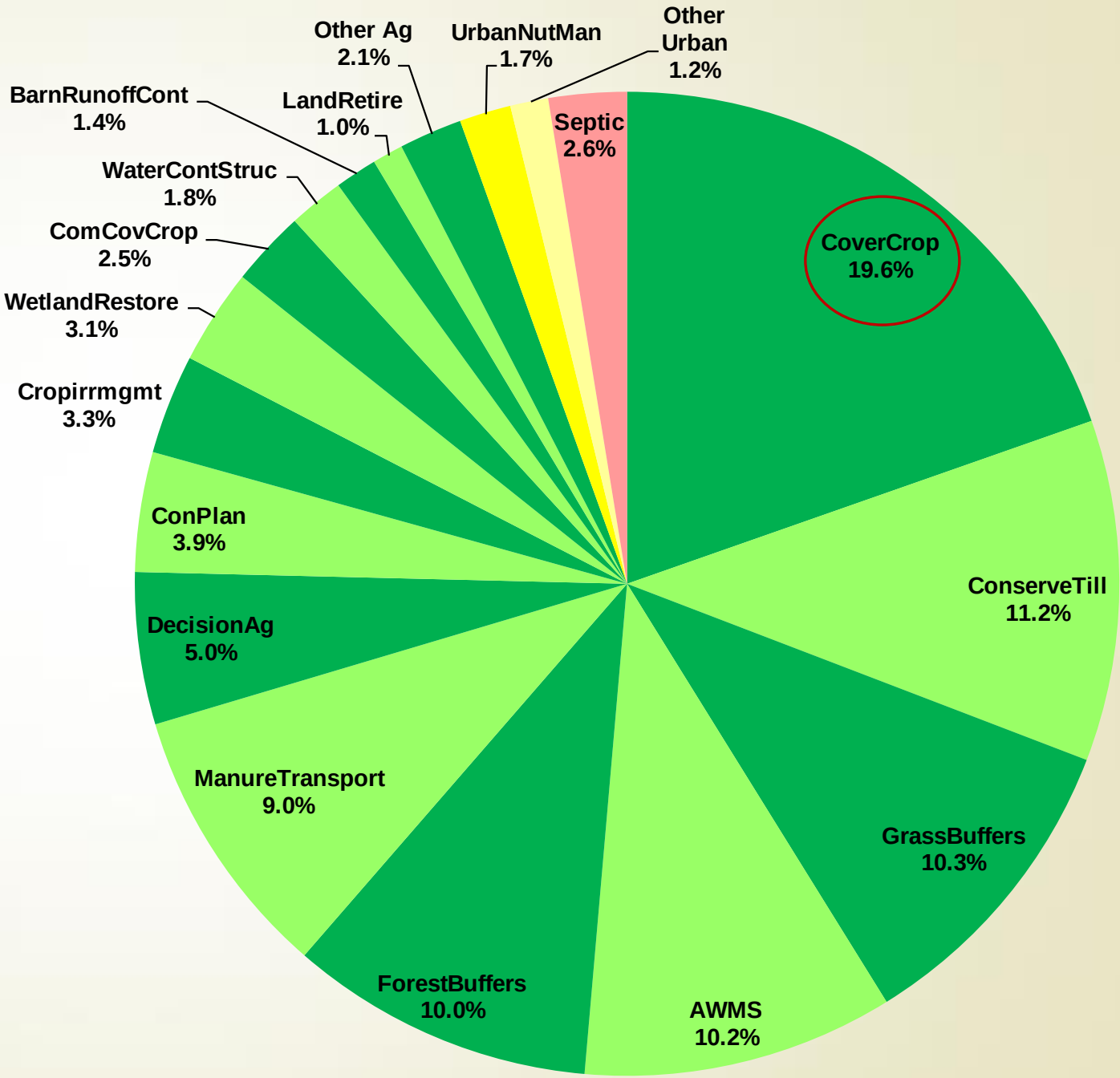
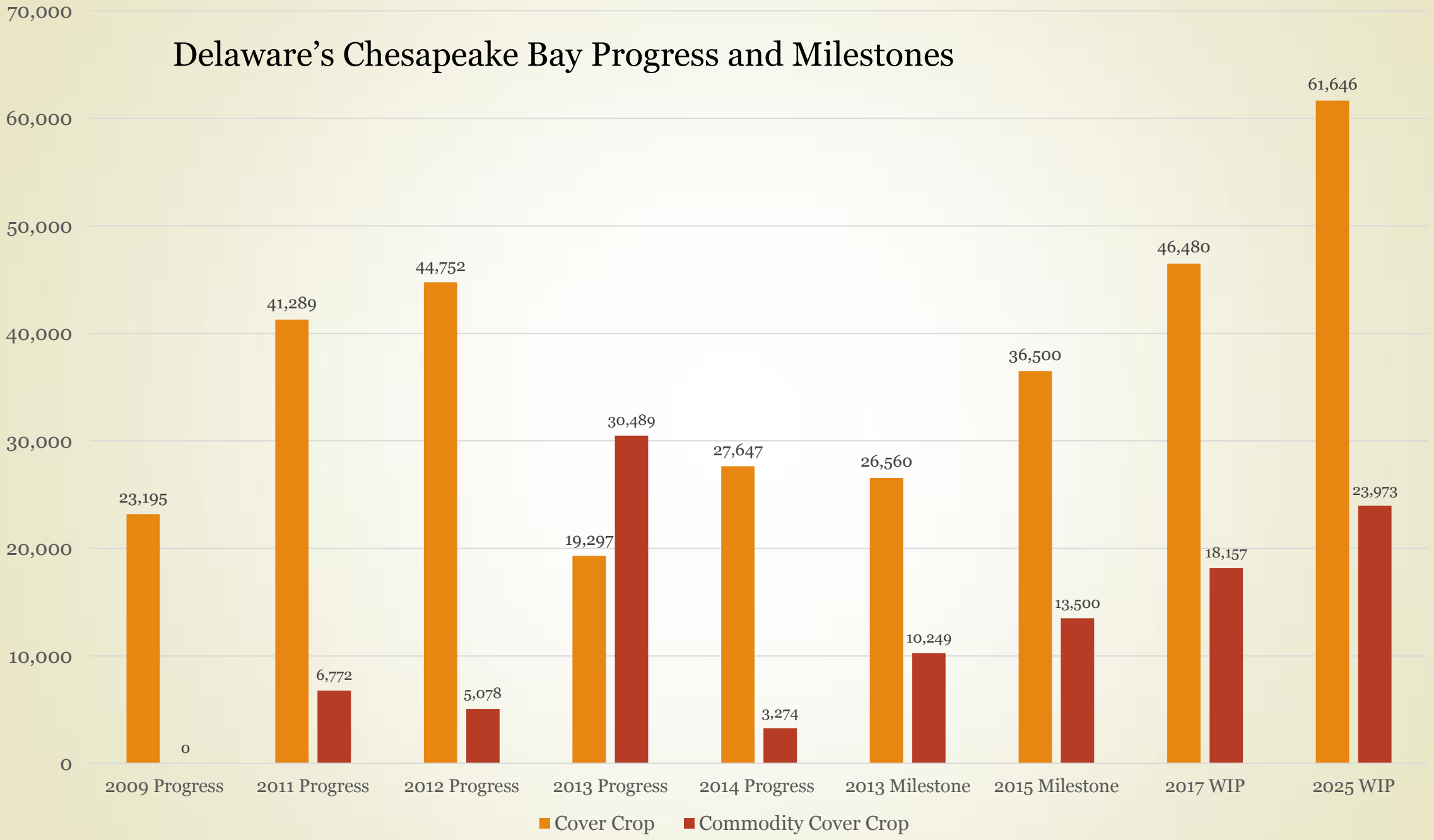
Delaware and Pennsylvania's Pilot Cover Crop Transect Surveys

Marcia Fox and Susan Richards

Delaware relies on Cover Crop Practices in our WIP!



Delaware's Chesapeake Bay Progress and Milestones



Adoption of CTIC Study and Goals

- Creation of consistent source of data for tillage practices
  - Source of a substantial portion of our load reductions in WIP
  - Include the incorporation of HRMSD practice for further reductions
- Adopted PA survey from CTIC
- Delawarized it!
  - Collect unaccounted cover crop data
    - Traditional vs. Commodity
    - Cost shared vs. Non-cost shared

Establishing a Statistically Valid Transect Procedure using the CTIC Method

- 110 miles along predominately cropland
- After majority of main crops planted, but before crop canopy closes
- “Windshield Observations”
- Driver, Navigator, Recorder, Observers
- QA/QC Team involving similar participants
- Need approximately 460 observations
- Make stops at specified intervals (.2-.5 miles) and observe both sides of road

CROPS	
corn	edible beans and peas
soybeans (full season)	barley
soybeans (double-cropped)	canola
winter wheat	forage crop (seeding year only)
oats	potatoes
grain (other)	sorghum
sunflowers	permanent pasture
vegetables and other crops	fallow
rye	hay
specialty crops (orchard, sod,..)	none

Cover Crops	
Annual Ryegrass (ARG)	Annual legume
Brassica (winter hardy)	Forage Radish
Triticale	Oats (winter hardy)
Rye (Ref. Species)	Annual Legume + Grass
Oats (winter killed)	Forage Radish + Grass

Cover Crop Planting Method	
Drill	Aerial
Broadcast	Other

Please contact Marcia Fox (302-739-9939) or Mark Dubin (###-###-####) with any questions en route or after. A list of survey team contact information may also be found on back.

LAND-USE KEY	
CODE	DESCRIPTION
AGRICULTURAL	
AFO	Animal feeding operations (barnyard)
PR	Pasture with riparian area (unfenced stream)
AP	All other pasture
ALF	Alfalfa (includes mixed with other seed combos)
GR	Grass (for hay)
AOC	All other crops (those not included in survey) (treefarm)
FCRP	Fallow and CRP
NON-AGRICULTURAL	
CM	Construction/mining
DI	Developed-impervious (over 30% impervious)
DP	Developed-pervious (under 30% impervious)
FOR	Forest (undisturbed)
FD	Forest- disturbed (more than one road or currently
WB	Water bodies

Don't forget to make notes… indicate (1) breaks in route, (2) route changes, (3)extended intervals to obtain observations or (4) other pertinent information on the line immediately following the most recent observation. Also make note on map of changes indicating reference point (ie. A-12 (page A, point 12)etc).

Cover Crop Variables Recorded

Cover Crops	Planting Time	CC Planting Method	Type
Annual legume	Early	Aerial	Commodity
Annual Ryegrass (ARG)	Standard	Broadcast	Traditional
Annual Legume + Grass	Late	Drill	
Brassica (winter hardy)		Other	
Forage Radish			
Forage Radish + Grass			
Oats (winter hardy)			
Oats (winter killed)			
Rye (Ref. Species)			
Triticale			
Other - See Notes			

Planning Dual Surveys

- Collaborative decision of survey teams & dates of survey
  - Utilized knowledge of planting times and current conditions from ag partners
- Drawing of survey routes
  - Broke up by county
  - Made sure to hit most ag land as possible without double-backing
- Adaptive Management!
  - Always prepared to change

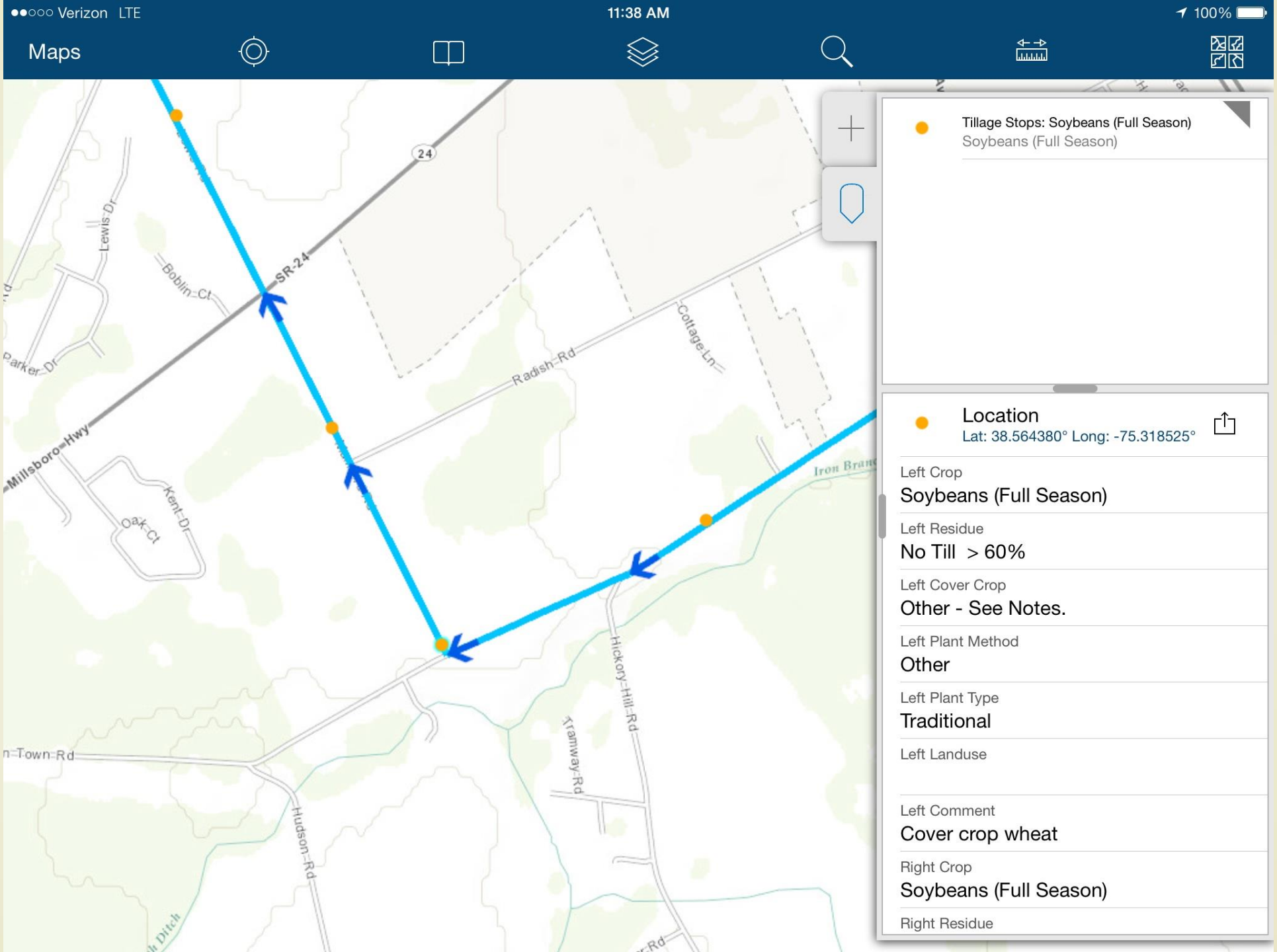

Road Type:
Major
Minor
1 in = 1 m

Trained Observation and QAQC Teams

- Classroom session
  - Survey details
  - Measuring techniques
- Outdoor session
  - Field observations and calibrations
  - Tested fields with varying crops and levels of residue at UD Coop
  - Bead, calculation, and quadrat test

App Development

- Developed an app with IT department utilizing ESRI ArcCollector (GIS)
  - Supported by Android or iOS
  - Collected and updated data in the field
  - Streamlined recording for faster and more reliable entry
- Downloadable through Apple's App Store
- Purchased iPads for data collection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Maps
Tillage Stops: Soybeans (Full Season)
Soybeans (Full Season)
Location
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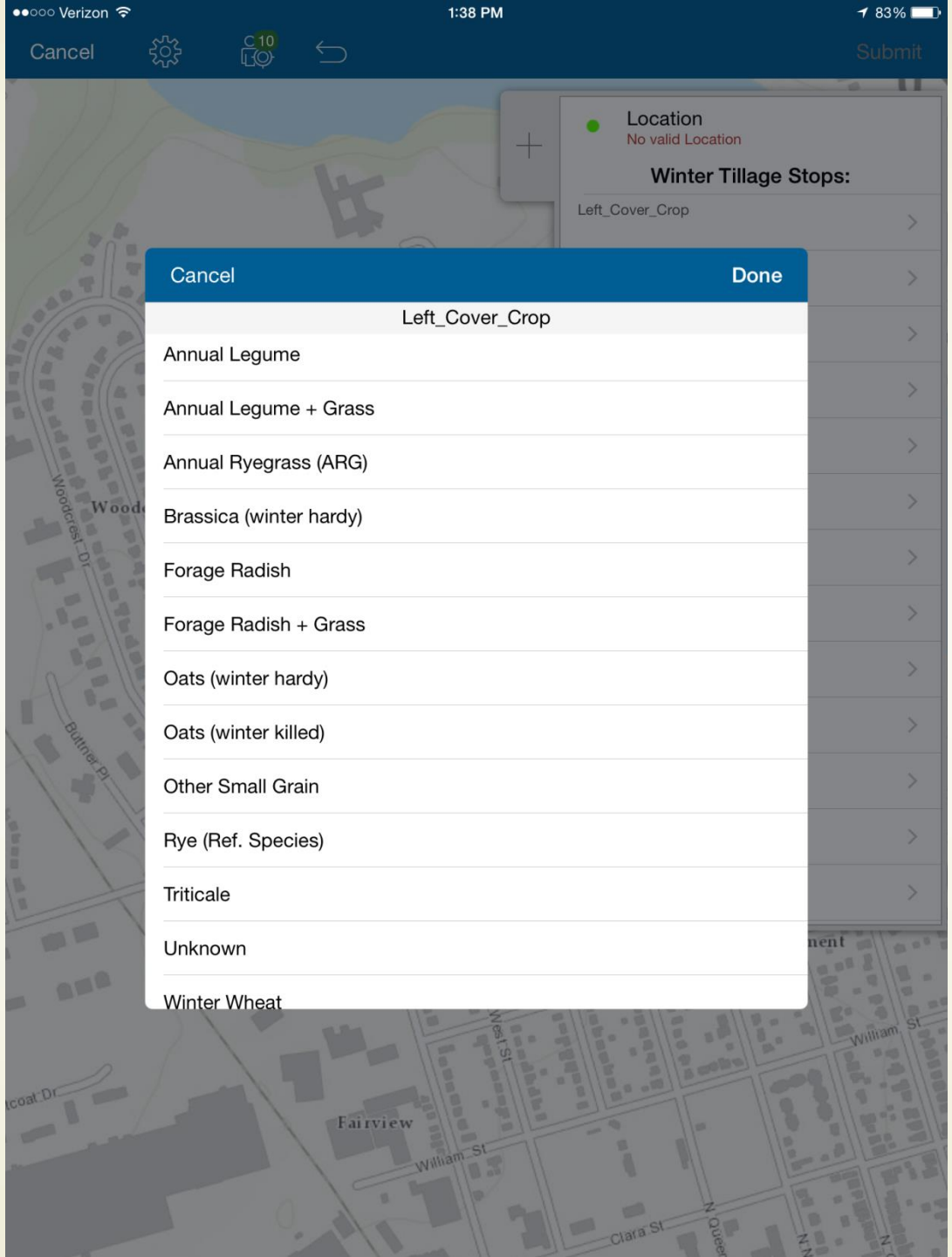
Left Crop
Soybeans (Full Season)
Left Residue
No Till > 60%
Left Cover Crop
Other - See Notes.
Left Plant Method
Other
Left Plant Type
Traditional
Left Landuse
Left Comment
Cover crop wheat
Right Crop
Soybeans (Full Season)
Right Residue
SR-24
24
Millsboro Hwy
Lewis Dr
Boblin Ct
Parker Dr
Radish Rd
Cottage Ln
Kent Dr
Oak Ct
Hickory Hill Rd
Tramway Rd
Hudson Rd
Town Rd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Cancel
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Winter Tillage Stops:
Left_Cover_Crop
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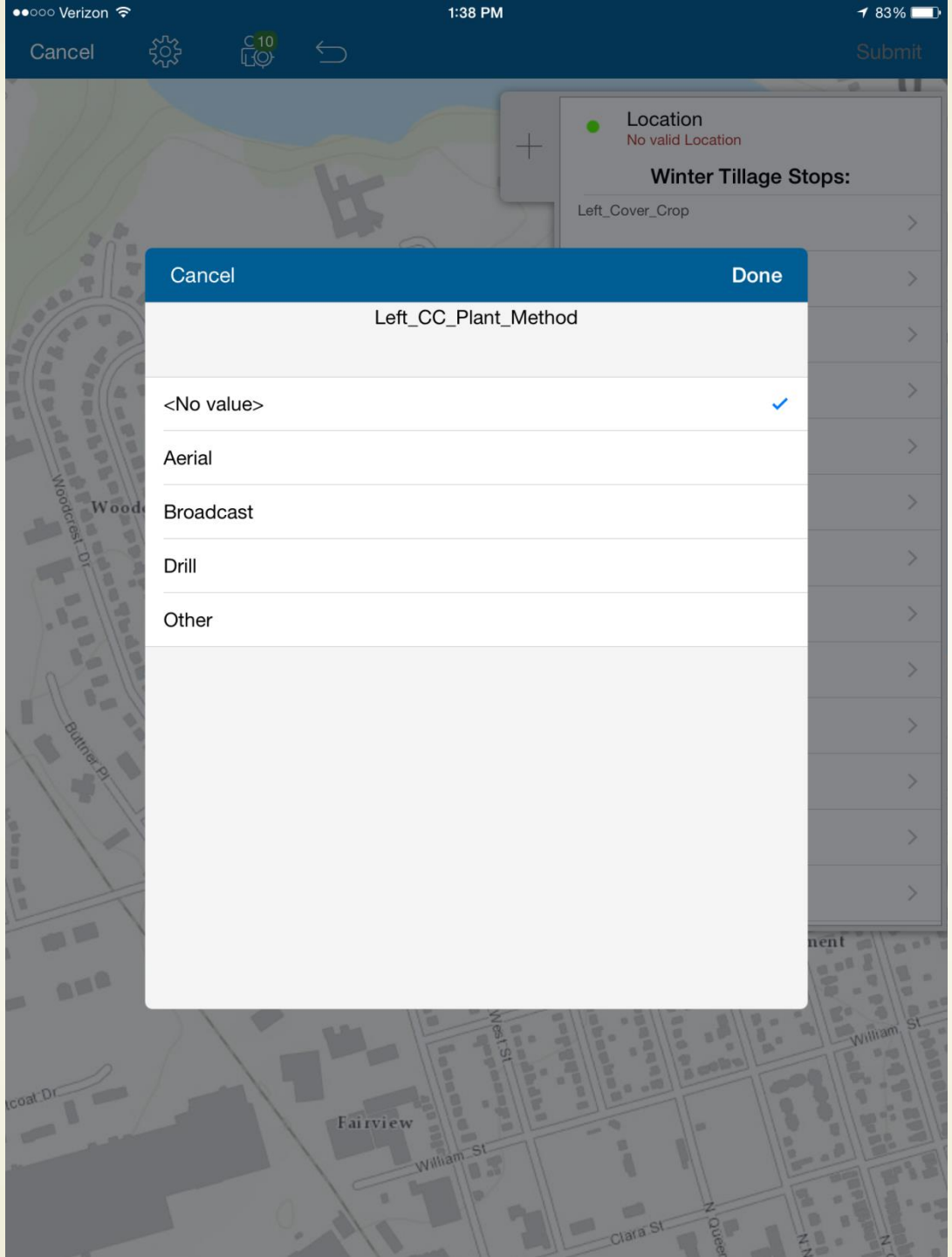
Done
Left_Cover_Crop
Annual Legume
Annual Legume + Grass
Annual Ryegrass (ARG)
Brassica (winter hardy)
Forage Radish
Forage Radish + Grass
Oats (winter hardy)
Oats (winter killed)
Other Small Grain
Rye (Ref. Species)
Triticale
Unknown
Winter Wheat
Woodcrest Dr
Buttner Pl
Fairview
William St
West St
Clara St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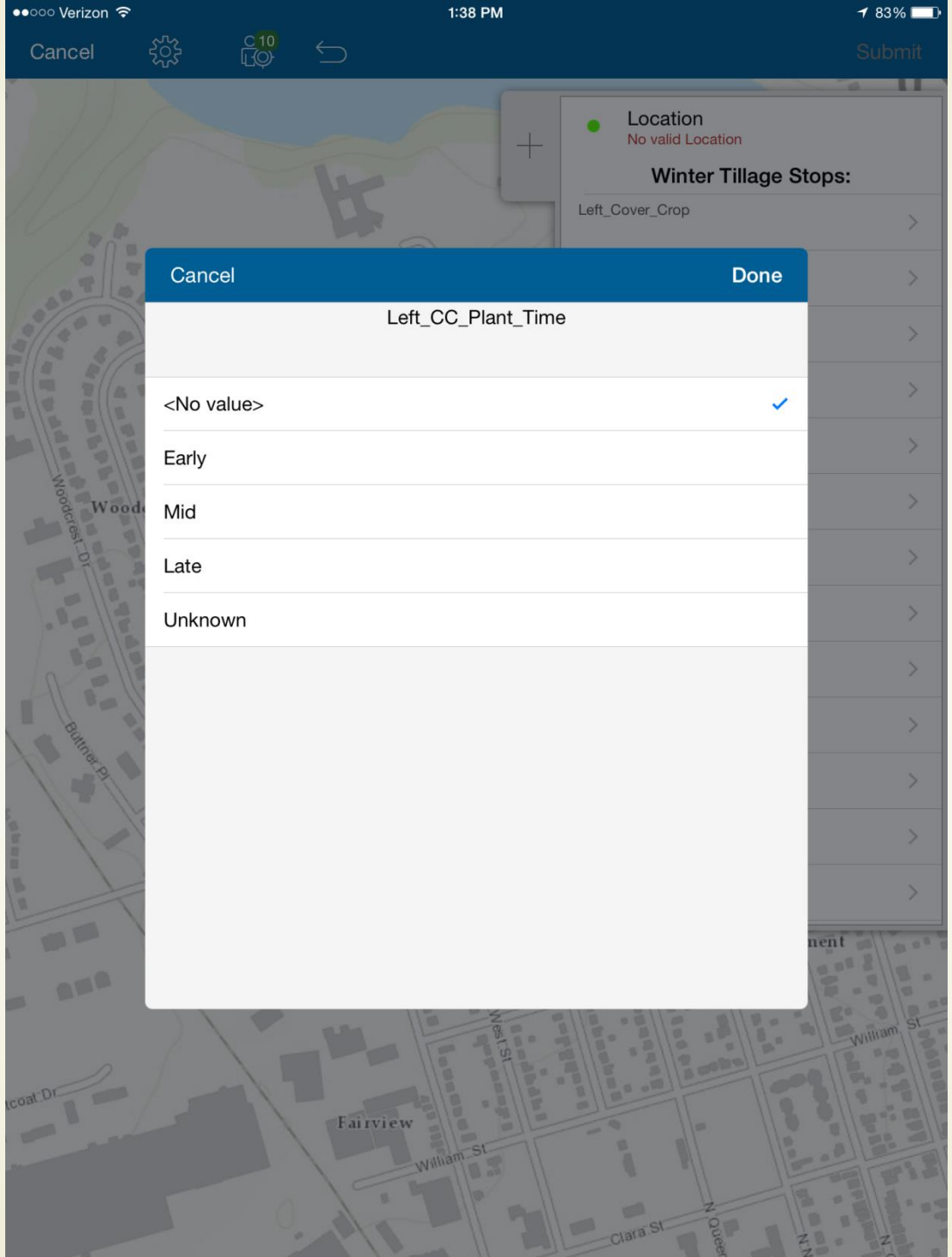
Aerial
Broadcast
Drill
Other
Woodcrest Dr
Buttner Pl
Fairview
William St
West St
Clara St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Done
Left_CC_Plant_Time
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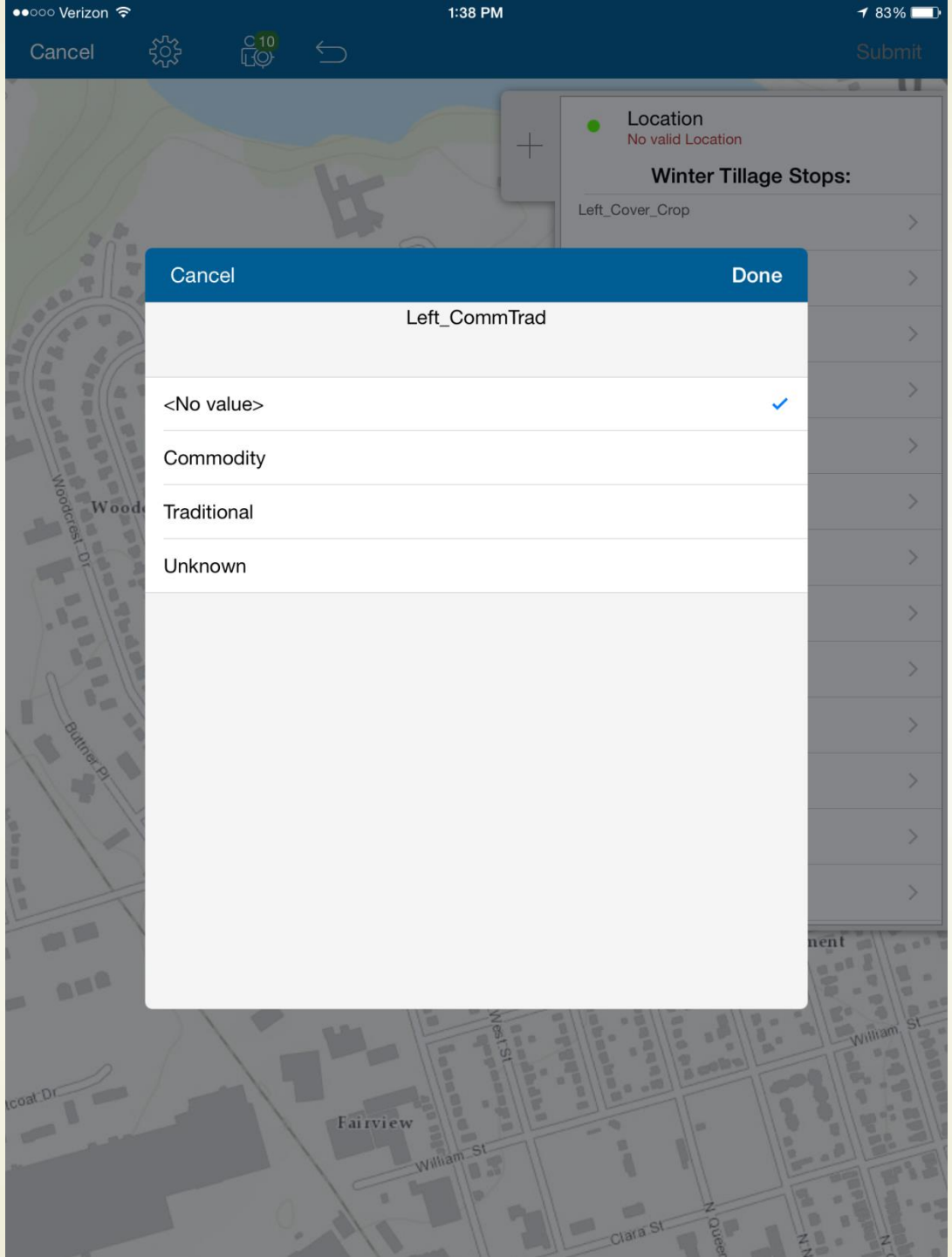
Early
Mid
Late
Unknown
Fairview
William St
West St
Clara St
Buttner Pl
Woodcrest Dr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Cancel
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Submit
Location
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Winter Tillage Stops:
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Commodity
Traditional
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Woodcrest Dr
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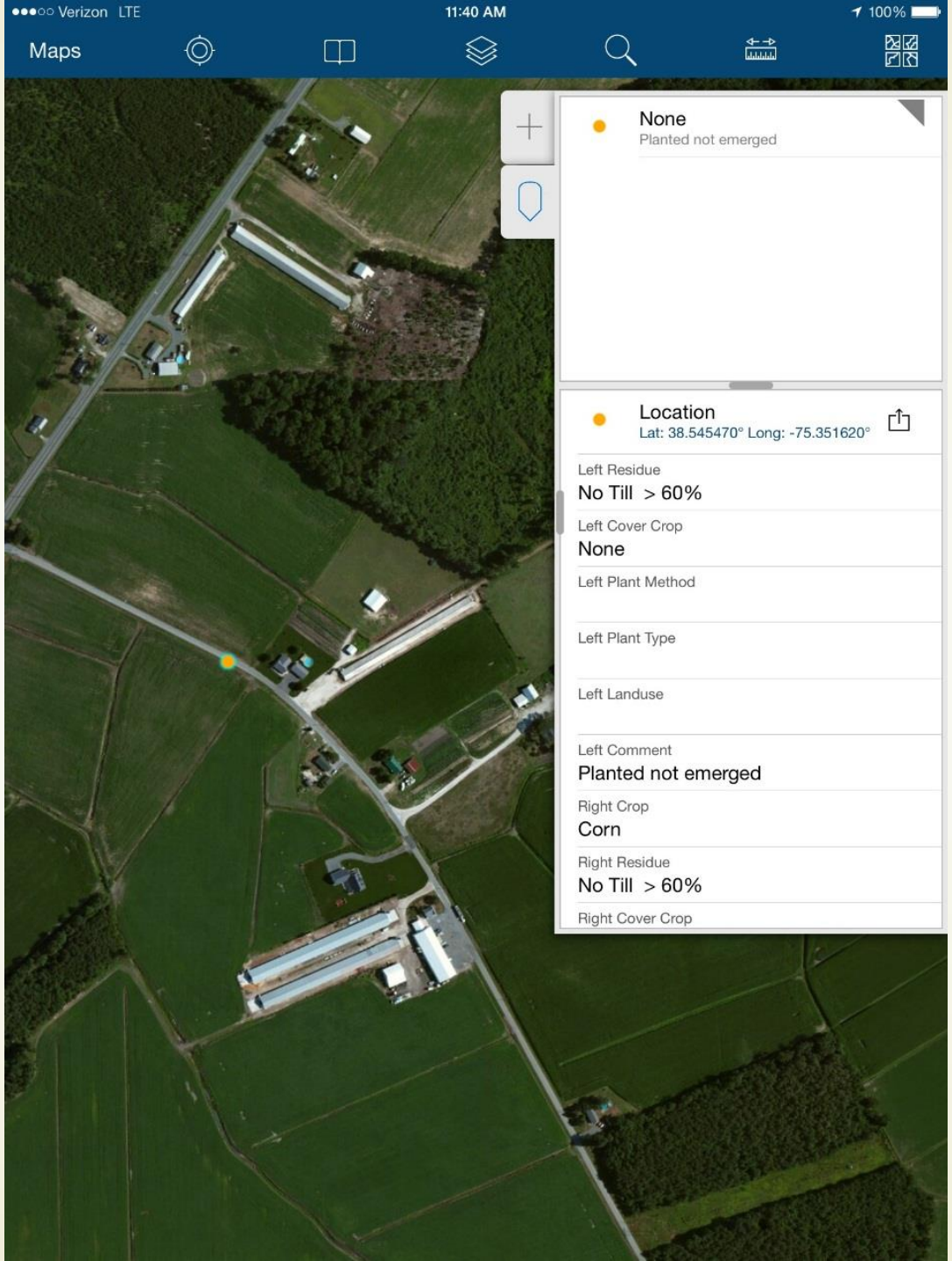
Fairview
William St
West St
Clara St


Verizon LTE
11:40 AM
100%
Maps
None
Planted not emerged
Location
Lat: 38.545470° Long: -75.351620°
Left Residue
No Till > 60%
Left Cover Crop
None
Left Plant Method
Left Plant Type
Left Landuse
Left Comment
Planted not emerged
Right Crop
Corn
Right Residue
No Till > 60%
Right Cover Crop

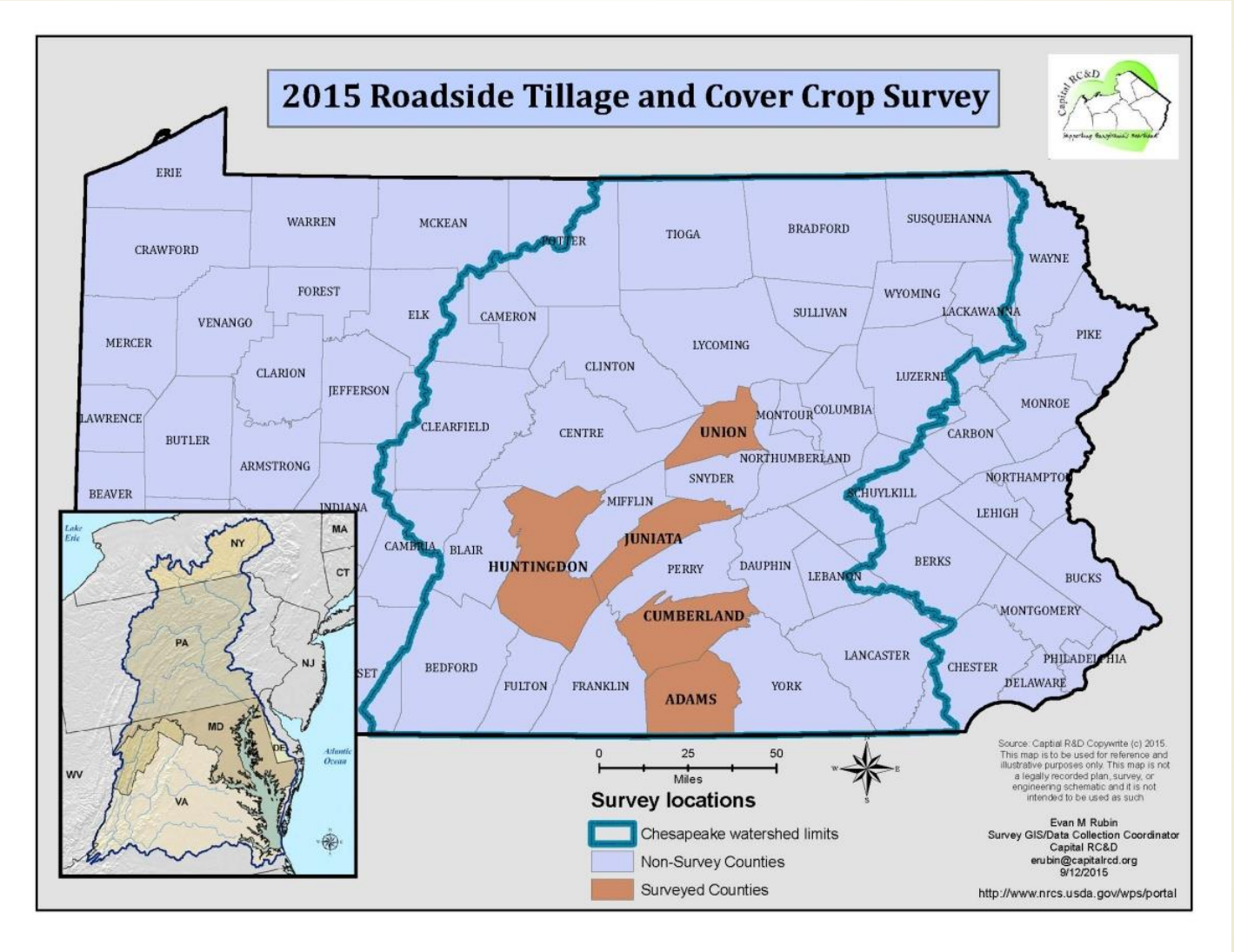
Pennsylvania Survey Background

- Capital RC&D has organized successful residue surveys in 2007, 2010, 2012 and 2013 using CTIC procedures
- 2012 and 2013 surveys established GIS waypoints for 460+ crop observations in all Chesapeake Bay Counties with over (approximately) 50,000 acres of crop land – 27 counties in total
- One-half of the counties surveyed in 2012, remaining half surveyed in 2013
- **Cover crop survey uses same routes and waypoints**

County Survey Teams

- **County Representative** – Experienced conservation district staff. Acted as source of local knowledge and as driver.
- **Consulting Technician** – Experienced in general cropping practices, trained and tested in consistent and accurate crop and residue level determination. All retired NRCS agronomists. Trained and tested by Joel Myers, former State Agronomist.
- **GIS and Data Entry Technician** – Trained technician guided team along survey route and identified observation waypoints. Data entry
- **QA/QC team** – Reviewed 10% of survey team's work. Consisted of two members, QC Technician and GIS & Data Entry Tech

Pilot Cover Crop Survey – Five Counties



Data Collection – Fall and Spring

Tested the validity of a cover crop survey by confirming that the needed data can be collected visually and on a large scale

Fall – Survey approximately four (4) weeks following first frost

Data Collected

- Harvested Crop
- Cover Crop
- Planting Method
- Establishment date estimate – function of

  Cover Crop height and density <50%>
- Manure Application (Yes/No)

Spring – Component of the residue survey of the county so after planting

Data Collected

- Cover crop termination information (commodity or traditional cover crop)

Example Survey Route Navigation

Cover Crop Data Collected

Fall Survey Sheet

HARVESTED CROP	
Corn - Silage	Corn - Grain
Full Season Soybeans	O - Other
Vegetables	SG - small grain

COVER CROPS	
Crops	**Planting Method**
SG- Small grain-winter	(B) Broadcast/aerial
LG- Legume	(I) Interseeded
G/L - Grass/legume mix	(ND) No-till Drilled
R - Annual Rye Grass	(D) Drilled conventional
O - Other	(O) Other
B- Brassica (Winter Hardy) (canola or rape)	
R - Forage Radish	
RG - Radish + Grass	
T - Triticale	
OA - Oats	
C - 3 or more species (cocktail)	

Spring Cover Crop Data

Cover Crop	Cover Crop Planting Method	Cover Crop Kill
Small Grain	Broadcast/aerial	Burned
Legume	Drilled	Harvested (Silage)
Winter Grain		To be harvested (Grain)
Other		Tilled
		Unknown

PA Cover Crop Survey Results

(Not adjusted for cost-shared acreage)

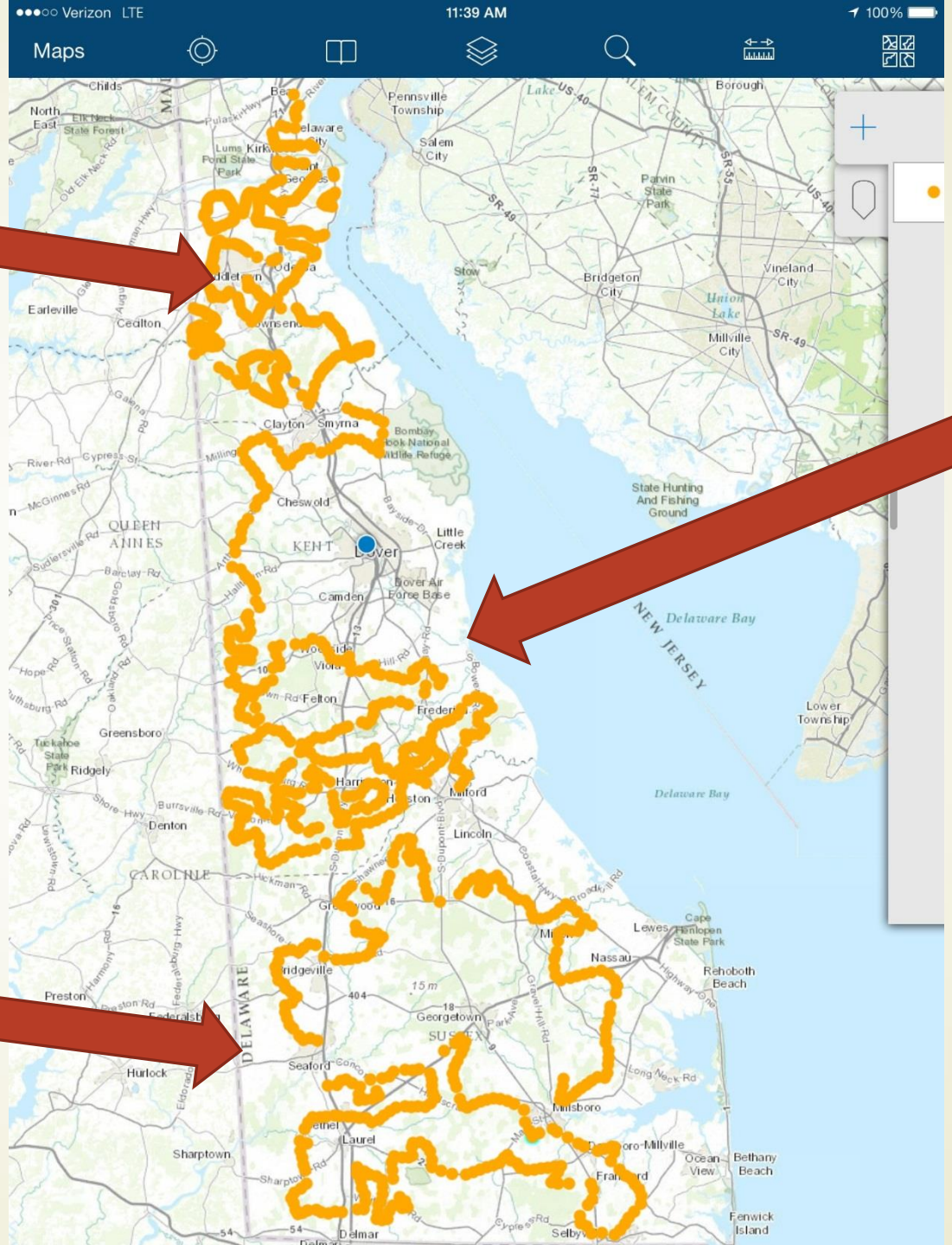
Cover Crop Survey

	County				
	Union	**Huntingdon**	**Juniata**	**Cumberland**	**Adams**
Total Crop Observations	469	361	446	370	421
Total Cover Crop Observations	172	123	136	137	142
% Cover Crops of Total Crop Observations*	37%	34%	30%	37%	34%
Commodity Cover Crop	11%	15%	24%	17%	20%
Traditional Cover Crop	25%	19%	6%	20%	14%
# Cover Crops Following Corn (%)	80 (47%)	99 (81%)	98 (73%)	100 (73%)	49 (35%)
# Cover Crops Following Soybeans (%)	83 (48%)	11 (9%)	27 (20%)	25 (18%)	67 (47%)
# Cover Crops Following Small Grain or Other (%)	9 (5%)	12 (10%)	9 (7%)	11 (8%)	25 (18%)

New Castle County
- 133 miles
- 470 observations

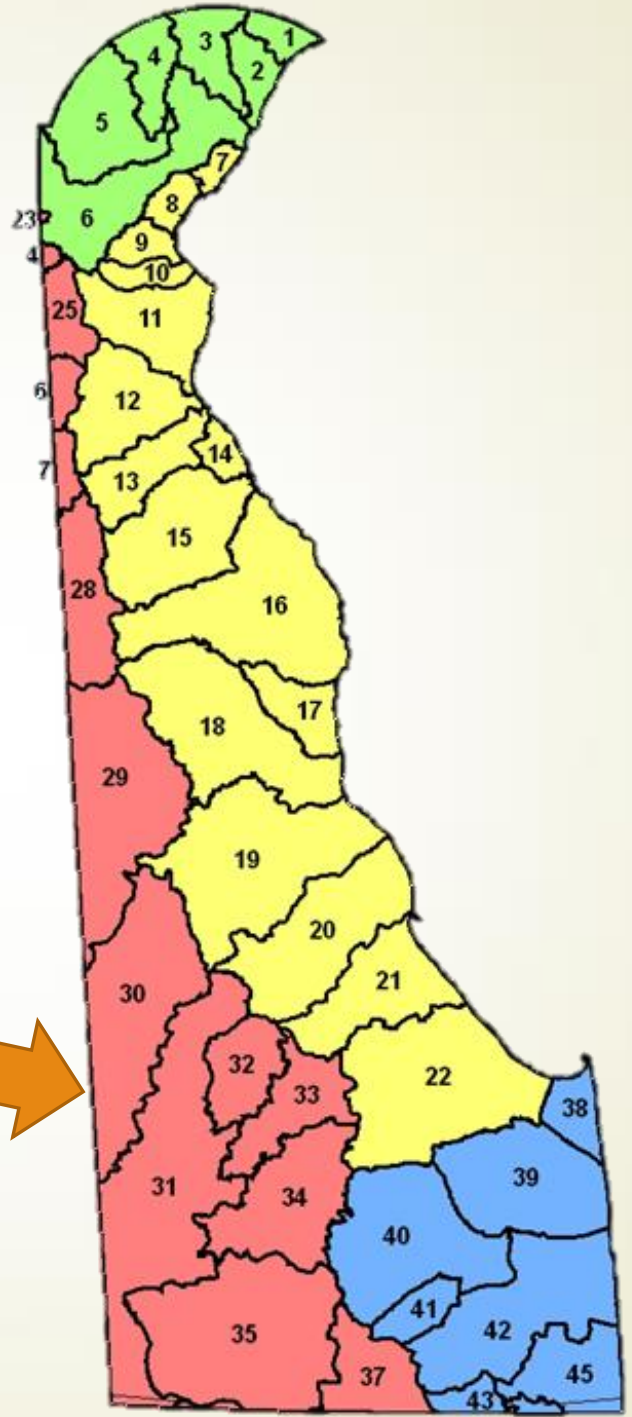
Kent County
- 206 miles
- 504 observations

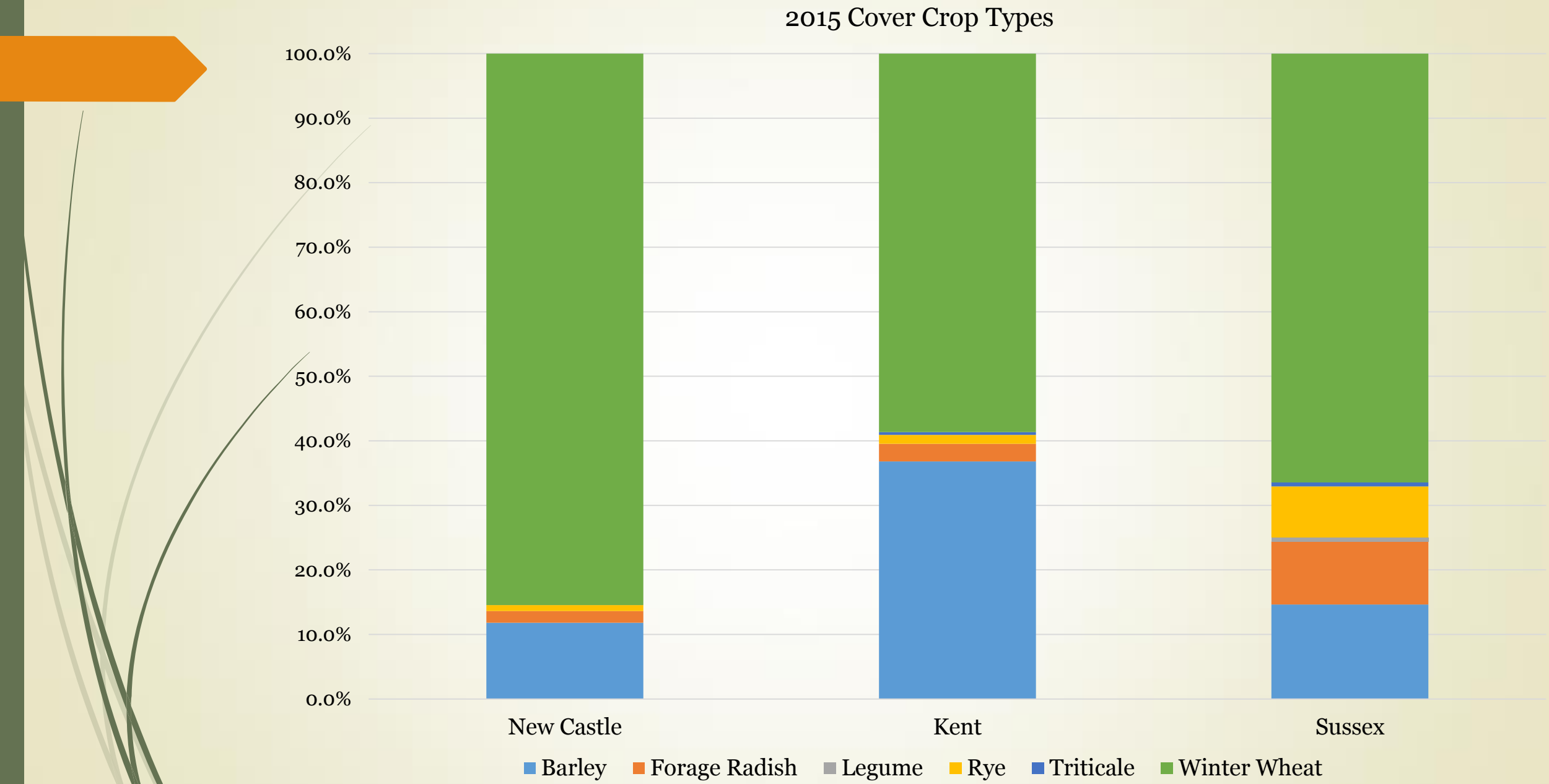
Sussex County
- 202 miles
- 497 observations

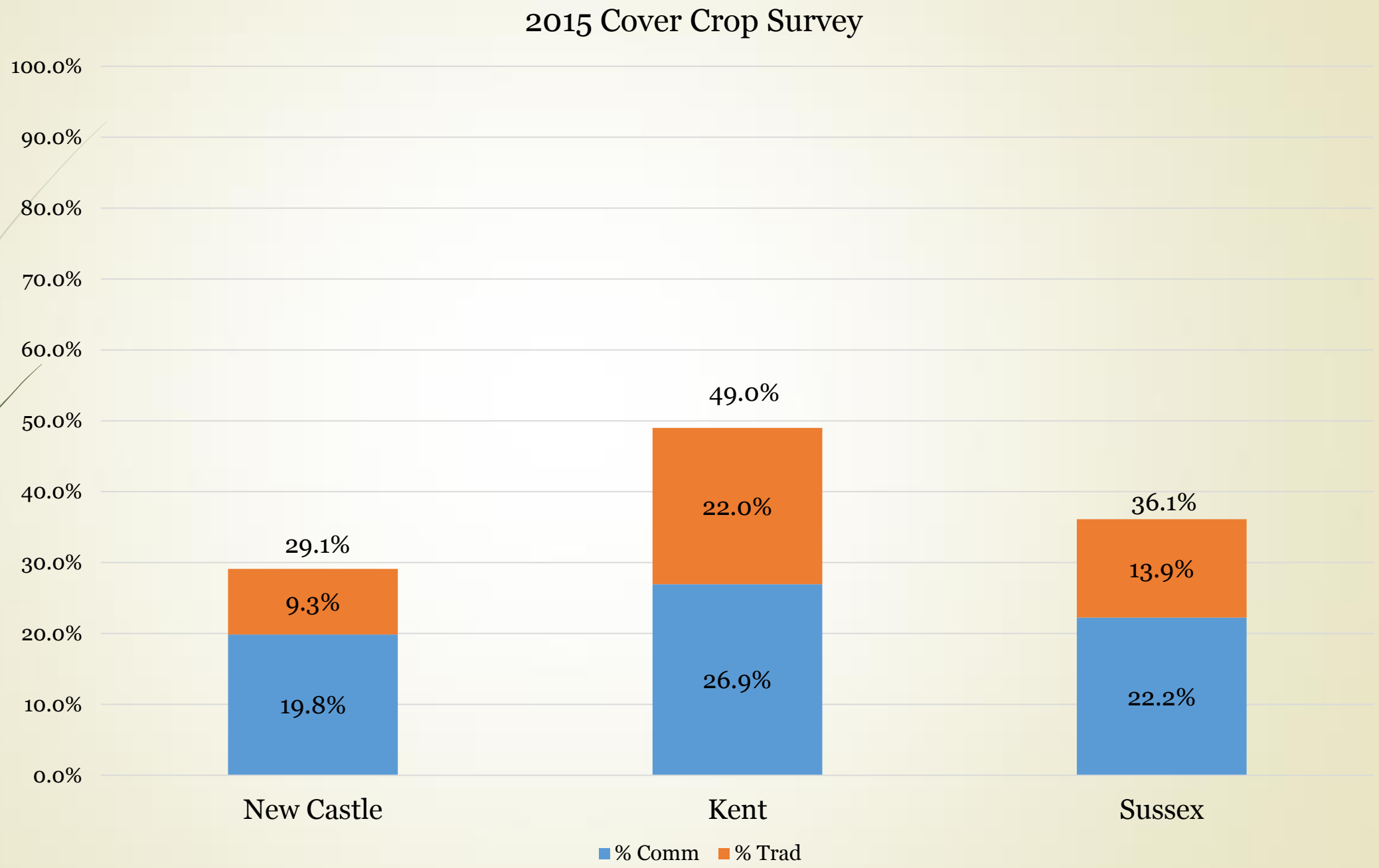


Chesapeake Bay Watershed
(43.82% of Observations)

- 36.2% Total
- 19.5% Traditional
- 16.7% Commodity




2015 Cover Crop Types
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
New Castle
Kent
Sussex
Barley
Forage Radish
Legume
Rye
Triticale
Winter Wheat


2015 Cover Crop Survey
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
29.1%
9.3%
19.8%
49.0%
22.0%
26.9%
36.1%
13.9%
22.2%
New Castle
Kent
Sussex
% Comm
% Trad

2015 Applied Acreages of Traditional Cover Crops

	New Castle	Kent	Sussex
Cover Crop Observations (%)	9.3%	22%	13.9%
Harvest Cropland (acres) – 2012 NASS data	53,507 Acres	141,758 Acres	226,056 Acres
Total Cover Crop Coverage (acres)	4,976 Acres	31,186 Acres	31,421 Acres

How will we use the data?

- Total Traditional Cover Crop Acres by County (TCC)
  - Calculations can be made for each cover crop type/planting method/date
  - Subtract Conservation District Cover Crop Acres by County (SWCD)
  - Any remaining acres will be reported and we will not report NRCS acres
  - Therefore, no double counting!
  - Report county-wide acreages not CB specific

How will we use the data?

Sussex County Example

- TCC – SWCD = reportable survey acres
- 31,421 (TCC) – 28,445 (SWCD) = **2,976 acres**

Conclusions

- What does this all mean?
  - Many farmers are doing the right thing – not for the Bay or water quality but for their own benefit
    - Economics
    - Soil Health
  - We need to conduct annual surveys to capture on the ground changes
  - We need this data to count NOW!
  - This data is useful to other partners and can be used to target programs for audiences (ie. vegetable growers or plain sect farmers) or areas (watershed, highly erodible land)

For More Information, Please Contact:

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Susan Richards, srichards@capitalrcd.org

New Castle Conservation District

Delaware Department of Natural Resources and Environmental Control

University of Delaware | Cooperative Extension
College of Agriculture & Natural Resources

Total Conservation Management – Kent Conservation District – Established 1943

Sussex conservation district
Prepare. Protect. Preserve.

NRCS
Natural Resources Conservation Service

FSA
Farm Service Agency

Delaware Department of Agriculture
Serving Agriculture and Protecting Consumers

pennsylvania
Department of Environmental Protection

Capital RC&D
Supporting Pennsylvania's Heartland!

PA Conservation District Offices of:

- Adams County
- Cumberland County
- Huntingdon County
- Juniata County
- Union County