

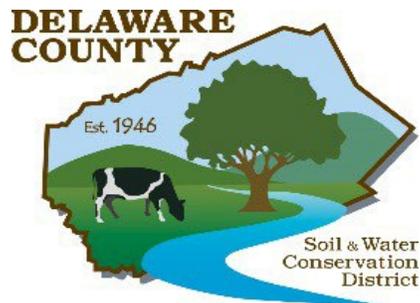
Enhanced Nutrient Management in the NYC Watershed and Delaware County

*USDA National On Farm Trials
Conservation Innovation Grant (CIG) Awardee*

Delaware County Soil & Water Conservation District

Paul Cerosaletti - Project Coordinator

Cornell Cooperative Extension of Delaware County



Watershed Agricultural Council
nycwatershed.org



NYC
Environmental
Protection



Cornell University
Cooperative Extension
of Delaware County

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Outline:

- ▶ The What and Why of CIG Project
- ▶ The CIG Grant Project Description
- ▶ Components of the Project
 - ▶ Custom Services Development
 - ▶ Implementing Enhanced Manure Management
 - ▶ Evaluation

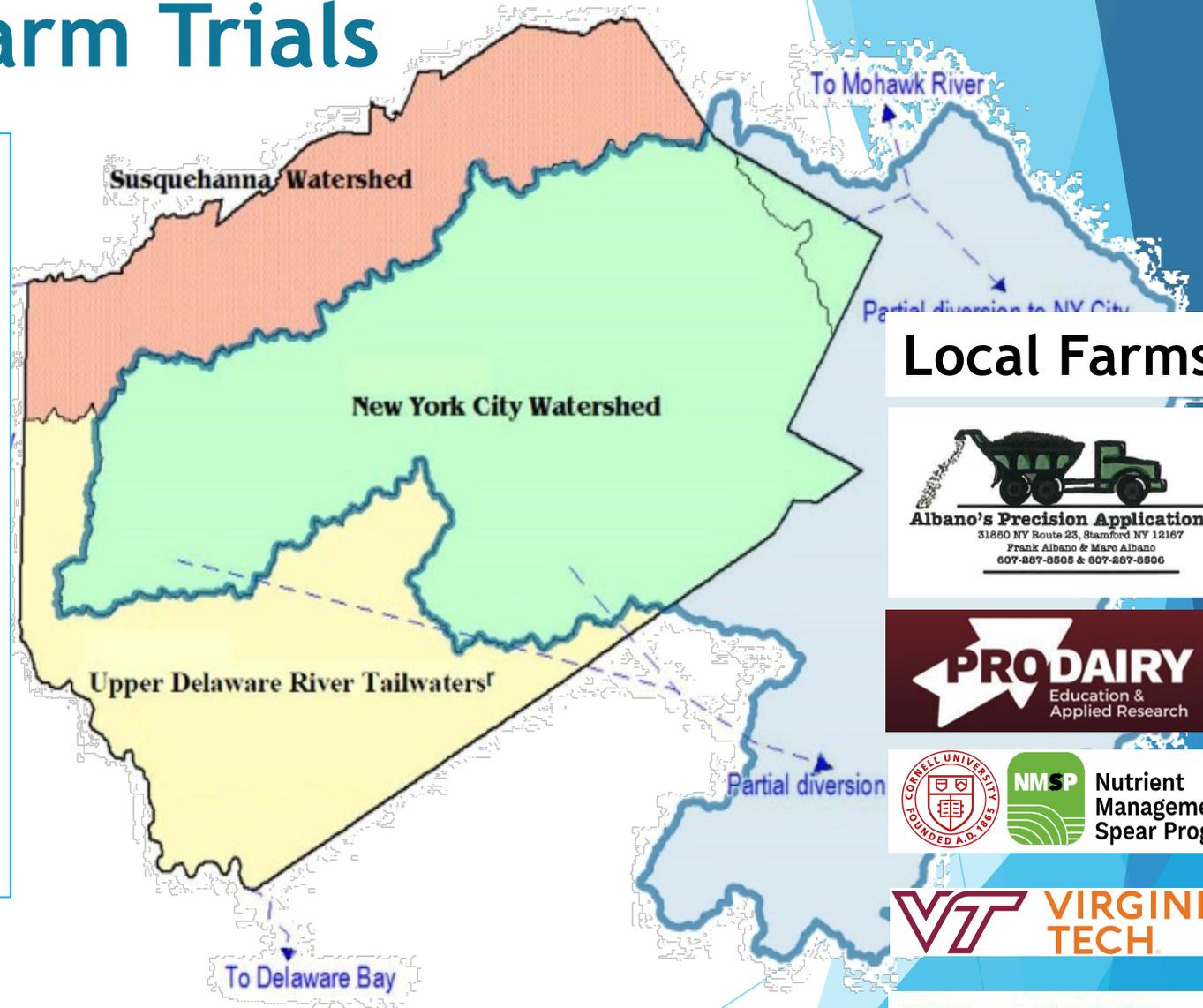


USDA-NRCS CIG-On Farm Trials

Enhanced Nutrient Management in the NYC Drinking Water Supply Watershed and Delaware County New York:

Breaking barriers to enhanced nutrient management adoption on small scale, resource challenged family farms in the Chesapeake Bay, Delaware River, and NYC Watersheds.

Federal Grant Agreement Number:
NR243A750011G001



Local Farms

Albano's Precision Application, Inc.
51850 NY Route 23, Stamford NY 12167
Frank Albano & Marc Albano
607-887-8805 & 607-287-8806

PRODAIRY
Education & Applied Research

CORNELL UNIVERSITY
FOUNDED A.D. 1865

NMSP Nutrient Management Spear Program

VIRGINIA TECH

USDA **NRCS**
United States Department of Agriculture
Natural Resources Conservation Service

DELAWARE COUNTY
Est. 1946

Soil & Water Conservation Districtwork

CORNELL UNIVERSITY
FOUNDED A.D. 1865

Cornell University
Cooperative Extension
of Delaware County

NYC
Environmental Protection

Watershed Agricultural Council
nycwatershed.org



Districtwork is supported by the Conservation Innovation Grants program at USDA's Natural Resource Conservation Service

The Why and What of the CIG Project

Why We are Doing This: The Over-View

1. To help farms better-manage stored manure and manure storages;
2. Reduce Nutrient Loss to the Environment;
3. Improved Nutrient Utilization;
4. Build a sustainable and efficient mechanism for implementing new technology;



The “Why”

Current Situation & Challenges

- ▶ After many years of implementing manure storages our experience has shown that our portfolio of farms often have difficulty effectively managing their storages.
 - Farm Demographics
 - Labor/Time
 - Equipment
 - Field Size/Proximity
 - Weather



Current Situation & Challenges

- ▶ Changes in nutrient management planning
 - NY P-Index 2.0, 590 Standard, Winter and Wet Weather Spreading Guidelines
- ▶ Our Farms are not getting the benefits of latest technologies
 - GPS mapping/Better rate control
 - Better manure distribution and timing
 - Manure Injection - Nutrient Conservation and Reduced Losses



Benefits of Shallow Disk Coulter Injection: What the Science Says

❖ Phosphorus:

- Dissolved P concentration was 38% lower than broadcast manure in both overland and subsurface water flow (Penn State Research 2013-2017)
 - New Phosphorus Index for NYS heavily favors injection of manure as BMP

❖ Nitrogen:

- Conservation of Ammonia N
 - Results in nearly 3X more N available to current crop compared to just organic N!



In a four-year study, shallow-disk injection of manure was found to result in less phosphorus loss in runoff from farm fields compared to broadcasting or spreading manure. The research findings have implications for Chesapeake Bay water quality. **IMAGE: MELISSA MILLER / PENN STATE**

Project Genesis Timeline

1. Formed working group in 2019 to discuss and address manure issues
2. Proof of concept - 2020
 - WAP/CCE injection demo
 - consults with custom applicators
3. Grant development 2020-2022
 - canvassed local farms for interest
 - presented to SWCD & WAC Boards
4. Applied for national CIG grant in fall of 2022
5. Contract finalized with USDA January 2024



Project Implementation Objectives

- *Develop* and *demonstrate* effective custom manure services;
- *Create capacity* to move manure efficiently to improve manure nutrient distribution and timing;
- *Facilitate* better manure storage management
- *Implement* shallow disk coultter injection to retain nutrients;
- *Implement* precision ag technology to facilitate and document applications;
 - Field Manure Prescriptions
 - Precision Rate Control
 - Cloud-based data platform
 - Precision mapping



Rate (Volume) (gal/US/acre)	
4956	123,488
Average	Total
Above 6125	0.768 ac
5375 - 6125	3.29 ac
4625 - 5375	15.71 ac
3875 - 4625	4.12 ac
Below 3875	1.03 ac



Project Implementation Means

1. *Build the custom manure services;*
2. *Make the Technology available through services;*
3. *Incentivize farmers to engage services and adopt technology;*

Rate (Volume) (gal/US/hec)	
4956	123,488
Average	Total
Above 6125	0.768 ac
5375 - 6125	3.29 ac
4625 - 5375	15.71 ac
3875 - 4625	4.12 ac
Below 3875	1.03 ac



Components of the CIG Project

CIG Project Components

1. Custom Services Development
2. Enhanced Farm Manure Management
3. Research, Evaluation and Education



CIG Project

CIG Project Components

1. Custom Services Development
2. Enhanced Farm Manure Management
3. Research, Evaluation and Education



Custom Services Development: Building Demand “Build it and they will come”

- **Step 1: - Farmer Participation**
 - Project Announcement August 2023
 - Farmer interest meetings
 - Two in Spring of 2024
 - One in Fall of 2024
 - Farmers complete “Intent to participate forms”
 - Indicate volume of manure willing to commit annually.



Delaware County
Soil and Water Conservation District
44 West Street, Suite 1 Walton, New York 13856
Phone 607-865-7161 FAX 607-865-5535

Delaware County SWCD Conservation Innovation Grant (CIG)- On Farm Trials
Farm Intent to Participate Form
Please return form to DCSWCD by November 22, 2024

Farm Name: _____
Farm Representative Name: _____
Address/Farm Location: _____
Contact Information: Phone _____ Email _____

Please select one option:

I am *not* interested in participating. – Stop here no more information needed

I am **interested** and I am willing to commit up to _____ gallons and/or _____ tons of manure or _____ percentage annually.
Select next option if it applies
 I am interested in manure injection and willing to inject approximately _____ acres annually

I **may be interested** in future years of the project, but not in 2025.

I don't currently store manure but would like to **participate when I am eligible**.
If I participate in the future, I would be willing to commit up to _____ gallons and/or _____ tons of manure or _____ percentage annually.
Approximate acres I might be interested having manure injection on = _____

Farm Information: Fill in or circle all that apply

Livestock type: _____ Total # of livestock: _____

Types of Manure: Liquid Semi Solid Pack

Type of Storage: _____

Bedding Material Used: _____

Completion of this intent form does not obligate you to participate in this project, nor does it guarantee participation. Participant eligibility will be contingent upon USDA-NRCS approval.

This work is supported by the Conservation Innovation Grants program at USDA's Natural Resource Conservation Service.



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Building Demand: Enhanced Manure Management- Farm Participation

- ▶ **Project manure targets:**
 - ▶ 18 million gals per year liquid manure (54 million gals over life of project)
 - ▶ 8,000 tons per year semi-solid manure (24,000 tons over life of project)
 - ▶ 1,800 acres per year of injected manure (5,400 acres over life of project)
- ▶ **Intent to Participate to-date (after 3 Farmer Interest meetings)**
 - ▶ 25 farms Indicating intent to participate
 - ▶ 19.2 million gallons of liquid manure annually
 - ▶ 7,600 tons semi solid manure annually
 - ▶ ~1,620 acres of injection annually (with indication of interest in doing more if able)

Custom Services Development *Meeting Demand:*

- ▶ RFP for custom services released in August 2024
 - Service Requirements
 - GPS mapping, Rate/Flow Control Technologies
 - Shallow Coulter Disk Injection
 - Ability to move and spread liquid and semi-solid manure
 - Move manure efficiently, appropriately for our topography
- ▶ 45-day Proposal Development Period - Q&A on RFP

Custom Services Development

Meeting Demand:

- ▶ Three proposals submitted for review, scoring and selection by 9-member review panel - October 2024.
 - ▶ Local agencies, Cornell Pro Dairy, Vermont Custom applicator
- ▶ Recommendation of Contractor selection to DCSWCD Board on 10/28.

Meeting Demand: CIG Custom Services Contractor



Albano's Precision Application

*Frank and Marc Albano
31850 NYS Rt. 23
Stamford NY 12167*





How do we fund this Equipment and Service????

Incentives to Build it...

Incentives to Engage it...

“How” the project works:

- ▶ Farms contract with DCSWCD Annually to commit manure to the project and develop field manure prescriptions (Rx);
- ▶ Farms contract annually with Custom Service to spread allocated manure according to manure Rx;
- ▶ Incentives paid for contracting, and application of manure as manure application events occur;
- ▶ Data is collected on manure spreading and nutrient management;



When and How does the funding flow?

Project Incentive Structure

1. Custom Services Contract Award Payment TO Custom Service (APA seed money)
2. Annual Farm Participation Incentive - payment TO farm for the commitment and time involved with project participation
3. Annual Custom Service Contracting Incentive - payment THROUGH farm to APA at time of contracting between farm and APA to incentivize commitments
4. Application Incentive Rate - payment THROUGH farm to APA for actual manure application based on Digital spreading records according to annual manure prescriptions.
 1. Incentives for handling and applying manure (per gallon or ton)
 2. Incentive for manure injection (per acre)

CIG Project Components

1. Custom Services Development
2. Implementing Enhanced Manure Management
3. Research, Evaluation and Education



Implementing Enhanced Manure Management: Precision Ag Technology and Cloud-based Data Platform

APA Chose Ag Leader Precision Ag Technology
 ...The DCSWCD then purchased the Ag Leader Agfiniti Data platform



Reports Summary Reports Comparison Reports DCSWCD

Filter Print PDF

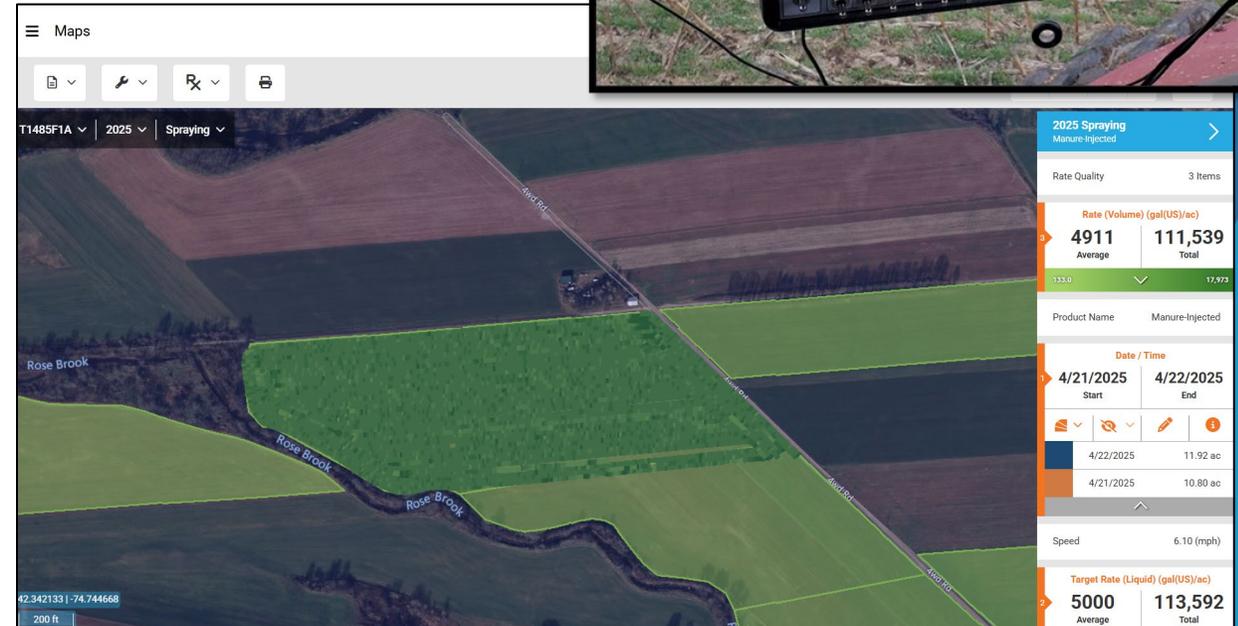
Landolt All Farms All Fields

2025 Spraying All Products

2025 Spraying Manure-Injected				
Field	Rate (gal(US)/ac)	Total (gal(US))	Area (ac)	Date
T7875F1B & T1624F1C	4168	144,828	34.75	7/14/2025 1:57 PM 7/15/2025 5:32 PM
Total	4168	144,828	34.75	7/14/2025 1:57 PM 7/15/2025 5:32 PM

Terms of Use | Privacy Policy | Contact Us
 © 2014-2025 Ag Leader Technology, All Rights Reserved

AgFiniti
 Powered By
Ag Leader



Precision Ag Technology:

Project Uses and Benefits

- ▶ Upload Field Boundaries and Manure Rx's
- ▶ Rate control for field application;
- ▶ Record as-applied data;
- ▶ As-applied data record for farms and program incentive payment generation;
- ▶ Performance data for APA



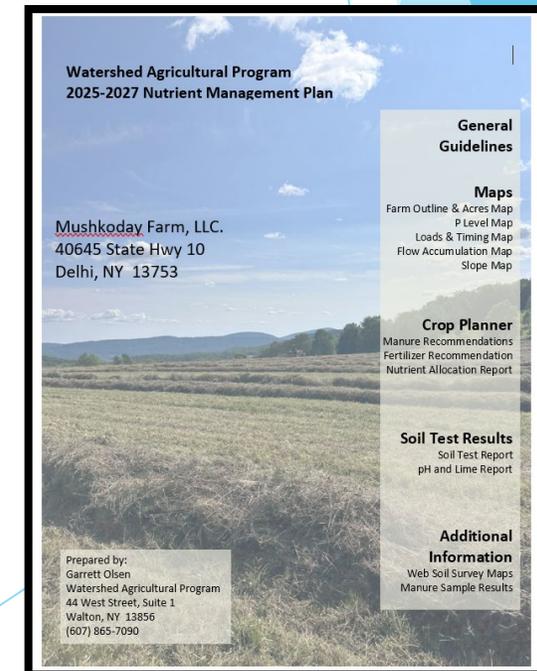
Developing Farm Manure Prescriptions

Manure Prescription Process:

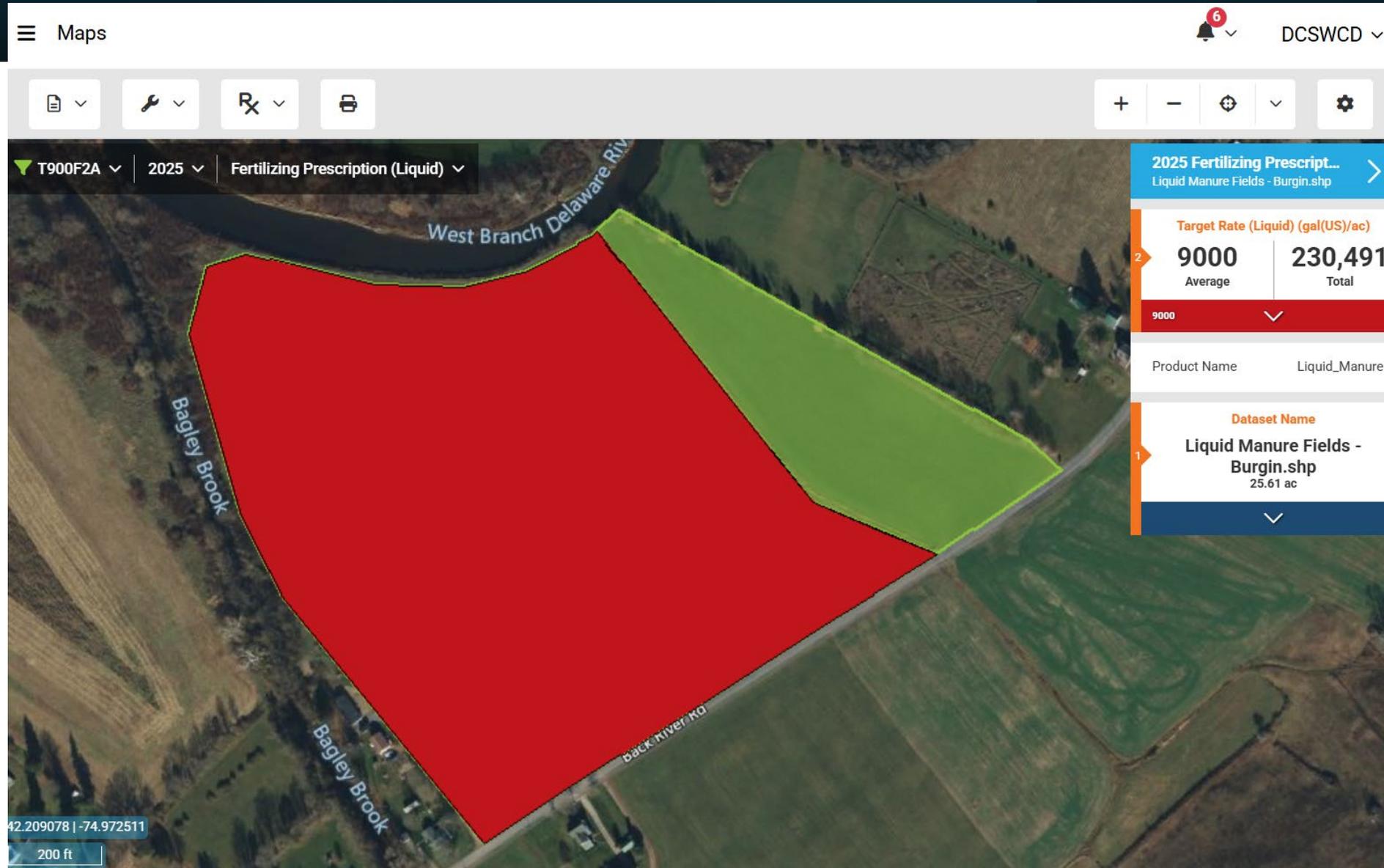
- *Collaboration between project staff*
- *Farmer*
- *Farm Nutrient Management planner*
- *APA staff*

- **Selecting**

- *Fields...*
- *Rates...*
- *Timing...*



Manure Prescription - Upload to Agfiniti Data Platform



Precision Ag Data Recording

- ▶ As-Applied Manure rate mapping
 - ▶ Rate Quality
 - ▶ As-Applied timing
 - ▶ Statistical summary



This work is supported by the Conservation Innovation Grants program



Rate (Volume) (gal(US)/ac)

Above 6125	0.768 ac
5375 - 6125	3.29 ac
4625 - 5375	15.71 ac
3875 - 4625	4.12 ac
Below 3875	1.03 ac

Average	4956
Total	123,488
Minimum	2.29
Maximum	23,538
Area	24.91 ac

Rate Quality	Good	20.25 ac
	Under Target	2.82 ac
	Over Target	1.84 ac
Product Name	Manure-Injected	24.91 ac
Date / Time	5/7/2025 - 5/7/2025	
Boom Pressure	0.00 psi	
Speed	6.75 mph	
Target Rate (Liquid)	5000 galUS/ac	
Vehicle Name	CaseIH Magnum 340	24.91 ac

Manure Application Event Summary Reporting

- Ability to filter data by Grower, Farm, field, Time and Date!

2025 Spraying Manure-Injected				
Field	Rate (gal(US)/ac)	Total (gal(US))	Area (ac)	Date
T780 F1&F2	6054	78,028	12.89	9/16/2025 10:06 AM 9/16/2025 1:04 PM
T8221F2	4896	61,394	12.54	8/23/2025 11:12 AM 8/23/2025 3:11 PM
T8221F3B	4469	24,835	5.56	8/24/2025 7:42 AM 8/24/2025 9:01 AM
T8221F6	4787	77,679	16.23	8/23/2025 8:20 AM 8/24/2025 10:57 AM
T890F7 & T8768F1A	6493	90,638	13.96	9/3/2025 10:04 AM 9/3/2025 1:16 PM
T896 F3A+F3B+F4	6357	126,858	19.95	9/3/2025 1:35 PM 9/3/2025 5:47 PM
T896F1A	6658	74,625	11.21	9/4/2025 10:51 AM 9/4/2025 4:11 PM
T896F1B	6616	18,657	2.82	9/4/2025 12:24 PM 9/4/2025 12:56 PM
T896F1C	6287	70,501	11.21	9/4/2025 8:15 AM 9/4/2025 10:45 AM
T896F1D	6388	64,468	10.09	9/4/2025 1:03 PM 9/4/2025 3:01 PM
Total	5905	687,684	116.5	8/23/2025 8:20 AM 9/16/2025 1:04 PM

CIG Project Manure Injection



In Stubble...

...cover crops

...and Sod!

To Date:
12,124,704 gallons manure
1,846 acres

This work is supported by the Conservation Innovation Grants program at USD



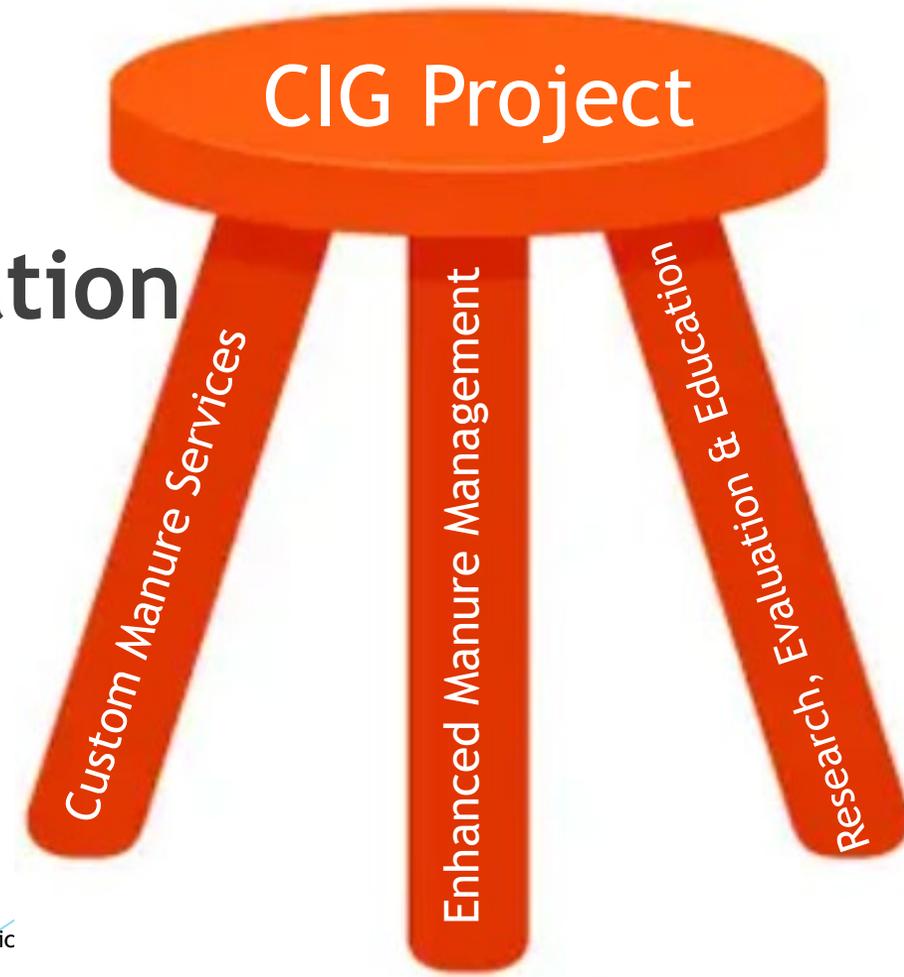
CIG Project: Semi-Solid Manure Spreading



To Date:
6,127 tons of manure
846 acres

CIG Project Components

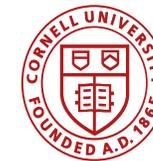
1. Custom Services Development
2. Implementing Enhanced Manure Management
3. Research, Evaluation and Education



Evaluation Component

Collaboration with Cornell and Virginia Tech

- ▶ *Basin and Sub basin SWAT modelling* for nutrient loss impacts from various manure management scenarios
- ▶ *Rate/Timing/Spreading Methods* - Historical Manure spreading records analysis
- ▶ *Phosphorus Management Planning Impacts* on NY P-Index 2.0, field specific decisions
- ▶ Assessment of manure management practices on *field* and *whole farm nutrient mass balance*
 - ▶ Corn Silage fields
- ▶ State-wide *Value of Manure Study* -
 - ▶ local sites



**Nutrient
Management
Spear Program**



**Cornell University
Cooperative Extension
of Delaware County**





Helen Solecki

Master's Thesis Components

1. Manure management practices pre and post implementation of custom operator service
2. Evaluate impact of manure injection on whole-farm mass balances and field balances for nitrogen and phosphorus
3. Evaluate impact of farm-based management changes on field and whole-farm levels based on P-index 2.0 scores

Slide courtesy of Helen Solecki

Evaluation Component

- ▶ **Socio-economic study:**
 - ▶ Manure Management Cost Analysis
 - ▶ Effect on Crop Yields, Commercial fertilizer purchases, Fertilizer values of manure nutrients conserved
 - ▶ Assessment of impacts on farm labor, management quality of life, odor control, and neighbor relations



New York Value of Manure Project

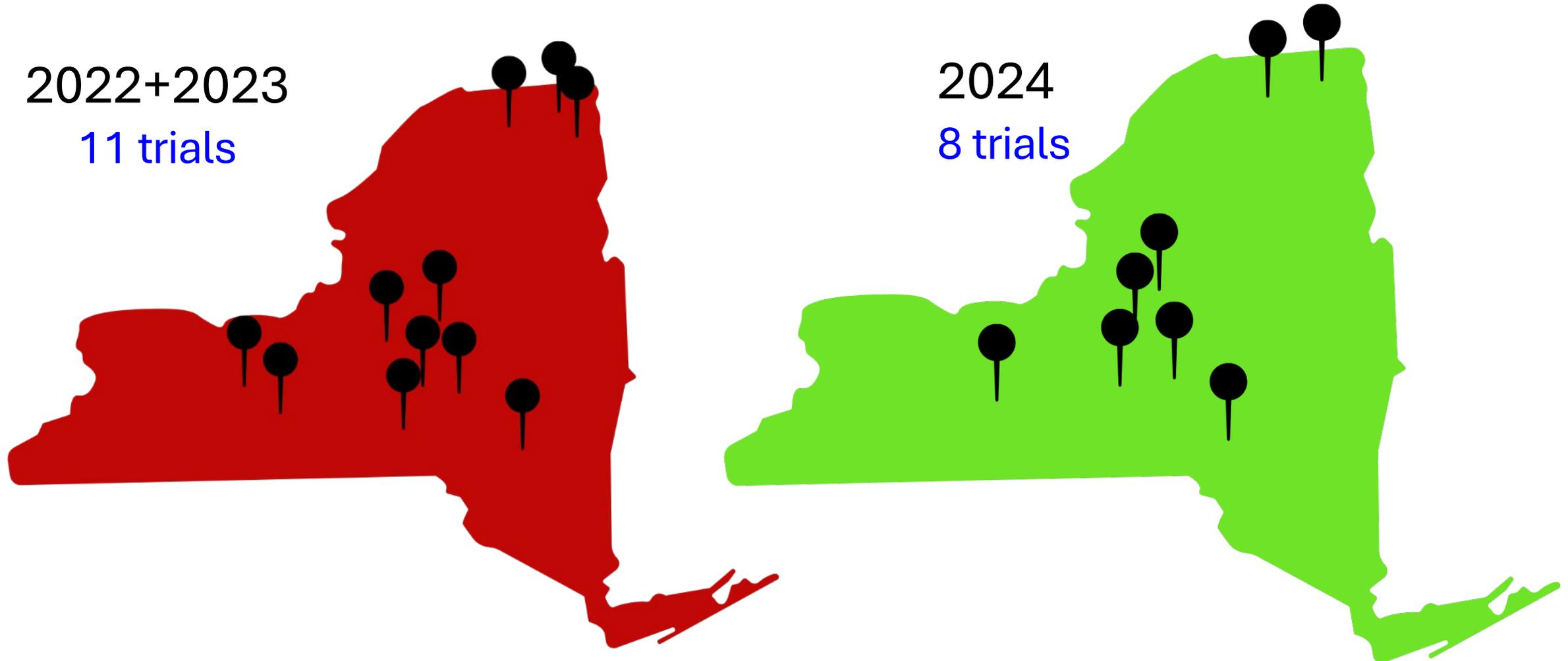
On-farm trials (2022-2025) to address two knowledge gaps:

- Need for information about manure nutrient crediting of variable sources of manure and application methods
- The potential economic, yield, and forage quality benefits of manure as a replacement of synthetic nitrogen



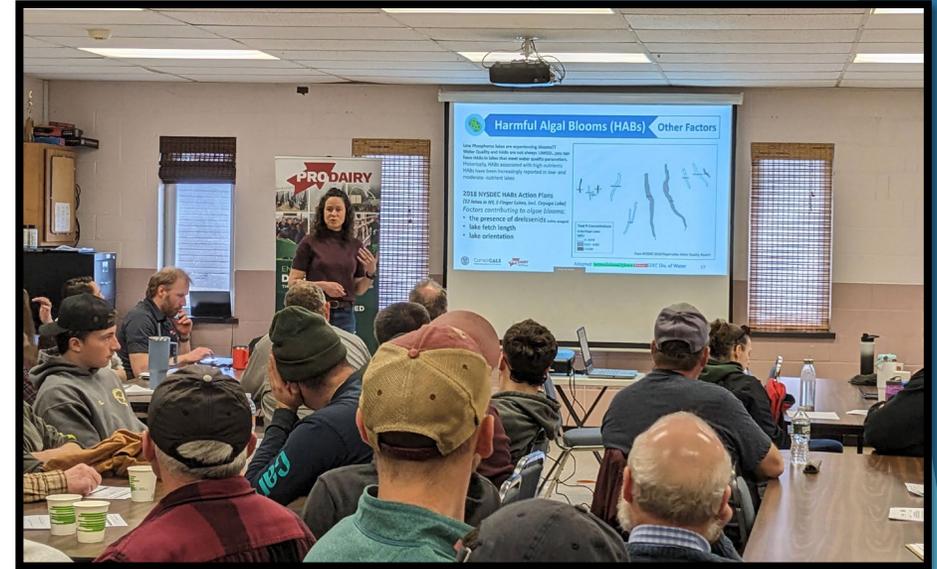
Slide Courtesy of
Dr. Quirine Ketterings

New York Value of Manure Project



Slide Courtesy of
Dr. Quirine Ketterings

Education:





Manure Injection Field Day
Friday, August 29th, 2025, 10:30 am-3:00 pm
Joleanna Holsteins
 309 Covered Bridge Rd, Unadilla, NY 13849

Live Equipment Demos!

Rain or Shine!

- 10:30 – Registration - *in the tent*
- Value of Manure when injected - *in the tent*
- Producer Panel - Experiences with Manure Injection - stubble & sod - *in the tent*
- LUNCH – Pulled Pork BBQ – *in the tent*
- Manure Injection Demonstrations – stubble & sod - *outside in field*
- Manure Spill Response demo – *outside in field*

Cost: \$10 per person
RSVP by 8/25 to Donna Wood @ 607-865-7161 or email - donna-wood@dcswod.org

This work is supported by the Conservation Innovation Grants program at USDA's Natural Resource Conservation Service.



This work is supported by the Conservation Innovation Grants program at USDA's Natural Resource Conservation Service



Teamwork makes the Dream work... A Real Team Effort....

- DCSWCD
- CCEDC
- WAC
- NRCS
- FSA
- Farmers
- Albanos Precision Applicaion
- Cornell & VA Tech (Research and Evaluation)
- Randall Implement – Roy Garrett
- Agri-Applicators Inc.



Questions?

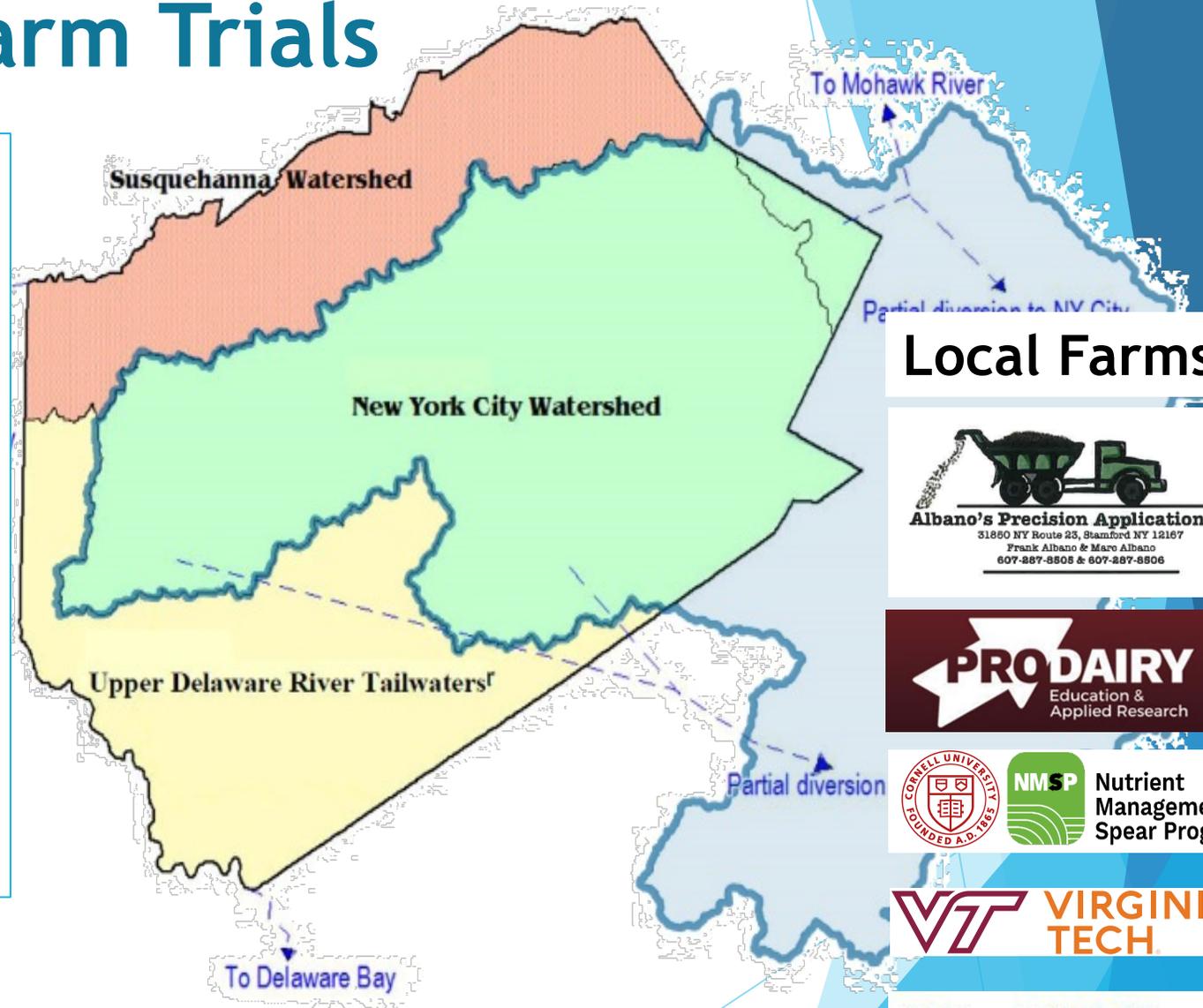


USDA-NRCS CIG-On Farm Trials

Enhanced Nutrient Management in the NYC Drinking Water Supply Watershed and Delaware County New York:

Breaking barriers to enhanced nutrient management adoption on small scale, resource challenged family farms in the Chesapeake Bay, Delaware River, and NYC Watersheds.

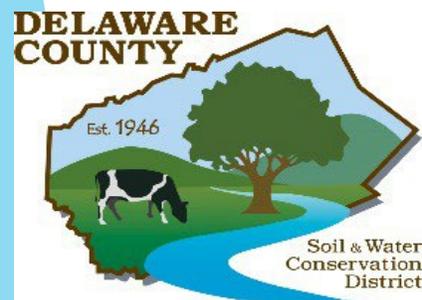
Federal Grant Agreement Number:
NR243A750011G001



Local Farms



Albano's Precision Application, Inc.
51850 NY Route 23, Stamford NY 12167
Frank Albano & Marc Albano
607-887-8805 & 607-287-8806



Cornell University
Cooperative Extension
of Delaware County



Watershed Agricultural Council
nycwatershed.org



Work is supported by the Conservation Innovation Grants program at USDA's Natural Resource Conservation Service