PA Cover Crop Surveys Enhancement Project

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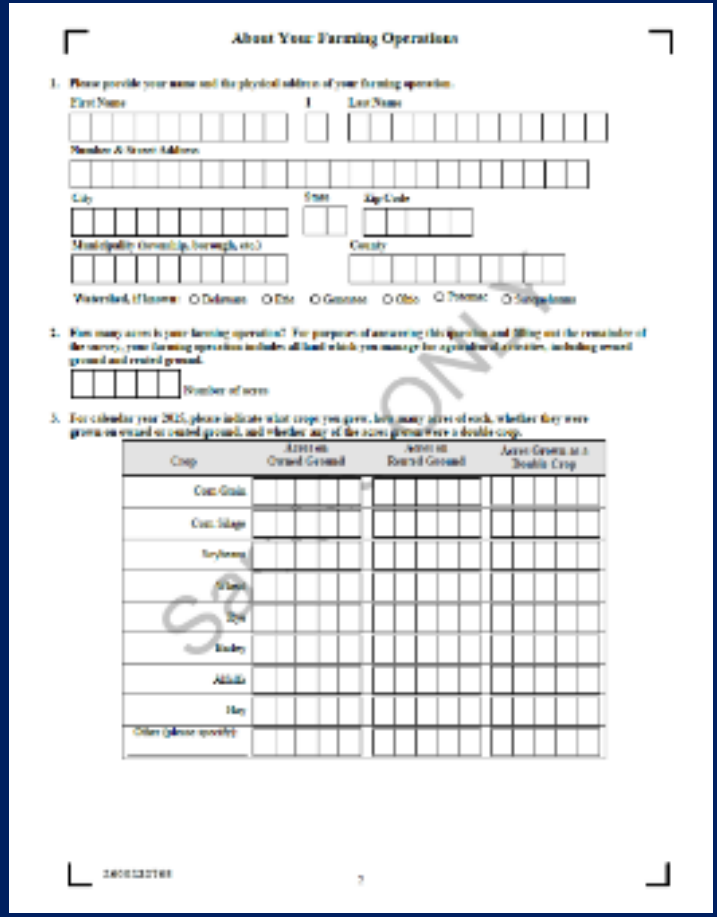
October 20, 2022

PA Conservation Practices Inventory

Voluntary Farmer Survey to Self-Report BMPs

- This survey was first done in 2016 (nearly 7,000 farmers participated)
- 2016 survey established CBP AgWG-approved method to collect “voluntary” (non-cost shared) practices
- Repeated in 2020 in four Phase 3 WIP “pilot counties” of Lancaster, York, Adams and Franklin (nearly 1,800 farmers participated)
- 2022 survey underway in 14 remaining Tier 2 & 3 counties (1,018 surveys returned to date)



About Your Farming Operation

1. Please provide your name and the physical address of your farming operation.

First Name | Last Name

Number & Street Address

City | State | Zip Code

Municipality (township, borough, etc.) | County

Watershed, if known: ○ Delaware ○ Erie ○ Genesee ○ Ohio ○ Potomac ○ Susquehanna

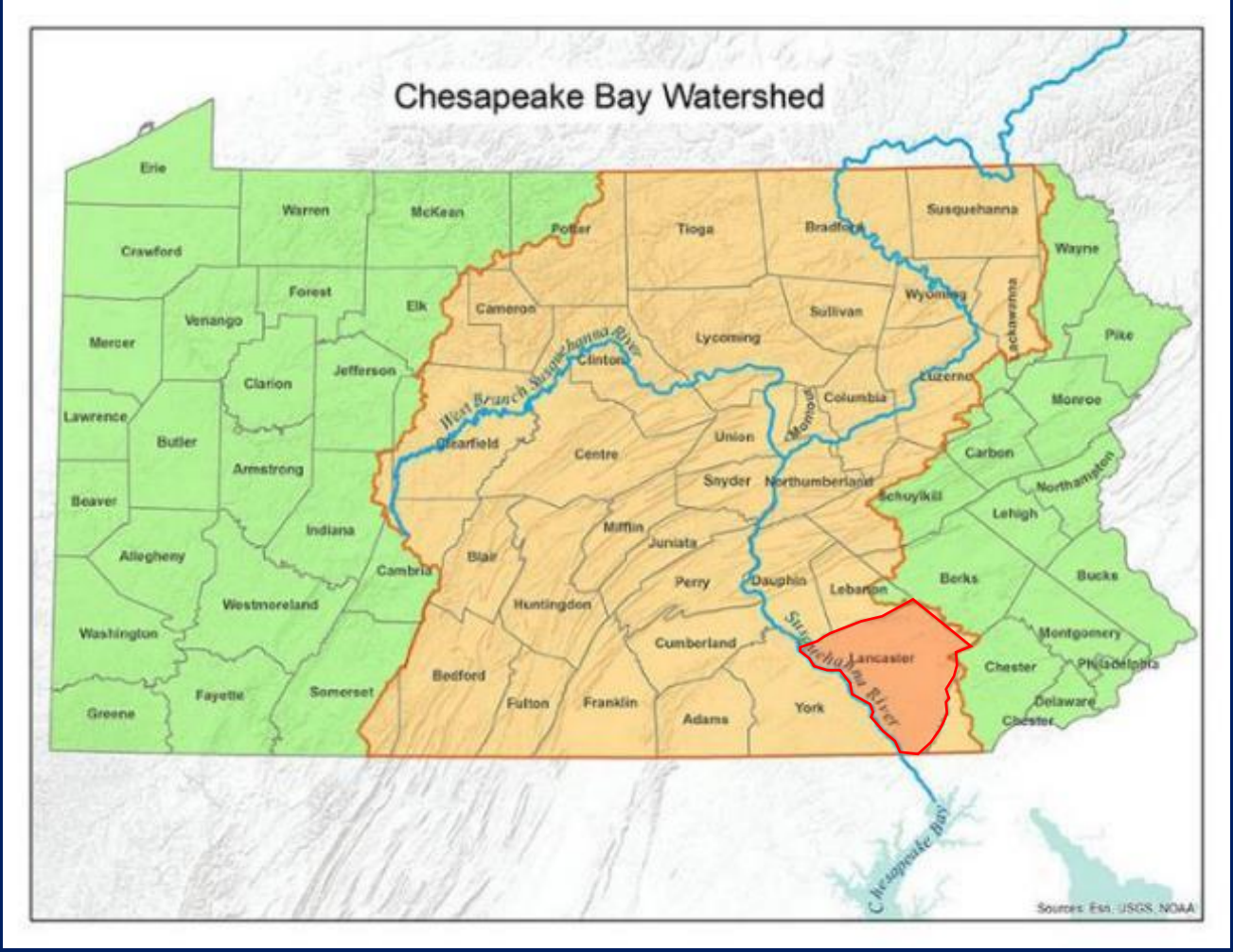
2. How many acres is your farming operation? For purposes of answering this question and filling out the remainder of the survey, your farming operation includes all land which you manage for agricultural activities, including owned ground and rented ground.

Number of acres

3. For calendar year 2021, please indicate what crops you grew, how many acres of each, whether they were grown on owned or rented ground, and whether any of the acres grown were a double crop.

Crop	Acres on Owned Ground	Acres on Rented Ground	Acres Grown as a Double Crop
Corn Grain			
Corn Silage			
Soybeans			
Wheat			
Rye			
Barley			
Alfalfa			
Hay			
Other (please specify)			

Lancaster County 2020 Data



- Transect survey and BMP survey *both* completed in 2020
- Allowed us to look at cover crops datasets from each survey for Lancaster County

Lancaster County 2020 Data

- 970 field observations in the transect survey (485 unique latitude/longitude pairs with observations on the left- and right-hand sides of the road)

- 989 Lancaster County farms in the Penn State BMP survey

- **Our question**: how many fields observed in the transect survey belong to farm operations represented in the Penn State BMP survey?

Methodology

- Obtained latitudes/longitudes for all farm addresses in the Penn State BMP survey
- Calculated straight-line distance between the coordinates of each farm address and the coordinates of each transect observation point

Methodology

Number of BMP survey farms with the nearest transect point...

> 1.00 miles away	527
Between 0.50 and 1.00 miles away	221
Between 0.25 and 0.50 miles away	133
Between 0.10 and 0.25 miles away	85
< 0.10 miles away	23

Methodology

Number of BMP survey farms with the nearest transect point...

> 1.00 miles away	527
Between 0.50 and 1.00 miles away	221
Between 0.25 and 0.50 miles away	133
Between 0.10 and 0.25 miles away	85
< 0.10 miles away	23

we proceeded with a careful search for matches among this subset of farms

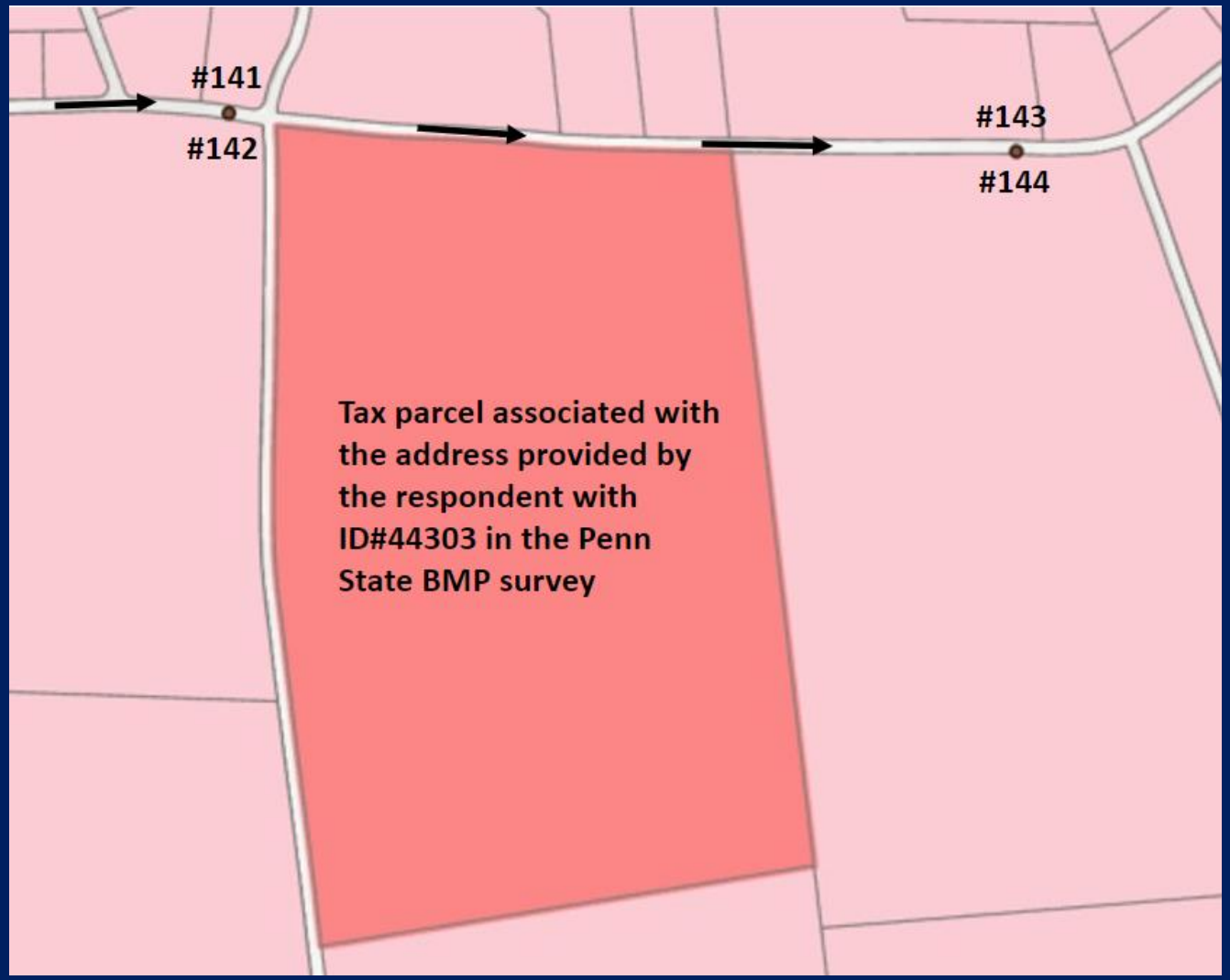
Methodology

- This list helped narrow down where to look for potential "matches" between the farm parcels associated with farms in the Penn State BMP survey and fields that were likely being observed by the transect surveyor

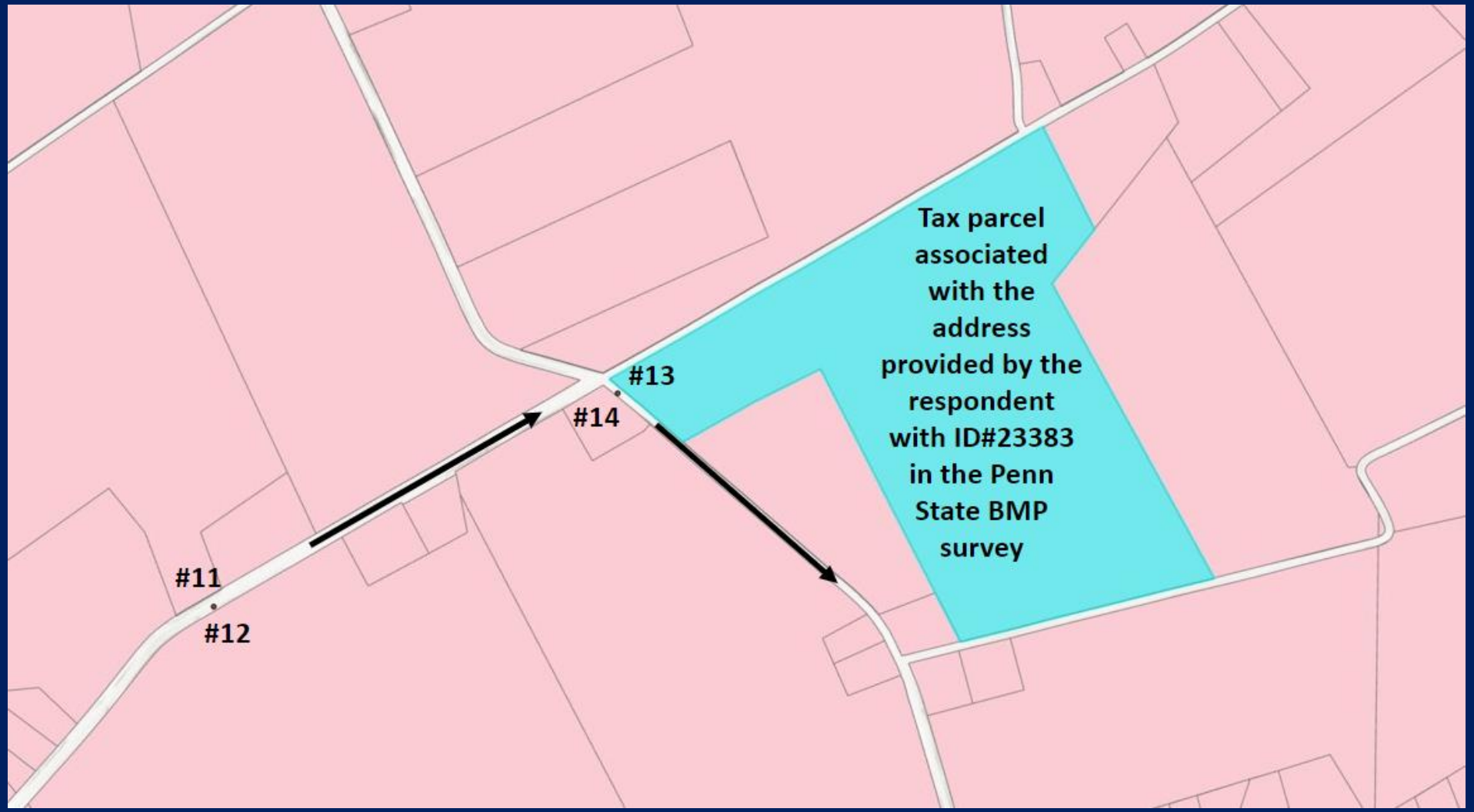
- Whenever a transect survey observation point was location directly on the border of a land parcel associated with the farm address of one of the respondents in the Penn State BMP survey, we considered that transect point/farm address pair to be a "match."

- A "match" implies that we believe the transect surveyor is likely observing the cover crop characteristics of *at least part of the acreage* associated with a farm that filled out the Penn State BMP survey

Transect point #142 is not a match for farm survey ID#44303



Transect point #13 is a match for farm survey ID#23383



Methodology

- Using just the Lancaster County tax parcel map, we identified 70 farms in the Penn State BMP survey that have a transect survey observation point bordering their farm operation

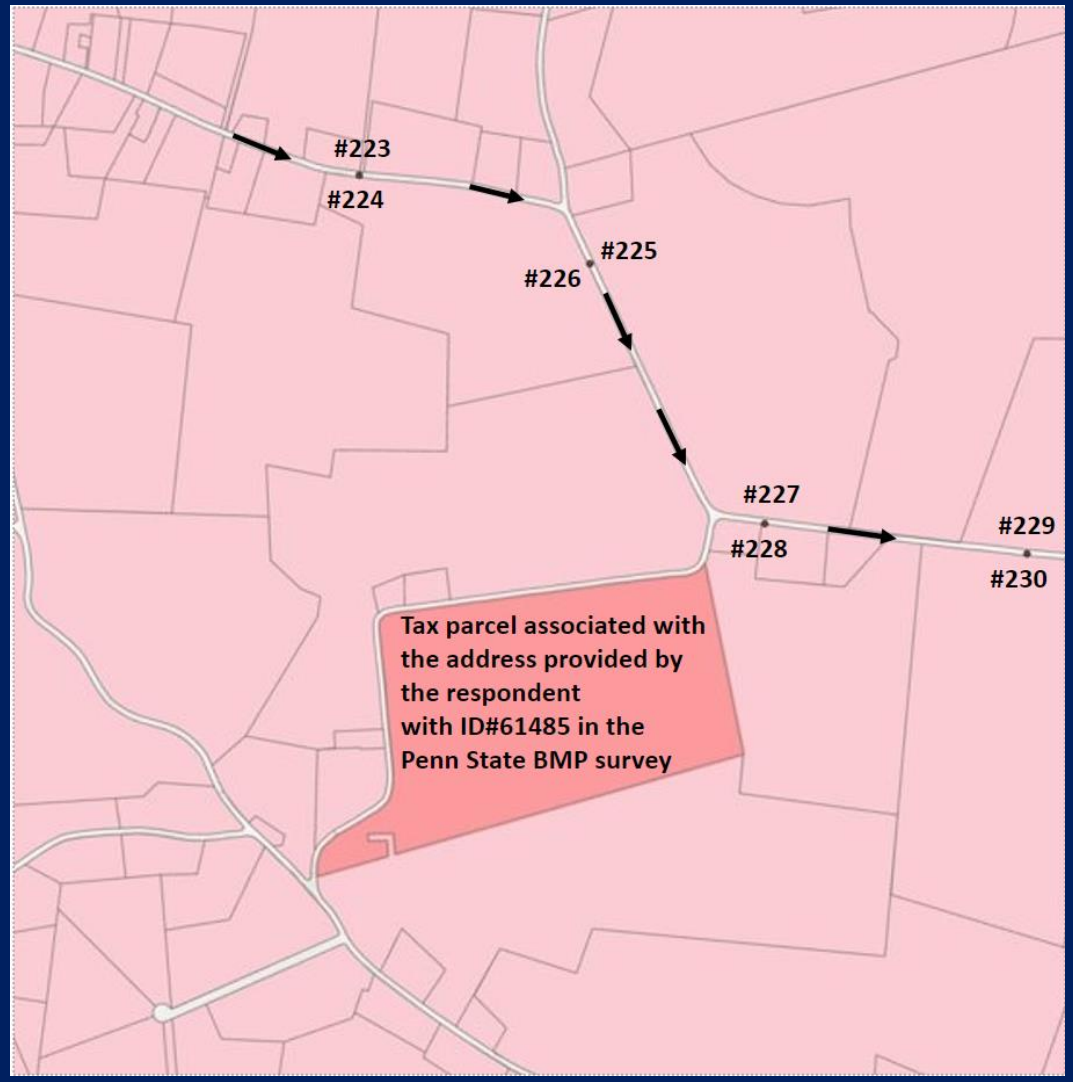
- But to account for the fact that survey respondents might have farm operations on parcels outside of just their tax parcel, we checked all transect points to see if any adjacent parcels appeared in the "PracticeKeeper" data set

Methodology

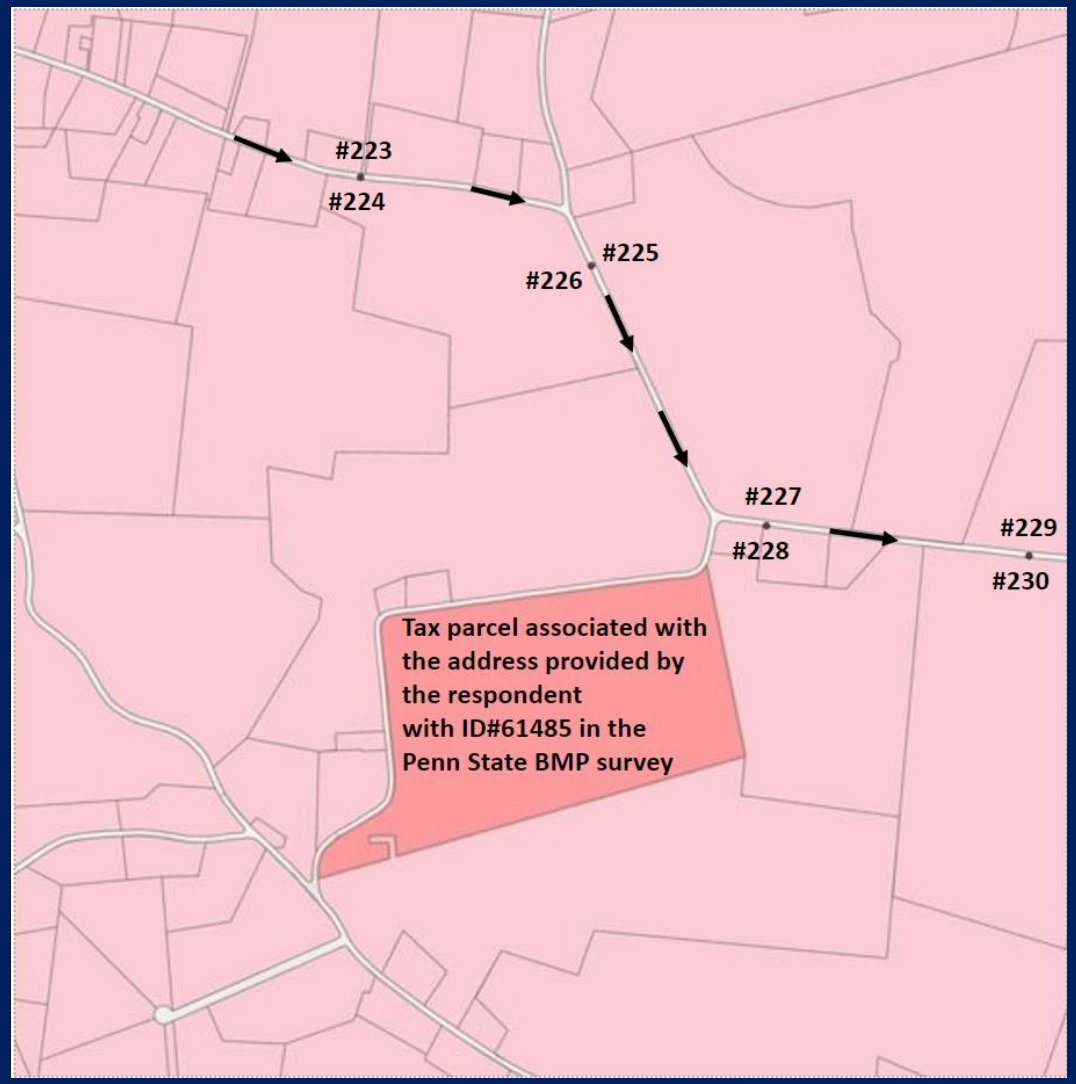
- For each transect point with an adjacent parcel that appeared in the PracticeKeeper data set, we checked the name and address of the operator associated with that PracticeKeeper parcel

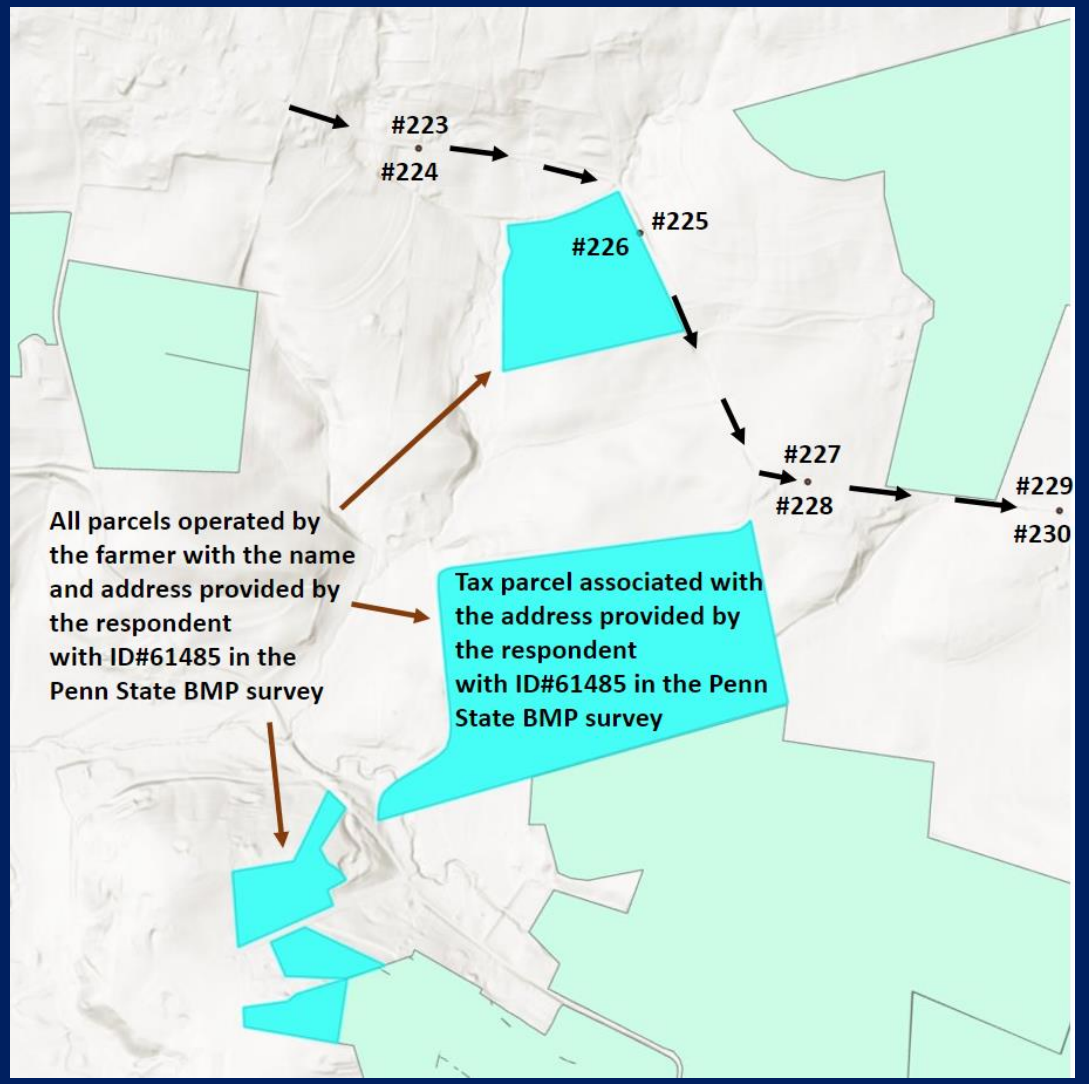
- If the name and address of the operator associated with that PracticeKeeper parcel matched the name and address of a respondent to the Penn State BMP survey, we considered that transect point to be a match for the BMP survey return associated with that operator

None of these transect points appear to match farm survey ID#61485...



...but PracticeKeeper parcels show a match between Tr#226 and ID#61485





Methodology

- Using the combination of the Lancaster County tax parcel map and the map of PracticeKeeper parcels, we identified 94 farms in the Penn State BMP survey that have a transect survey observation point bordering their farm operation (as compared to 70 farms using just the Lancaster County tax parcels)

Results

- The degree of correspondence between the cover crop information reported by farmers in the Penn State BMP survey and the cover crop information collected in the transect survey can be compared in terms of:

1. the presence of any cover crop reported
2. the type of cover crop reported
3. whether the cover crop was reported to be harvested

Presence of a cover crop

		Were cover crops reported at the transect point?	
		Yes	**No**
Were cover crops reported by the farm in the Penn State BMP survey that borders the transect point?	**Yes**	51 (54.3%)	30 (31.9%)
	No	2 (2.1%)	11 (11.7%)

The numbers in each cell denote the number of farm-transect point pairs where cover crops were reported in one or the other survey, both surveys, or neither survey

Cover crop type

		Cover crop type reported in the transect survey			
		Small grains	**Mixture**	**Hay**	**Unknown**
Cover crop type reported in the Penn State BMP survey	**Small grains**	**43 (84.31%)**		1 (1.96%)	2 (3.92%)
	Mixture	1 (1.96%)	**2 (3.92%)**		
	Legume	1 (1.96%)			
	Other				1 (1.96%)

Each cell denotes the number of farm-transect point pairs for which a particular combination of cover crop types were found across the two survey

Green indicates that the crop type reported in the transect survey matches the type reported in the Penn State BMP survey

COVER CROP HARVESTING

		Harvesting regime observed in the transect survey	
		Harvest	**No Harvest**
Harvesting regime reported in the Penn State BMP survey	**Harvest**	16* (31.4%)	12 (23.5%)
	No Harvest	3 (5.9%)	20** (39.2%)

*This number includes farms where *at least one* of the matching transect points found a harvested cover crop and *at least one* of the cover crop plots reported by the matching farm in the Penn State BMP survey reported a harvested cover crop

**This number includes farm-transect pairs where *at least one* of the matching transect points found no cover crop harvest and *at least one* of the cover crop plots reported by the matching farm in the BMP survey reported no cover crop harvest

KEY FINDINGS

- 66% (62 of 94) of the matching farm-transect point pairs reported consistent results in terms of cover crop presence
- 88% (45 of 51) of the cases where a cover crop was present in both the BMP farm survey and the transect survey reported the same category of cover crop type
- The harvesting regime matched in 70% (36 of 51) of the cases

PADEP: Using PSU Survey Data to Classify Crop Types

- PSU Cover Crop Survey Response Options fit well in the crop definitions developed within the Chesapeake Bay Program's January 2017 Expert Panel Report for Phase 6. Phase_6_CC_EP_Final_Report_12-16-2016-NEW_TEMPLATE_FINAL.pdf (d18lev1ok5leia.cloudfront.net)

- Matched survey responses were identified as fitting in Double Crop, Traditional, Traditional w/ Fall Nutrients, and Commodity Cover Crop definitions. Only matched survey responses were included in the evaluated response data. Identified Double Crop Acres are not used in Cover reporting

Current Reporting Method

County	2020 Row Crop Acres	CommCov %	CommCov AC	TradCovCrop %	TradCovCrop AC	Trad w/Nut %	Trad w/Nut Ac	Late CC%	Late CC AC
Lancaster	210,691	0.4965	104,608	0.1506	31,730	0.0136	2,865	0.0070	1,475
		Not Reported							

Reporting from the current Transect Survey extrapolates point count observations from a systematic, non-biased data collection. Annual County Row Crop Acres reported in CAST are used to report the three classes of covers reported by the Transect Survey. All "Harvested" acres are grouped as Commodity Cover and excluded from annual Cover Crop reporting.

Using PSU Survey Data to Report Crop Types

- The PSU Producer Survey generates a biased dataset based on those operators choosing to participate in the survey. PADEP is using the previously discussed matching of systematic Transect Waypoints to individual PSU Survey respondents to develop a subset within the PSU data that are matched to the systematic Transect Survey data.

- In this way, PADEP has identifying a population of PSU respondents that correspond with the Transect observation points that report the additional management actions needed to more fully report attributes of covers being planted in Lancaster County.

- The matched response dataset represents 9,585 acres or 5% of the annual Row Crop Acres in Lancaster County (210,691 acres).

Cover crop types from PSU

Results of PSU Survey Responses From Transect Matched Points (9,585 Ac.)		
Traditional with Fall Nutrients Applied Total 4,472 Ac. (46.7%)	Acres	Percent of Share
Legume and Grass Mix Normal Other	1,572	35.2%
Wheat Normal Other	1,221	27.3%
Triticale Normal Other	604	13.5%
Forage Radish Plus Normal Other	595	13.3%
Rye Normal Other	478	10.7%
Oats Normal Other	2	0.04%
Double Crop Acres Total 3,507 Ac. (36.5%)		
Traditional Cover Crops Total 1,543 Ac. (16.1%)	Acres	Percent of Share
Rye Normal Other	703	45.6%
Wheat Normal Other	607	39.3%
Legume Plus Grass 50% Normal Other	75	4.9%
Annual Ryegrass Normal Other	70	4.5%
Forage Radish Plus Normal Other	60	3.9%
Legume Plus Grass 25-50% Normal Other	20	1.3%
Barley Normal Other	8	0.5%
Commodity Cover Crops Normal Total 63 Ac. (0.7%)	63	100.0%

Each of four types of Cover were identified from the PSU response data. Several blank PSU response fields were processed using data from the matched Transect Survey points. A single 1,500-acre record "Legume and Grass Mix" will require an efficiency developed using the Phase 6 Cover Crop Expert Panel Report.

Using PSU Subset to Identify Crop Types

Extrapolated Results of PSU Survey Responses From Transect Matched Points (9,585 Ac.)

Cover Crop Type	Proposed Extrapolated Result (Ac)			Current TS Reporting (Ac)
Traditional with Fall Nutrients Applied Total 4,472 Ac. (46.7%)	**Acres**	**Percent of Share**	26,537	
Legume and Grass Mixture Normal Other	1,572	35.2%	**9,328**	
Wheat Normal Other	1,221	27.3%	**7,245**	2,865
Triticale Normal Other	604	13.5%	**3,584**	
Forage Radish Plus Normal Other	595	13.3%	**3,531**	
Rye Normal Other	478	10.7%	**2,836**	
Oats Normal Other	2	0.04%	**12**	
Double Crop Acres Total 3,507 Ac. (36.5%)				
Traditional Cover Crops Total 1,543 Ac. (16.1%)	**Acres**	**Percent of Share**	9,155	33,205
Rye Normal Other	703	45.6%	**4,171**	
Wheat Normal Other	607	39.3%	**3,601**	31,730
Legume Plus Grass 50% Normal Other	75	4.9%	**445**	
Annual Ryegrass Normal Other	70	4.5%	**415**	
Forage Radish Plus Normal Other	60	3.9%	**356**	
Legume Plus Grass 25-50% Normal Other	20	1.3%	**119**	
Barley Normal Other	8	0.5%	**47**	
		Cover Crop Later Other Wheat		1,475
Commodity Cover Crops Normal Total 63 Ac. (1%)	63	100.0%	**375**	0

Key Take Aways

- This project has demonstrated that it is possible to integrate management action information from the PSU Survey data with the systematic data collection performed in the approved Transect Survey.

- The PSU Producer Survey indicates that more cover crop acres are receiving nutrients than is currently understood through the Transect Survey alone.

- Mixtures of grass and rye species plantings will be developed within the “Traditional Cover Crops with Fall Nutrients Applied” group within the 2017 Phase 6 Cover Crop Expert Panel Report and using the Phase 5.3.2 Cover Crop report efficiencies.

Proposed Action

- Pennsylvania proposes that this analytical method be allowed on a county-by-county basis to more fully report on the ground implementation of annual cover cropping practices.

- Like the current Transect Survey, the PSU Survey informed cover crop “fingerprint” for the county could be carried forward into the next reporting year until a subsequent county analysis is performed.

- This presentation will initiate a 30-day comment period for members of the Agriculture Work Group to provide comments, feed back, and suggestions prior to a requested formal approval vote at the November Work Group meeting.

- If approved, this method could be available for reporting cover crops in Lancaster County for the 2022 Progress reporting period.