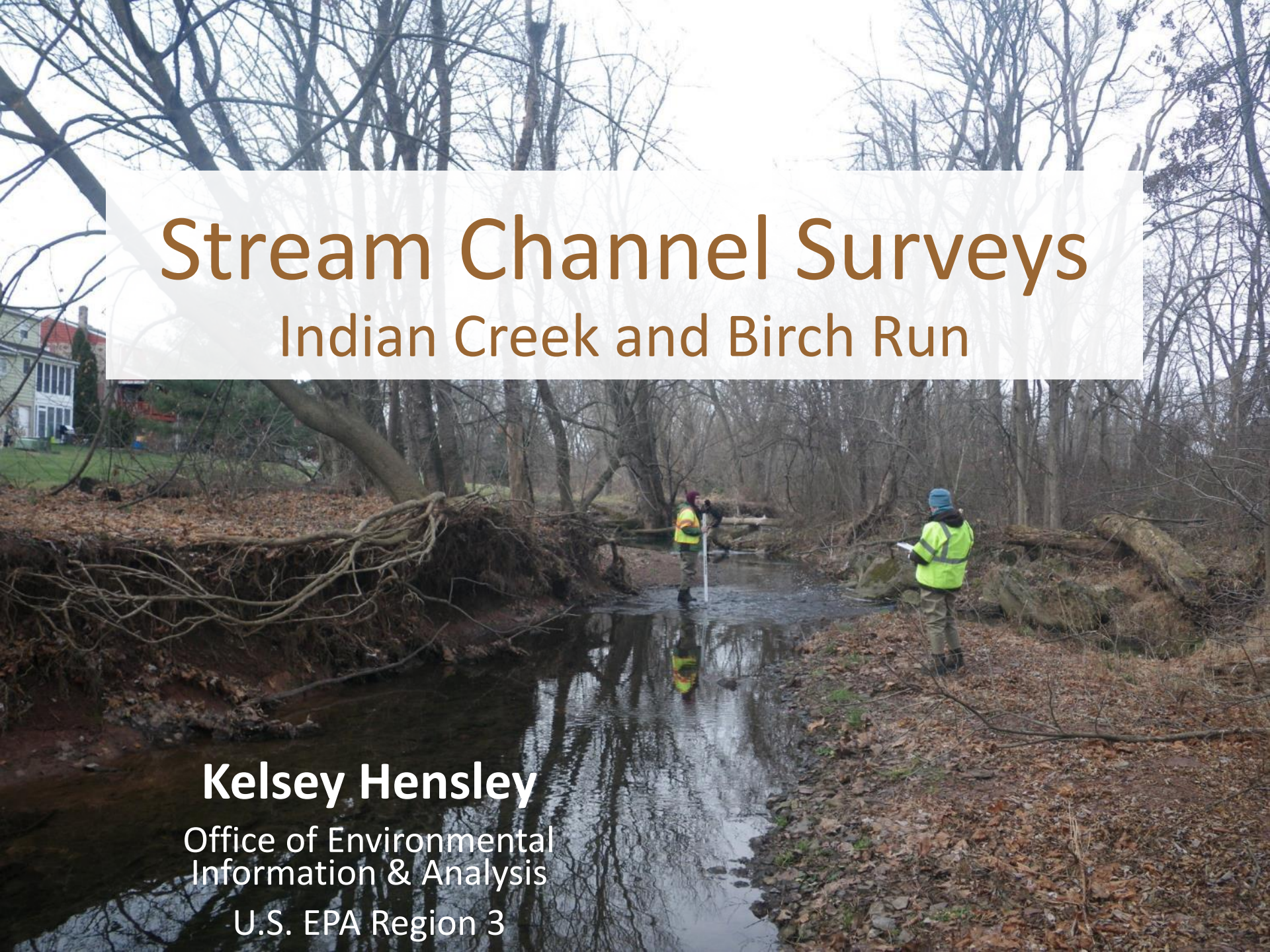
Timeline

Milestone	Date
Notification of potential local data for Birch Run to EPA	16-Feb-2016
Final deadline for providing local data for Birch Run to EPA	**1-Mar-2016**
Completion of water quality modeling	29-Apr-2016
Presentation of the new existing sediment loads (stakeholder meeting)	10-Jun-2016
Presentation of the new sediment allocations (stakeholder meeting)	30-Sep-2016

Final Deadline to Submit Local Data is March 1, 2016

Please send data to:

Jennifer Sincock
Office of Standards, Assessment, and TMDLs
Water Protection Division
U.S. EPA Region III
1650 Arch Street (3WP30)
Philadelphia, PA 19103
(215) 814-5766
sincock.jennifer@epa.gov



Stream Channel Surveys

Indian Creek and Birch Run

Kelsey Hensley

Office of Environmental Information & Analysis

U.S. EPA Region 3

Indian Creek Pre-Sediment TMDL

ArcView Generalized Watershed Loading Function simulates:

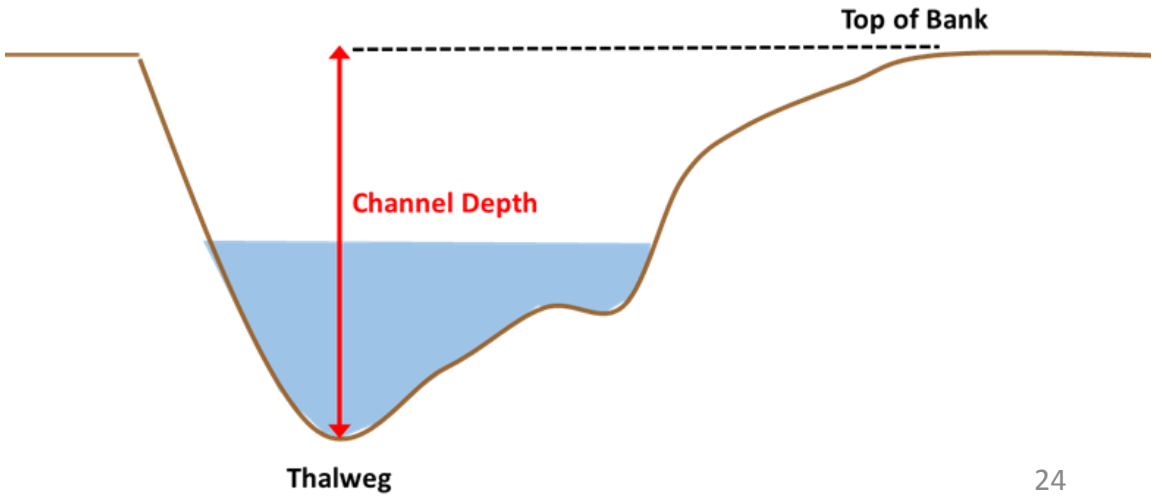
- surface runoff
- streambank erosion

Streambank Sediment Load =

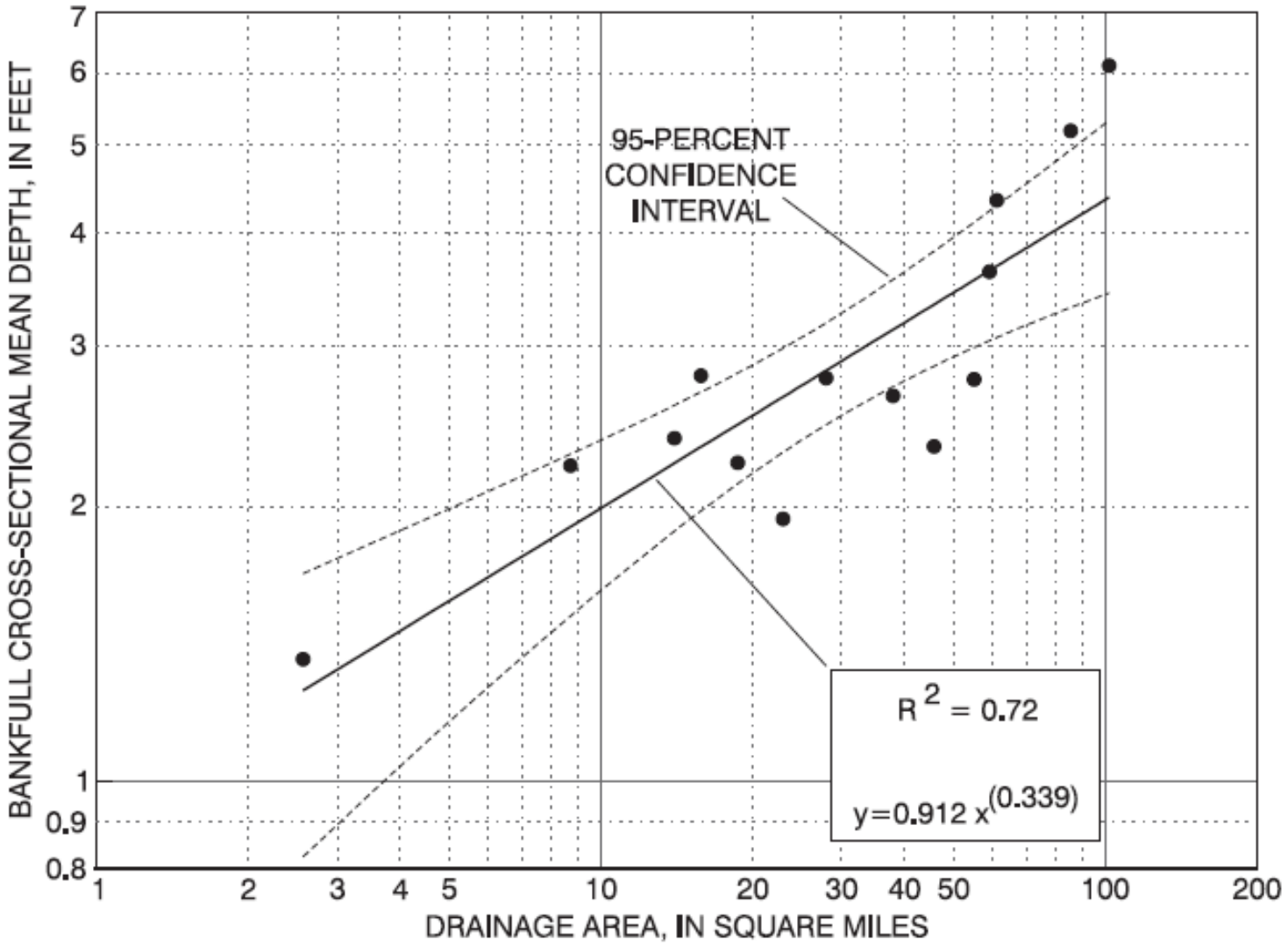
lateral erosion rate x stream length x soil bulk density x **mean channel depth**

Mean Channel Depth

- Literature values
- USDA-NRCS regional curves
- Site-specific measurements



Mean Channel Depth – Regional Curves



Cinotto, (2003). Development of regional curves of bankfull-channel geometry and discharge for streams in non-urban, Piedmont Physiographic Province, Pennsylvania and Maryland. Water-Resources Investigation Report 03 4014: USGS, New Cumberland, PA

Site Selection

Hydrography

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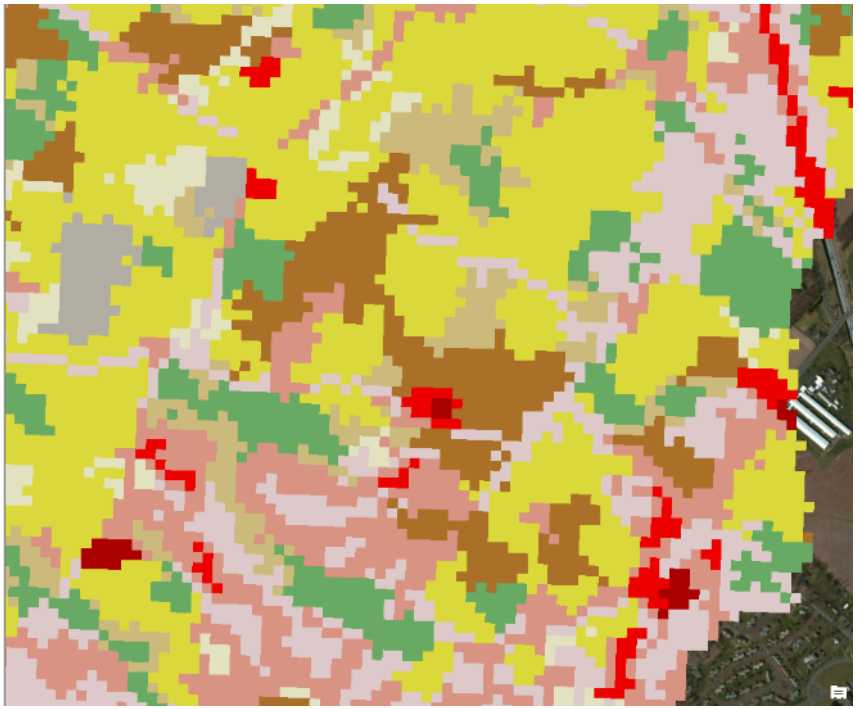
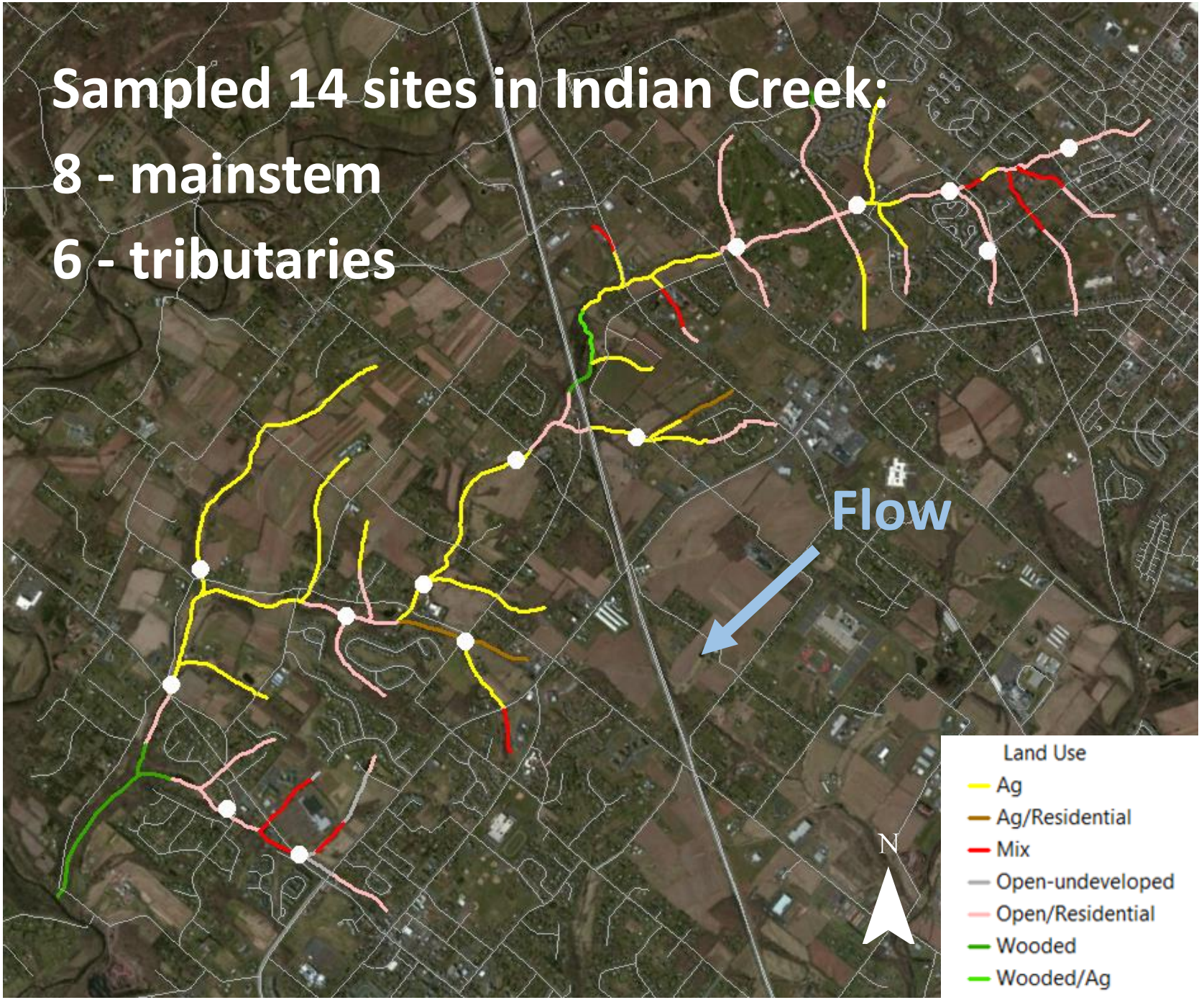
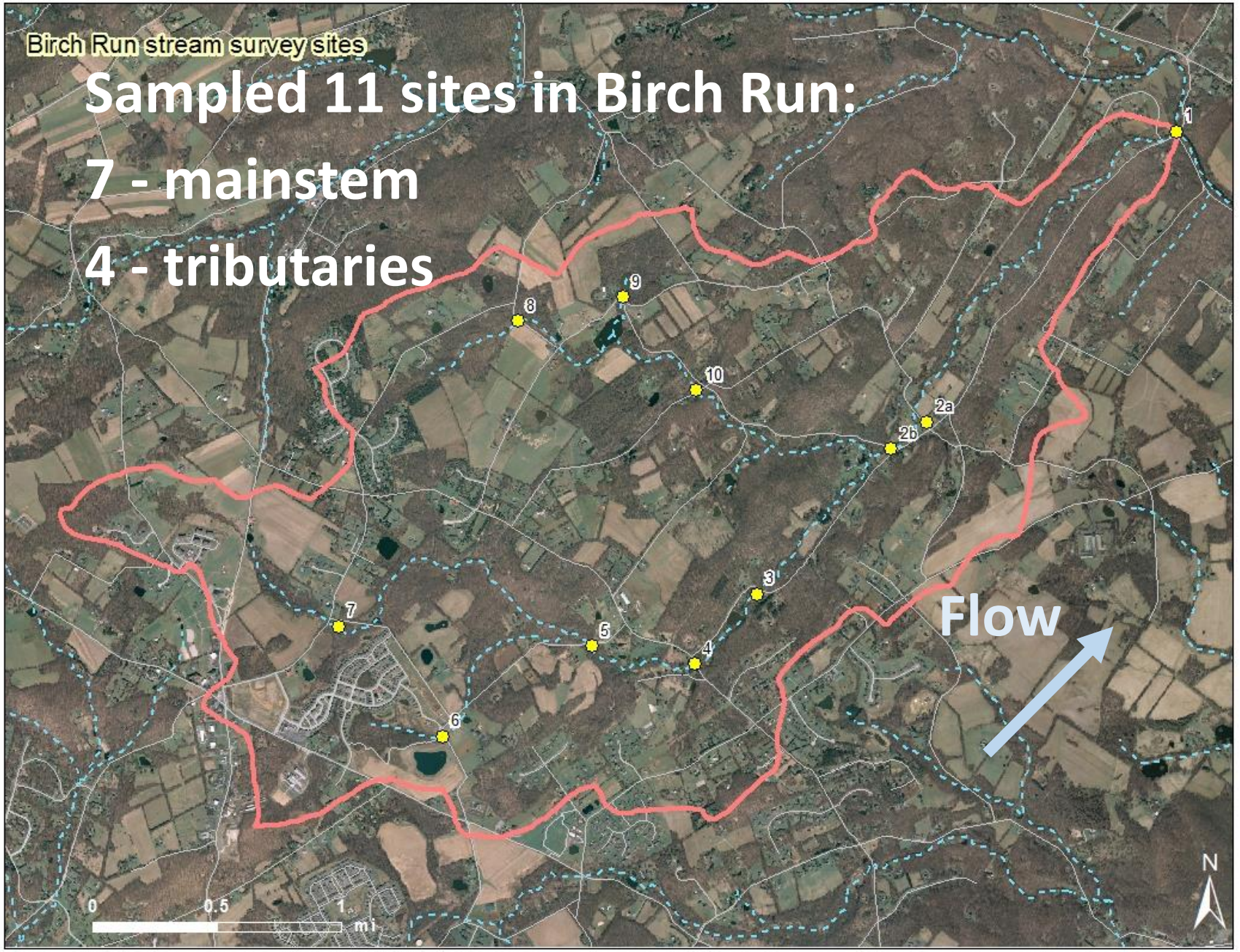


National Land Cover Database (NLCD)


Sampled 14 sites in Indian Creek:
8 - mainstem
6 - tributaries
Flow
N
Land Use
Ag
Ag/Residential
Mix
Open-undeveloped
Open/Residential
Wooded
Wooded/Ag


Birch Run stream survey sites
Sampled 11 sites in Birch Run:
7 - mainstem
4 - tributaries
1
2a
2b
3
4
5
6
7
8
9
10
Flow
N
0
0.5
1
mi

Data Collected

- **Channel Depth**

Data Collected

- **Channel Depth**
- Land use
- Flow condition
- Riparian vegetation
- Streambank condition (bank angle, surface protection, observable erosion, etc)

Mean Channel Depth

Average measurements

Indian Creek – 1.5m

Birch Run – 0.6m

Streambank Sediment Load =

lateral erosion rate x stream length x soil bulk density x **mean channel depth**

Questions?

Questions?

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Map Tech:

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- James Kern jkern@maptech-inc.com