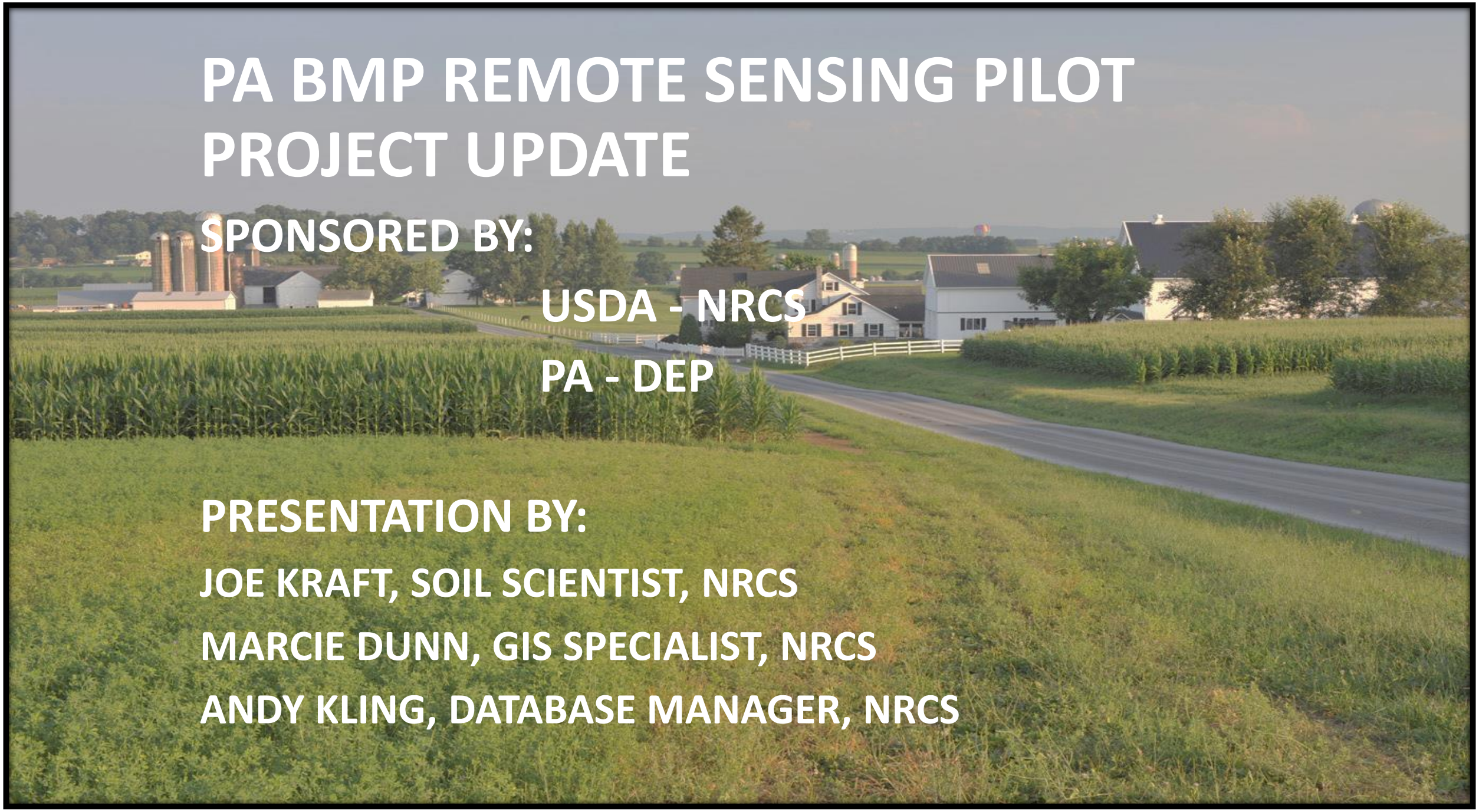


PA BMP REMOTE SENSING PILOT PROJECT UPDATE

SPONSORED BY:

USDA - NRCS

PA - DEP

PRESENTATION BY:

JOE KRAFT, SOIL SCIENTIST, NRCS

MARCIE DUNN, GIS SPECIALIST, NRCS

ANDY KLING, DATABASE MANAGER, NRCS

Remote Sensing Pilot Project: Potomac Watershed- Pennsylvania

- Provides assurance the Commonwealth is receiving proper credit for Best Management Practices (BMPs) installed without State and Federal cost-share
- Uses a statistically reliable data collection method, in a cost-effective manner
- Determines effectiveness of counting best management practices (BMPs) using aerial photography, reducing the need to visit over 30,000 farms in Pennsylvania's Chesapeake Bay Watershed
- Involves National Office, Remote Sensing Lab, NGCE, EPA, PA-NRCS, and PA Department of Environmental Protection Agency.

PA Remote Sensing Pilot
Project Overview

Summary of Partnership Input and Collaboration:

2/14 - White Paper submitted to NRCS Leadership

3/14 - Briefing to NRCS Chief for Agency Support / Approval

4/14 - Briefing with EPA

PA Remote Sensing Pilot
Project Overview

- Summary of Partnership Input and Collaboration:

4/14 - Preliminary Comments & Questions from EPA & CBP Modeling Team:

Kelly Shenk, Gary Shenk, Jeff Sweeny, Rich Batiuk, Rich Simms, Dan Good, Dorsey Plunk, Denise Coleman, Susan Marquart, Joe Kraft

6/14 - Vetting and Support from Chesapeake Ag Workgroup Committee, College Park, MD

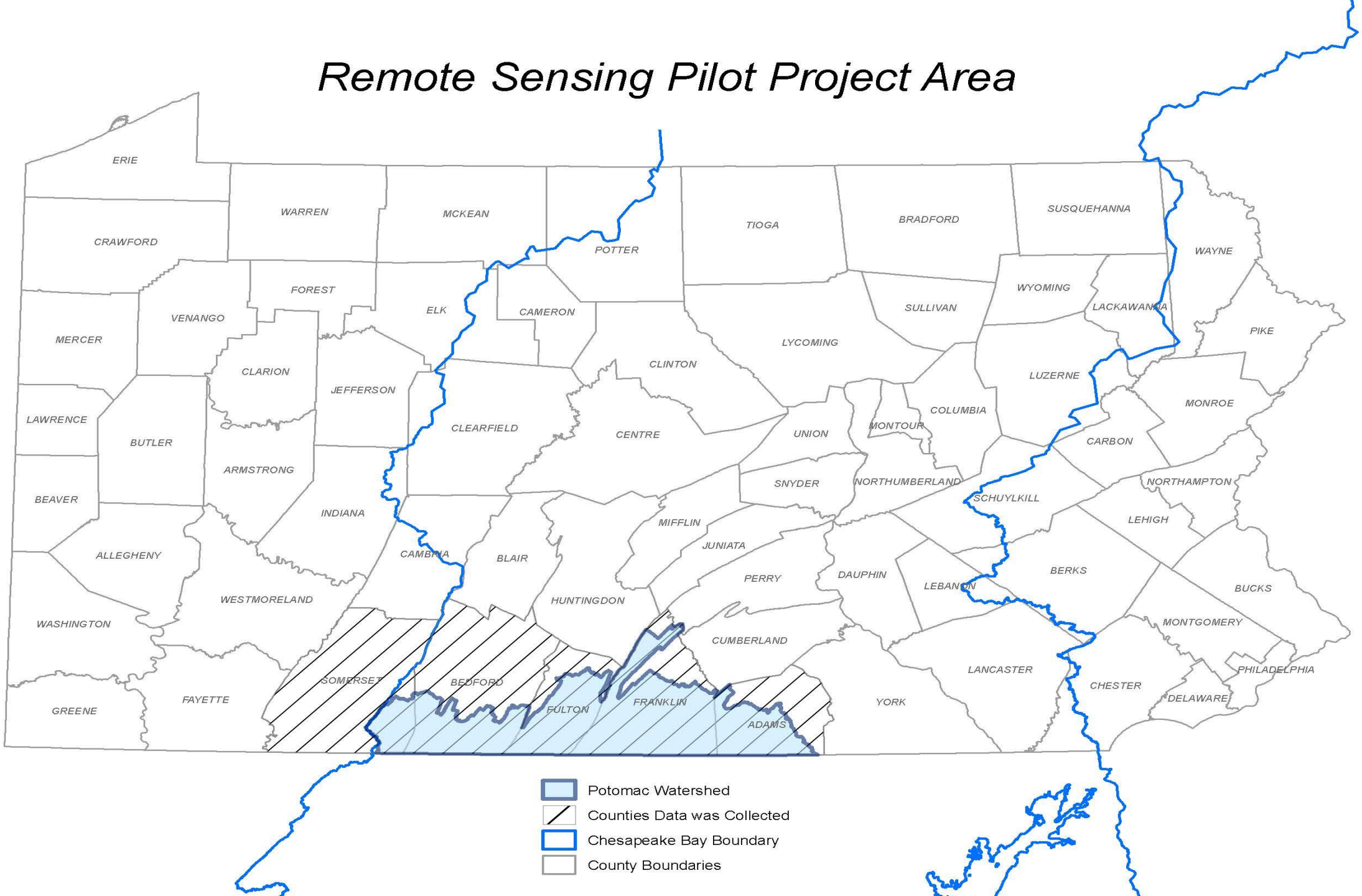
Rich Sims, Denise Coleman and Andy Zemba

It was determined there were 28 conservation practices that were important to collect -

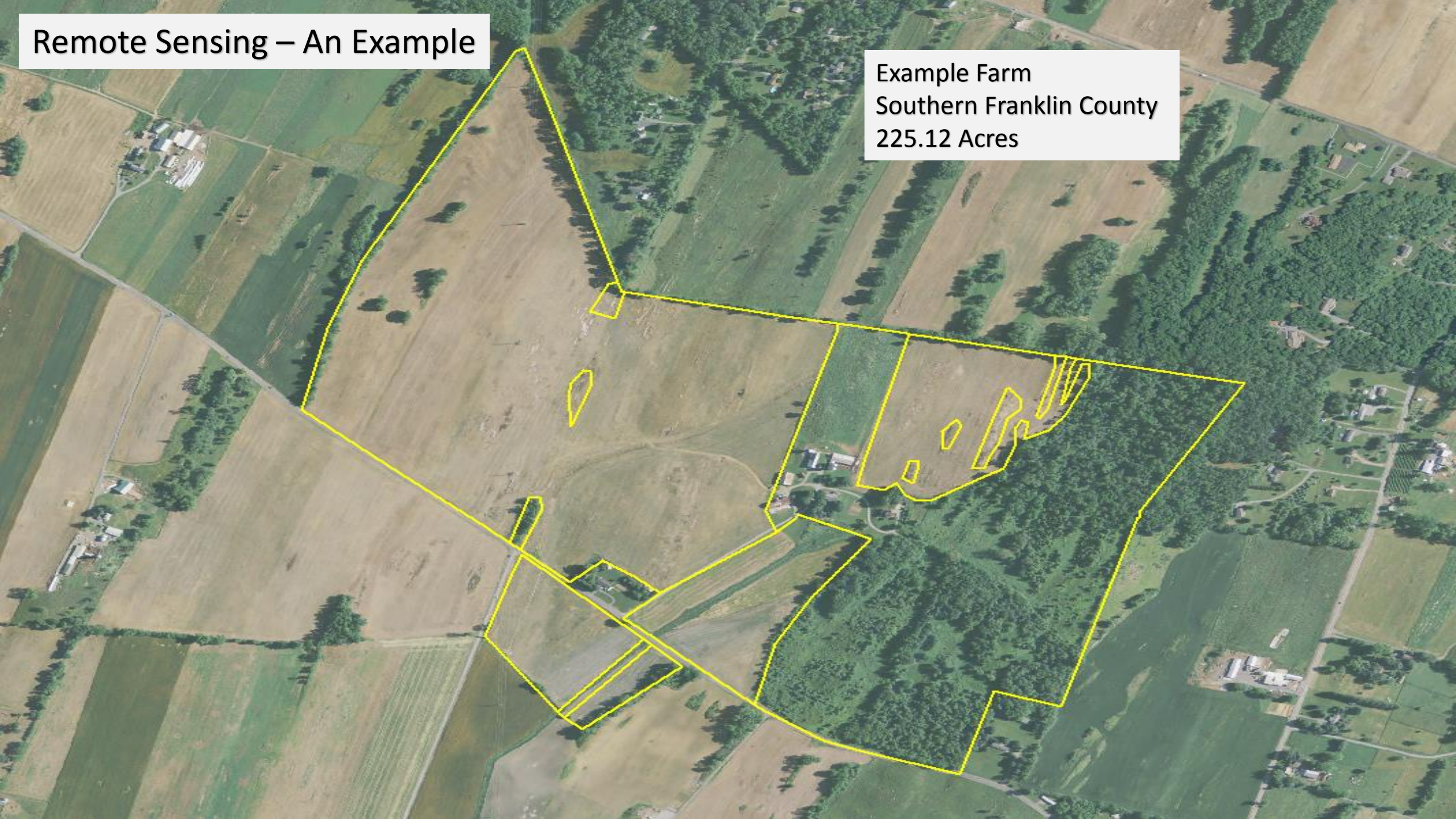
- Diversion
- Windbreak/ Shelterbelt
- Pasture Fence
- Field Border
- Lined Waterway or Outlet
- Roof Runoff Structure
- Animal Trails and Walkways
- Terrace
- Vegetative Barrier
- Animal Waste Storage
- Animal Mortality Facility
- Composting Facility
- Spring Development
- Waste Treatment
- Waste Treatment Lagoon
- Water and Sediment Control Basin
- Contour Farming
- Contour Orchard
- Contour Buffer Strips
- Cover Crop
- Riparian Buffer
- Access Control
- Prescribed Grazing
- Heavy Use Area Protection
- Stripcropping
- Tree and Shrub Establishment
- Vegetated Area
- Grassed Waterway

A crosswalk was needed because the practices in the Bay Model are not named consistently with NRCS practice codes.

Remote Sensing Pilot Project Area



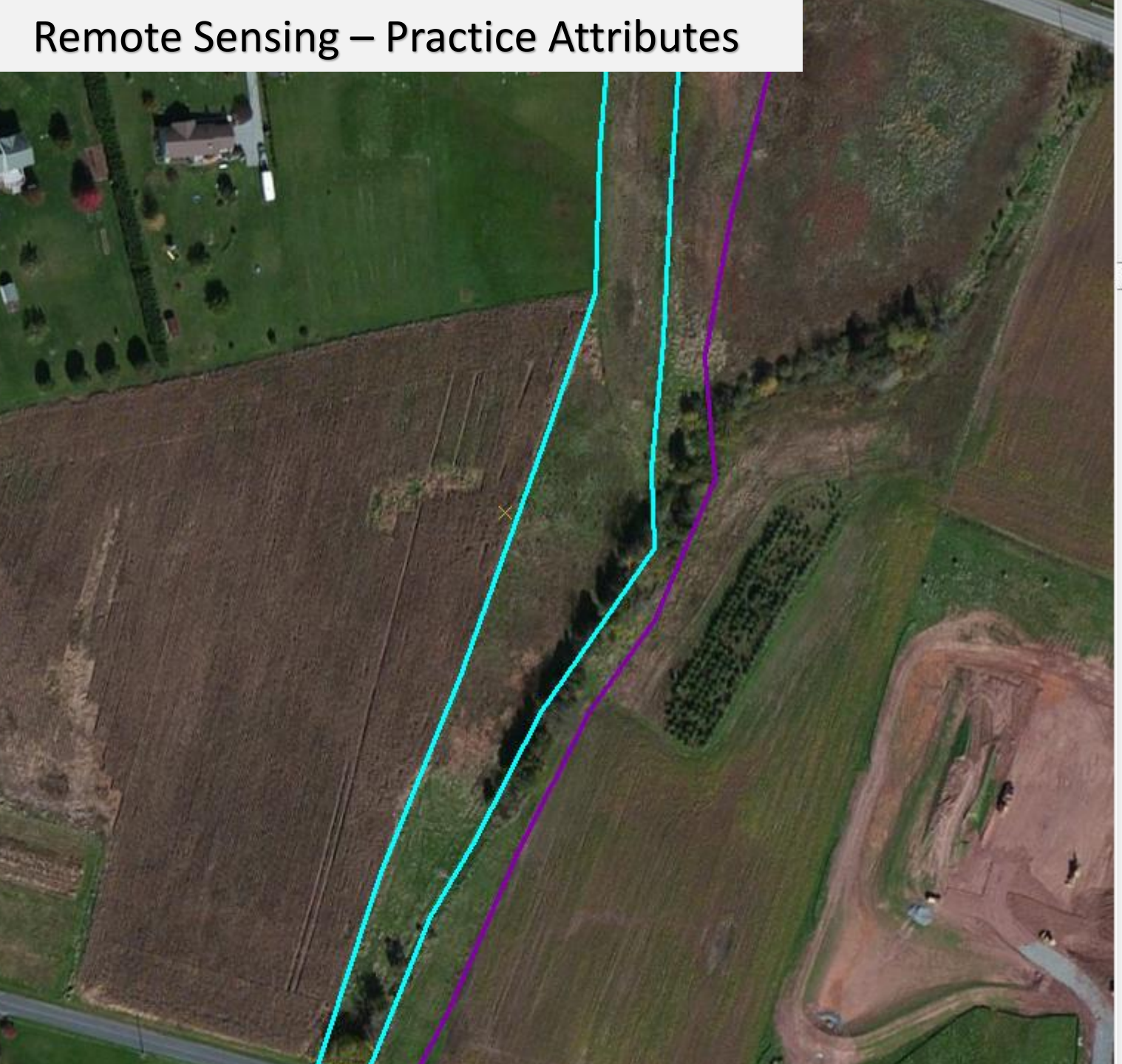
Remote Sensing – An Example



Remote Sensing – How it Was Systematically Analyzed

<u>Grids</u> – Grids were set up to track the areas complete. Once the grid area was check for practices it was marked ‘Complete’ in the database along with a date and initials of the data collector.
This farm has 48 grids.

Remote Sensing – Practice Attributes



Forest or Grassland buffer?

OBJECTID	4381
practice_group	<Null>
Practice_Code	riparian buffer
applied_amount	<Null>
measurement_unit	<Null>
applied_date	<Null>
operation_type	<Null>
type_name1	Forest or Grassland buffe
type_value1	grassland
Var_name_1	Land Use Before Buffer
Var_Value_1	Associated Ag land
Var_Name_2	Buffer Length
Var_Value_2	1150
var_name_3	Fenced?
var_value_3	NO
var_name_4	Feet of Stream Fenced
var_value_4	1150
var_name_5	<Null>
var_value_5	<Null>
CAFO	<Null>
farm_number	<Null>
tract_number	<Null>
land_unit_number	<Null>

Fence / Pasture Fence
Lined Waterway or Outle
Roof Runoff Structure
Terrace
Vegatative Barrier
Windbreak, Shelterbreak

Collect_Points

- animal mortality
- animal waste storage
- composting facility
- spring development
- waste treatment
- waste treatment lagoon
- water and sediment cont

Collect_poly

- access control
- contour buffer strips
- contour farming
- contour orchard
- cover crop
- Field Border
- grassed waterway
- heavy use area protectio
- prescribed grazing
- riparian buffer
- strip cropping
- tree and shrub establishr
- vegetated treatment area

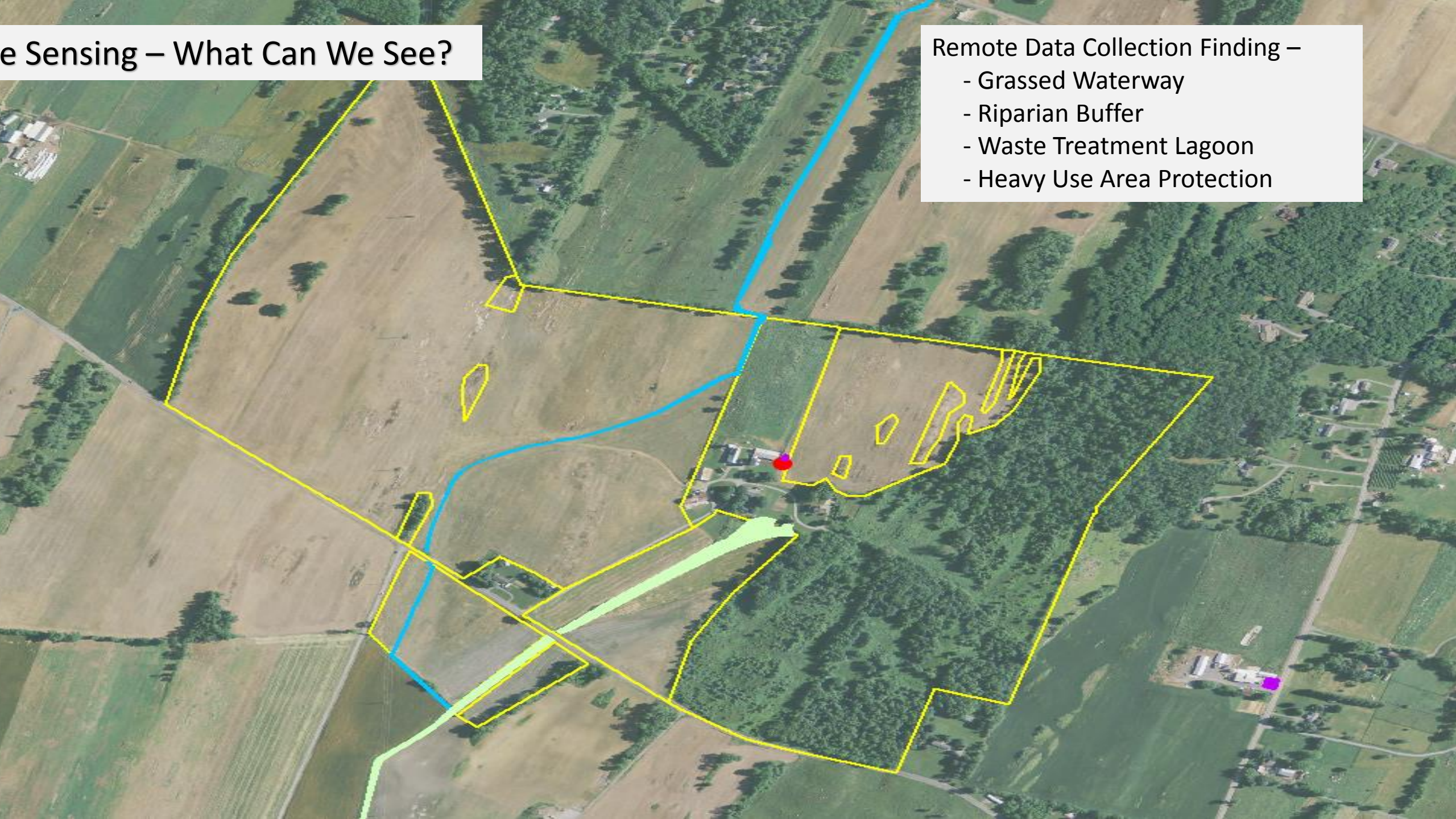
Construction Tools

- Polygon
- Rectangle

e Sensing – What Can We See?

Remote Data Collection Finding –

- Grassed Waterway
- Riparian Buffer
- Waste Treatment Lagoon
- Heavy Use Area Protection



Database Attributes on Practices Collected

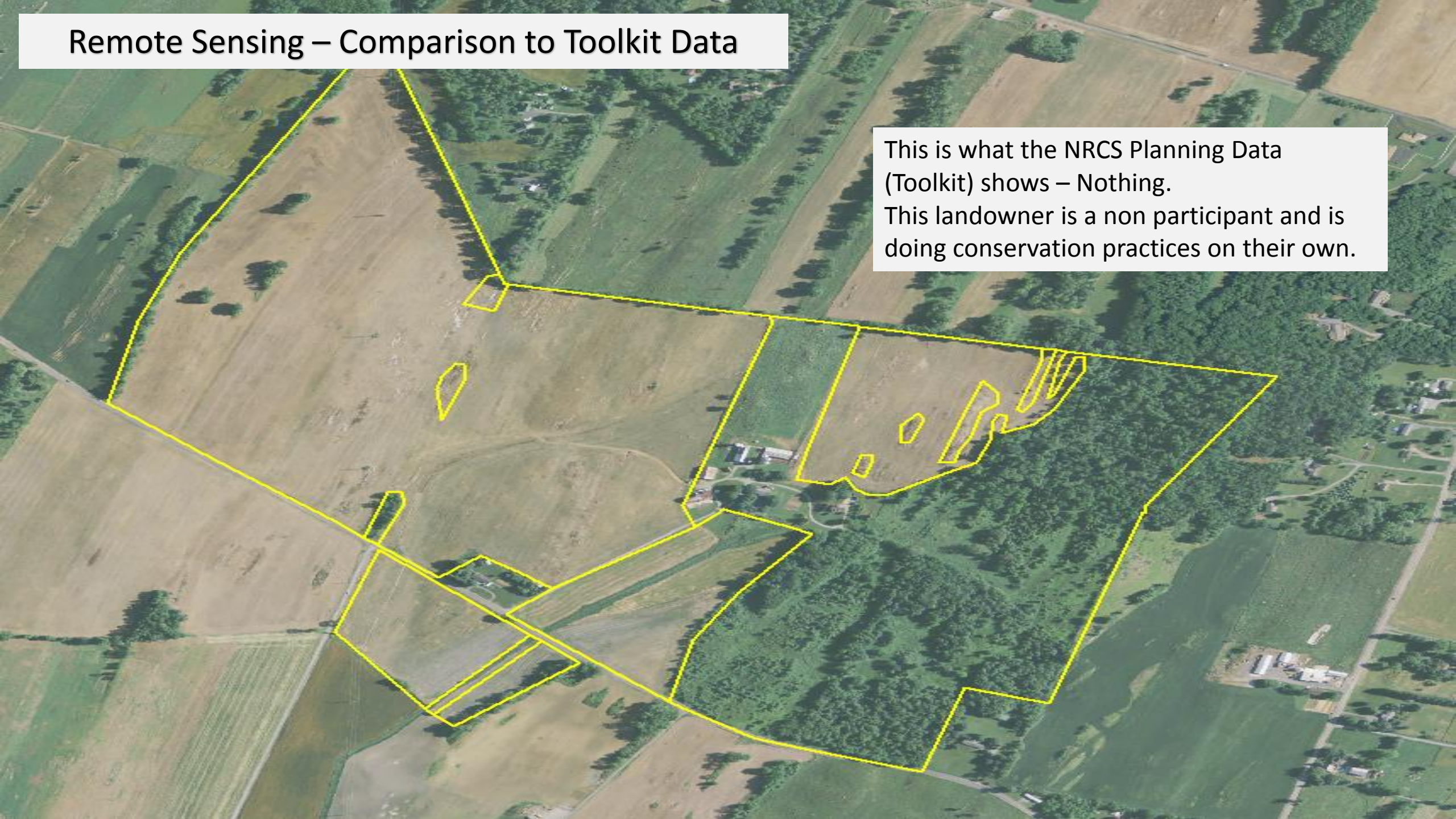
Practice_Code	riparian buffer
applied_amount	0.615587
measurement_unit_display	acres
applied_date	<null>
operation_type	<null>
type_name1	Forest or Grassland buffer?
type_value1	grassland
Var_name_1	Land Use Before Buffer
Var_Value_1	Crop
Var_Name_2	Buffer Length
Var_Value_2	1208.20
var_name_3	Fenced?
var_value_3	NO
var_name_4	Feet of Stream Fenced
var_value_4	N/A
var_name_5	Buffer Width
var_value_5	less than 35 ft
CAFO	<null>
farm_number	<null>
tract_number	<null>
land_unit_number	<null>
applied_year	2003
ortho_source	NAIP
ortho_date	1/29/2003
reviewed_by	amr
Comments	<null>
level_of_review	rsl
review_date	4/9/2015
conservation_plan	no
conservation_plan_name	<null>
conservation_plan_id	<null>
plan_county	<null>
county_name	Franklin
state_name	PA
huc_12	<null>
Latititude	39.745445
Longitude	-77.68324
SHAPE	Polygon
DataCollectionType	RC

Practice_Code	grassed waterway
applied_amount	0.721129
measurement_unit_display	acres
applied_date	<null>
operation_type	<null>
type_name1	N/A
type_value1	N/A
Var_name_1	Acres Treated
Var_Value_1	104.21
Var_Name_2	N/A
Var_Value_2	N/A
var_name_3	N/A
var_value_3	N/A
var_name_4	N/A
var_value_4	N/A
var_name_5	<null>
var_value_5	<null>
CAFO	<null>
farm_number	<null>
tract_number	<null>
land_unit_number	<null>
applied_year	2003
ortho_source	NAIP
ortho_date	1/29/2003
reviewed_by	amr
Comments	<null>
level_of_review	rsl
review_date	4/1/2015
conservation_plan	no
conservation_plan_name	<null>
conservation_plan_id	<null>
plan_county	<null>
county_name	Franklin
state_name	PA
huc_12	<null>
Latititude	39.748184
Longitude	-77.684277
SHAPE	Polygon
DataCollectionType	RC

Practice_Code	heavy use area protection
applied_amount	0.011036
measurement_unit_display	acres
applied_date	<null>
operation_type	Dairy
type_name1	Animal Units
type_value1	Less than 500
Var_name_1	Land Use before Grazing
Var_Value_1	Associated agricultural land
Var_Name_2	N/A
Var_Value_2	N/A
var_name_3	N/A
var_value_3	N/A
var_name_4	N/A
var_value_4	N/A
var_name_5	<null>
var_value_5	<null>
CAFO	<null>
farm_number	<null>
tract_number	<null>
land_unit_number	<null>
applied_year	2008
ortho_source	NAIP
ortho_date	<null>
reviewed_by	amr
Comments	<null>
level_of_review	rsl
review_date	4/1/2015
conservation_plan	no
conservation_plan_name	<null>
conservation_plan_id	<null>
plan_county	<null>
county_name	Franklin
state_name	PA
huc_12	<null>
Latititude	39.747559
Longitude	-77.681602
SHAPE	Polygon
DataCollectionType	RC

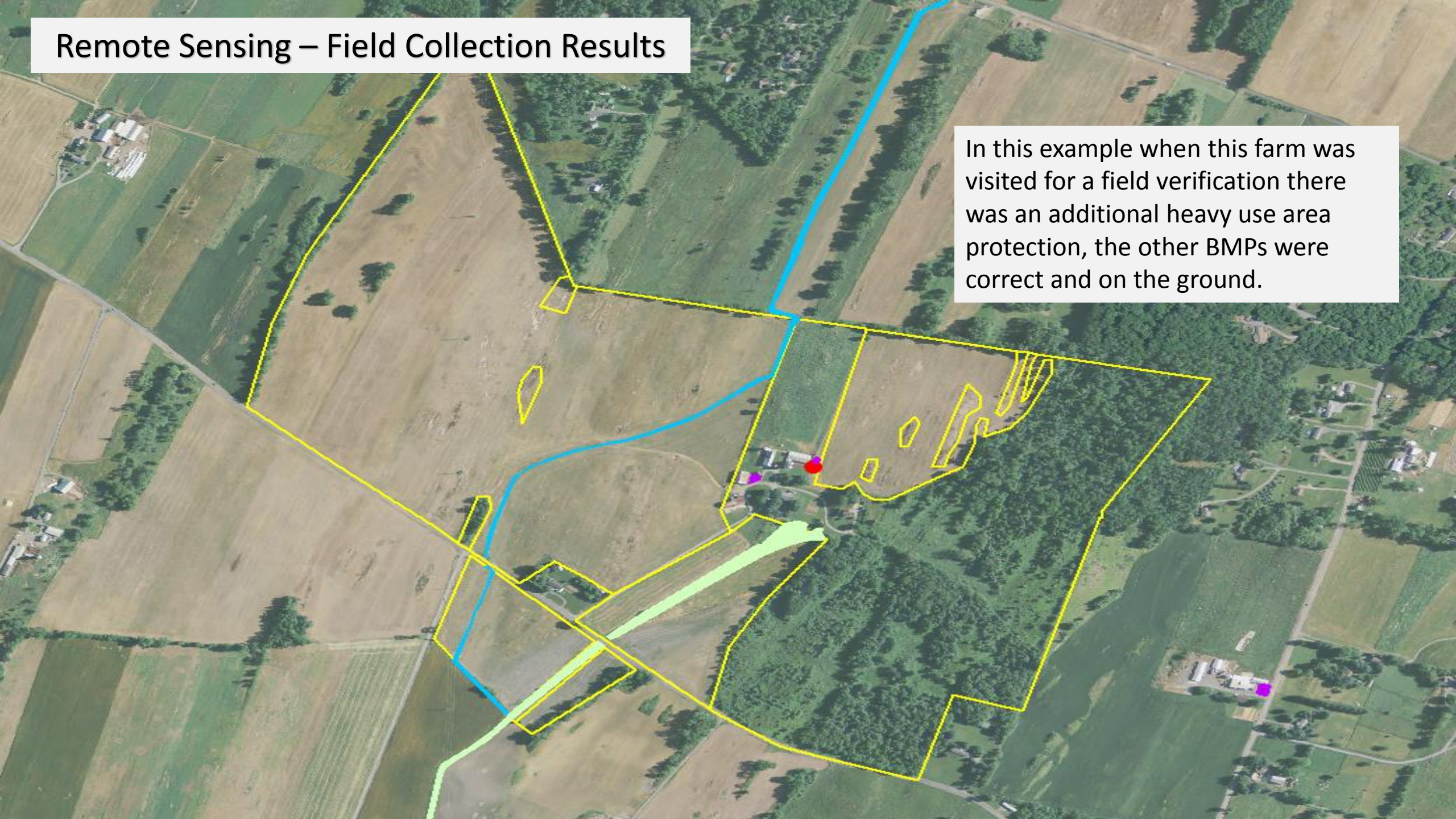
Practice_Code	waste treatment lagoon
applied_amount	1
measurement_unit_display	Integer Count of items
applied_date	<null>
operation_type	Dairy
type_name1	Dry or Wet?
type_value1	Wet
Var_name_1	Animal Units
Var_Value_1	less than 500
Var_Name_2	<null>
Var_Value_2	<null>
var_name_3	<null>
var_value_3	<null>
var_name_4	<null>
var_value_4	<null>
CAFO	<null>
farm_number	<null>
tract_number	<null>
land_unit_number	<null>
applied_year	2008
ortho_source	Google Earth
ortho_date	5/27/2008
reviewed_by	amr
Comments	<null>
level_of_review	rsl
review_date	4/1/2015
conservation_plan	no
conservation_plan_name	<null>
conservation_plan_id	<null>
plan_county	<null>
county_name	Franklin
state_name	PA
huc_12	<null>
Latititude	39.747451
Longitude	-77.681629
SHAPE	Point
DataCollectionType	RC

Remote Sensing – Comparison to Toolkit Data



This is what the NRCS Planning Data (Toolkit) shows – Nothing.
This landowner is a non participant and is doing conservation practices on their own.

Remote Sensing – Field Collection Results



In this example when this farm was visited for a field verification there was an additional heavy use area protection, the other BMPs were correct and on the ground.

PA Remote Sensing Pilot:
Project Benefits

- Total of 5,790 farms inventoried in 5 Counties - Adams, Franklin, Fulton, Bedford, Somerset

- 200 Farms selected for on-the-ground spot checks
  - 13 staff for data collection and 5 staff for field verification

Remote Sensing Pilot: Results

- Data collected through this pilot is protected by Section 1619 of the Food, Conservation and Energy Act of 2008.
- Data will be released to PA Department of Environmental Protection (DEP) in aggregated form only.
- DEP requested that the data be aggregated to the HUC 12 level.

Remote Sensing Pilot: Results Were Significant

- 15,787 practice instances were identified as part of this pilot project.
- This serves a baseline of conservation BMP's present on the ground. By comparison, the toolkit data contained in NCPDB only identified 4,226 practice instances.

Practice Type	Unit	Delete	Field Collect	Remote Collect
LINE	Feet	18 (< 1%)	67 (3%)	2084
POINT	Number	4 (< 1%)	63 (11%)*	560
POLYGON	Acre	120 (< 1%)	512 (5%)	12501

* 46 of the 63 practices that were identified during Field Collection were Waste Storage Facilities (313)

Remote Sensing: A Comparison of Practices

- Selected practice detailed comparison

			Toolkit		Remote Sensing Pilot Collection	
Practice Code	**Practice Name**	**Units**	**Count**	**Applied Amount**	**Count**	**Applied Amount**
313	Waste Storage Facility	Number	131.0	136.0	263.0	263.0
362	Diversion	Feet	72.0	47,166.9	275.0	82,429.5
391	Riparian Buffer	Acre	298.0	943.1	1,941.0	3,983.2
412	Grassed Waterway	Acre	370.0	189.1	1,637.0	1,002.0
561	Heavy Use Area Protection	Acre	196.0	143.1	426.0	2,000.3

Remote Sensing: Review of Staff Cost

		Planning	Implementation
Direct Staff Cost	$377,939.32	$158,606.21	$219,333.11

Administrative Cost	$56,282.05

Total Project Cost	$434,221.37

Remote Sensing: New Project Estimate

- Cost Estimate: 1 Million Acre Watershed – Approximately the size of Potomac Watershed (*Total pilot collection area was 2.4 million acres)

Project Planning and Prep		Data Collection		Post Collection		Data Analysis		
NGCE	$ 5,000.00	ERSL	$ 125,000.00	Project Mgr.	$ 7,500.00	Project Mgr.	$ 3,000.00	
Project Mgr.	$ 4,000.00	Project Mgr.	$ 2,000.00	Field Verification	$ 25,000.00			
ERSL	$ 2,000.00	Database	$ 1,500.00					
Database	$ 2,500.00							
Total	**$ 13,500.00**		**$ 128,500.00**		**$ 32,500.00**		**$ 3,000.00**	**$ 177,500.00**
Collect Imagery		Data Collection		Field Verification Prep		Data Review		
Update Database		Data Check in/Check out		Field Verification		Data Analysis		
Project Coordination		Internal QA/QC		Data Entry form Verification				
Develop Plan of Work								

Remote Sensing: Moving Forward

- Protocols and Procedures are currently in place, and work
- Database is built and is scalable to any project size
- ERSL has experience performing this type of work
- The initial development that was completed will allow this project concept to be used for a variety of projects on varying landscapes
- The remote sensing approach allows for a total landscape inventory and can develop a geospatial baseline of conservation