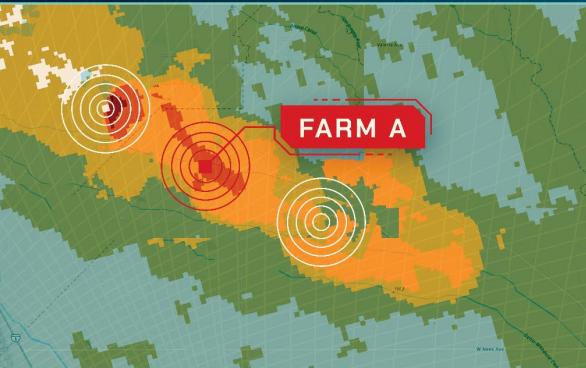




TRACKING  
WATERFOWL  
TO PROTECT  
YOUR POULTRY

## WATERFOWL ALERT NETWORK

MAKING DAILY PREDICTIONS OF  
WATERFOWL ABUNDANCE AT YOUR FARMS



DAILY EMAILS  
AND MONTHLY REPORTS

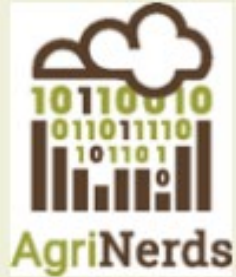
HIGH RESOLUTION (250M)

ALERTS FOR FARMS  
WHERE HPAI DETECTED

HISTORICAL ANALYSIS



AgriNerds  
530-219-1407  
waterfowlalertnetwork.com  
agrinerds.com



# Waterfowl Alert Network

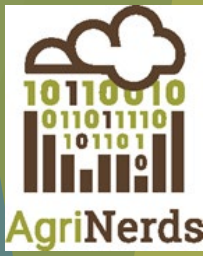
Tracking Waterfowl to Protect your Poultry

**better connected data = better decision-making (potential)**

**NPIP Technical Advisory Committee Meeting**  
August 27<sup>th</sup> 2024

Contact: [mepitesky@agrinerds.com](mailto:mepitesky@agrinerds.com)  
[mepitesky@ucdavis.edu](mailto:mepitesky@ucdavis.edu)  
530-219-1407  
[waterfowlalertnetwork.com](http://waterfowlalertnetwork.com)

# Outline



## ► WaterFowl Alert Network

## ► NPIP Navigator Software

The screenshot shows the Waterfowl Alert Network web application. The header includes the AgriNerds logo and the text "Waterfowl Alert Network Tracking Waterfowl to Protect your Poultry". A map displays a central red dot labeled "Your Ranch" with concentric circles representing detection ranges. Below the map, a text box states: "Turning radar detections of waterfowl into daily risk models of waterfowl roosting". A sidebar on the left contains navigation links: Home, Free Resources, About the Waterfowl Alert Network, and Contact us. A bottom section titled "Waterfowl Alert Network" lists features:

- Daily roosting models from November to end of March
- Models track presence/absence of waterfowl & density
- Daily and seasonal waterfowl ranking for farms
- High resolution (up to 250m granularity)
- Farm location integrated into maps
- Historical analysis back to 1995
- Alerts for farms within counties of HPAI detections

At the bottom left, a small note reads: "Demo the Waterfowl Alert Network by logging in with the following username and password. Username: ACME\_User".

The screenshot shows the NPIP Navigator Software web application. The header includes the AgriNerds logo and the text "NPIP H5/H7 AI Monitoring Program". The interface is divided into sections for "PART 145 TESTING", "PART 146 TESTING", and "EGG ASSESSMENT". The main form includes fields for:

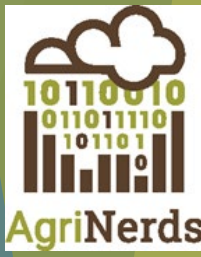
- Participant: JF-002 - Joe Rancher Farms
- Accession Numbers: JF3021 (Press enter to add a value)
- Form Date: 11 / 02 / 2023
- Certification Period: November 2023
- Ranch ID Numbers: JF-001, JF-002 (Press enter to add a value)
- Number of Flocks: 4
- Bird Type: 60 - Meat Type Chickens
- Flock ID Numbers: JF-001-01, JF-001-02, JF-002-01, JF-002-02 (Press enter to add a value)
- Total Birds in Flock: 145,123

A table displays test results:

Test Type	Number of Tests	# Negative	# Positive
ELISA	134	134	0
AGID	Number of Tests	# Negative	# Positive
PCR	Number of Tests	# Negative	# Positive

Buttons for "RESET" and "SUBMIT" are located at the bottom right. A copyright notice at the bottom right reads: "© 2024 AgriNerds, Inc. All rights reserved."

# WaterFowl Alert Network (WFAN)



- a. Management/Biosecurity
  - Physical biosecurity
  - Operational biosecurity
  
- b. WaterFowl Alert Network (WFAN)
  - HPAI detections in wild waterfowl and domestic birds
  - Waterfowl roosting location
  - Movement of waterfowl from HPAI positive areas



Goal: Link on and off-farm variables to improve the ability to identify which farms are at the greatest risk

Why is linking data important?

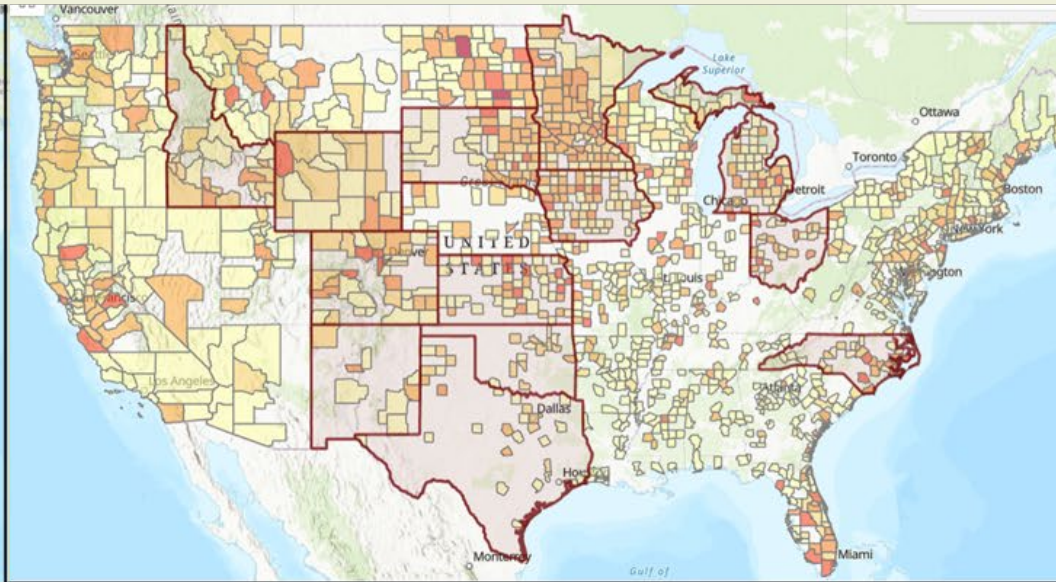
By linking on and off-farm data we can increase the Positive Predictive Value (PPV) of which farms break with HPAI by 3.5x

# State of the Current HPAI Outbreak

## 2014-2015 HPAI Detections per County



## 2022-present HPAI Detections per County



status

- Wild Birds HPAI+ Counties
- Backyard Birds HPAI+ Counties
- Commercial Birds HPAI+ Counties
- Wild & Backyard Birds HPAI+ Counties
- Wild & Commercial Birds HPAI+ Counties
- Commercial & Backyard Birds HPAI+ Counties
- Wild & Commercial & Backyard Birds HPAI+ Counties
- HPAI\_Livestock

# Value of Waterfowl Surveillance

USDA Animal and Plant Health Inspection Service  
U.S. DEPARTMENT OF AGRICULTURE

## Epidemiologic and Other Analyses of HPAI Affected Poultry Flocks July 2022 Interim Report



Other valuable tools for understanding disease risk are eBird and BirdCast migration data. BirdCast migration maps show real-time intensities of nocturnal bird migration between local sunset to sunrise, as detected by the U.S. weather surveillance radar network. eBird is a database of species-specific, crowd-sourced observational data by scientists and birding enthusiasts. Intense periods of bird migration, as seen by BirdCast maps were correlated with outbreaks in domestic poultry, suggesting that this tool can be used to increase awareness of increased HPAI risk due to wild bird movements. Using eBird data, we estimated that HPAI-positive premises were more likely to be detected within the first seven days of heavy wild bird observation within a 50km spatial window.

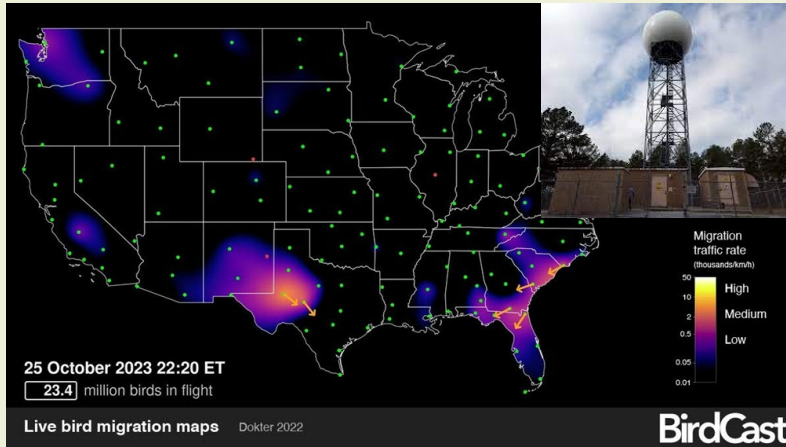
Further information on the epidemiologic features of this outbreak and additional analyses will be provided in subsequent reports.

# Remote Sensing of Waterfowl



## Radar

BirdCast and WFAN



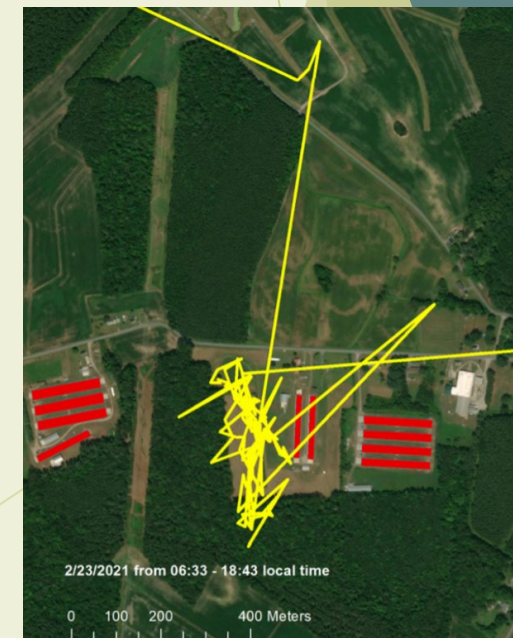
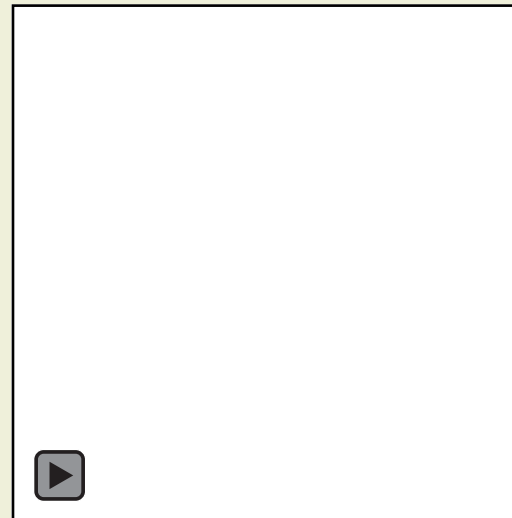
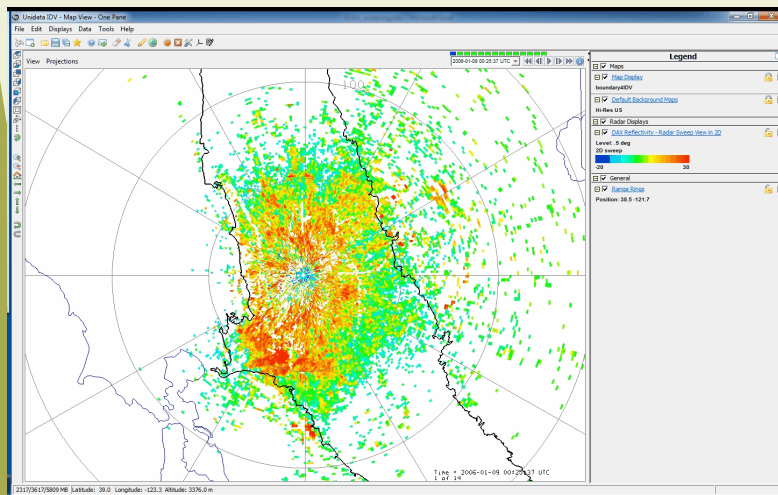
## EO Satellite

WFAN



## Telemetry

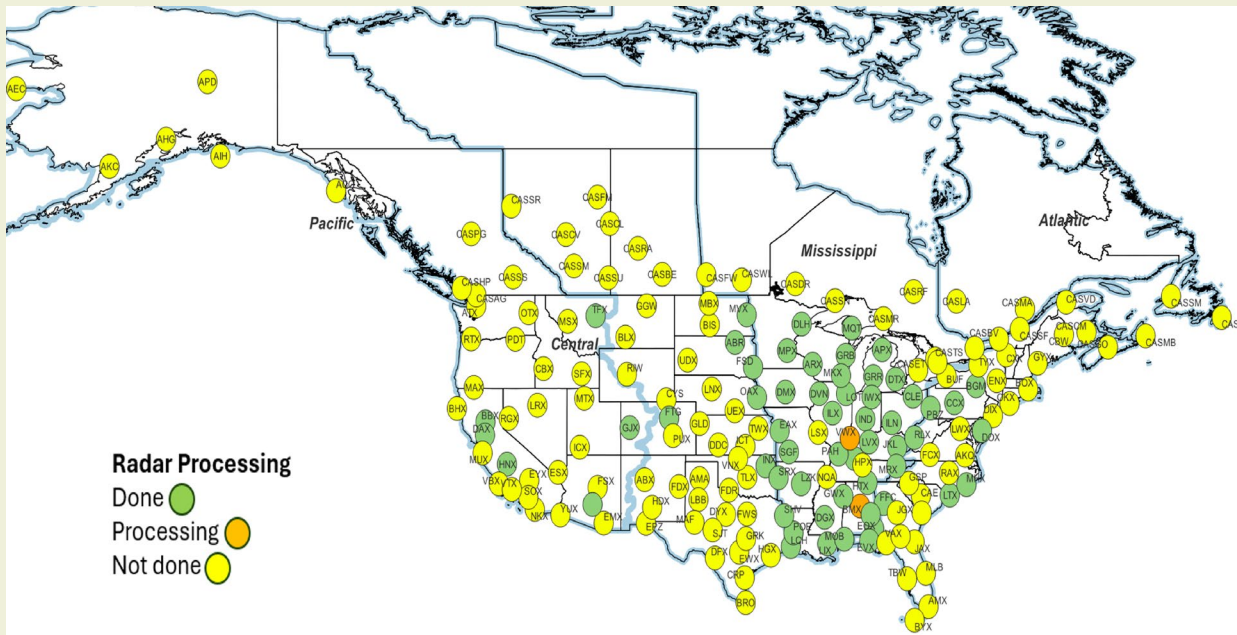
WFAN



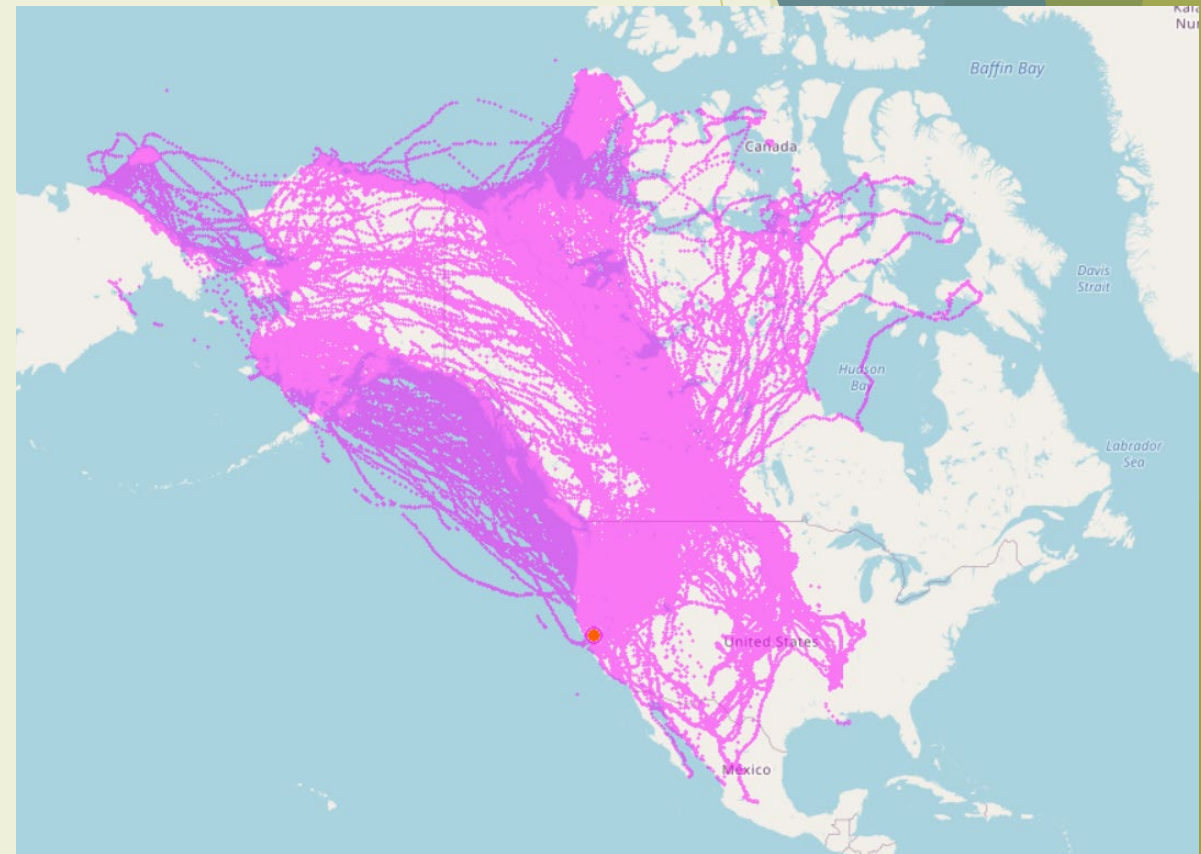
# WFAN: Current Modeling Status



## Radar



## Telemetry



# How the WaterFowl Alert Network Works



**My Farms**

**Meadowlark Farms** High


**Overview**

Risk: High

Rank: 1

Abundance: 6420

AI in County: 3



**Farm Data**

Location: Davis, CA

Assignee: John Doe

Housing Type: Caged

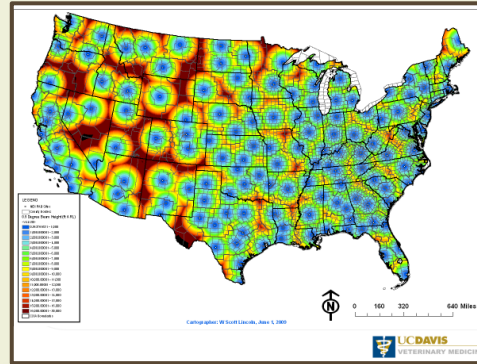
Last Inspected: Jan 17, 2023 Create Report

**Riverdale Ranch** High

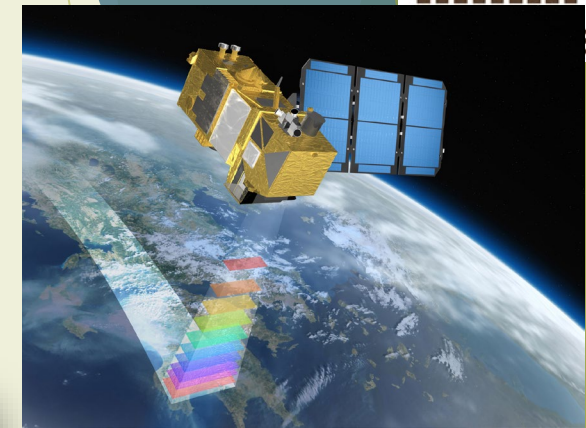
**Rolling Hills Ranch** Moderate

**Golden Plains Farm** Low

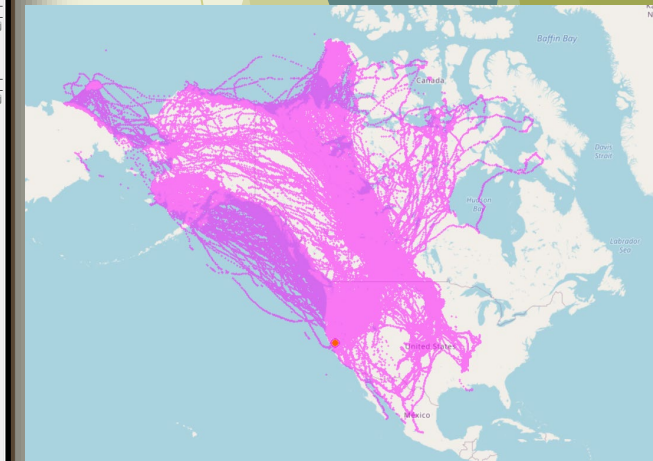
## Weather Radar



## Satellite Imagery



## Telemetry



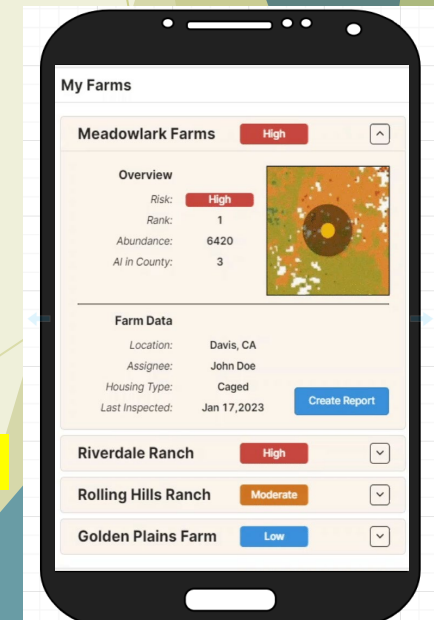
We use a combination of radar, satellite imagery, ground based environmental data to make daily predictive models of waterfowl roosting. The technical infrastructure is global, demonstrating national and international scalability



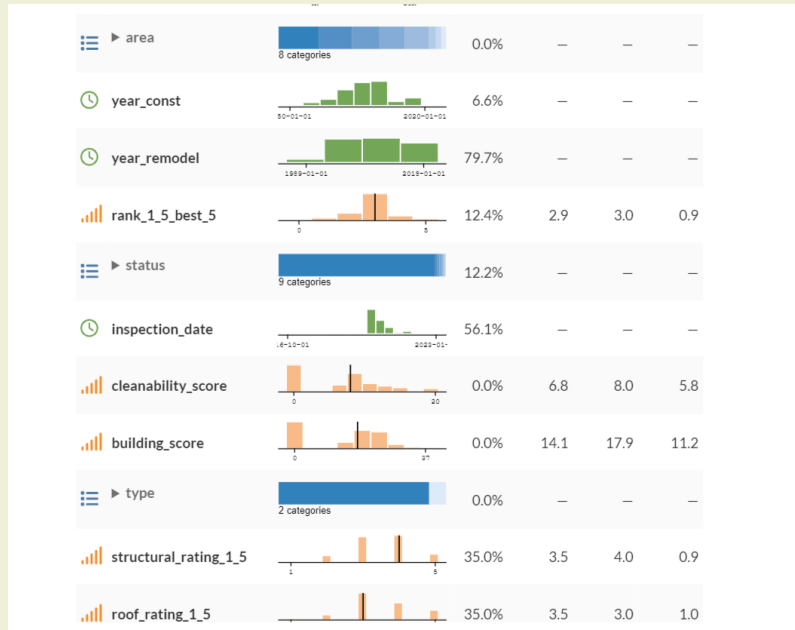
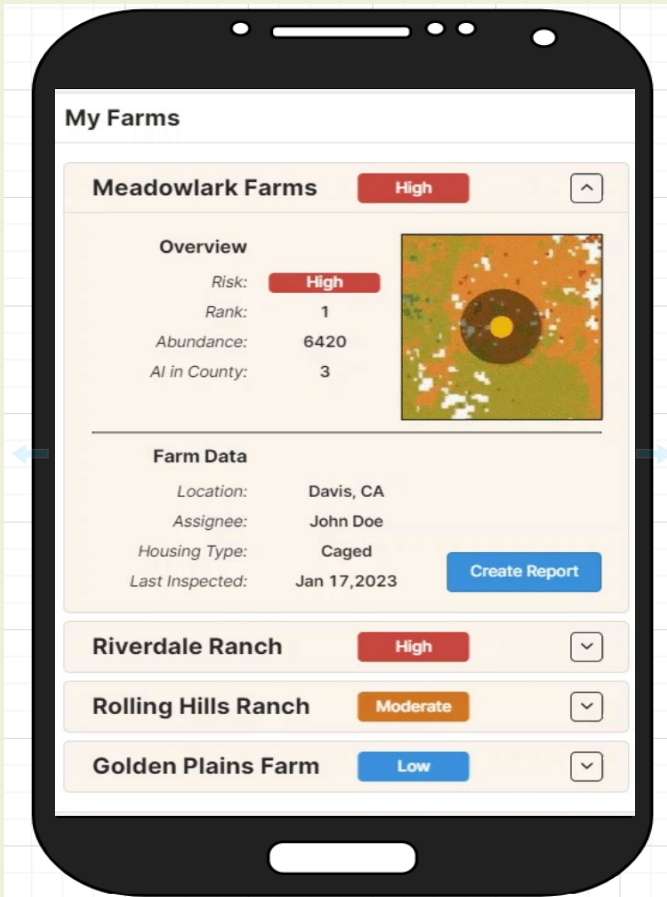
## How to Identify Which Farms will get HPAI

- You can increase the PPV by 3.5x by combining the following on and off farm variables
  - HPAI detected in wild waterfowl within 10km of a farm (20 day window)
  - Increased waterfowl abundance within 2km of a farm (20 day window)
  - Biosecurity variable (~ physical biosecurity)

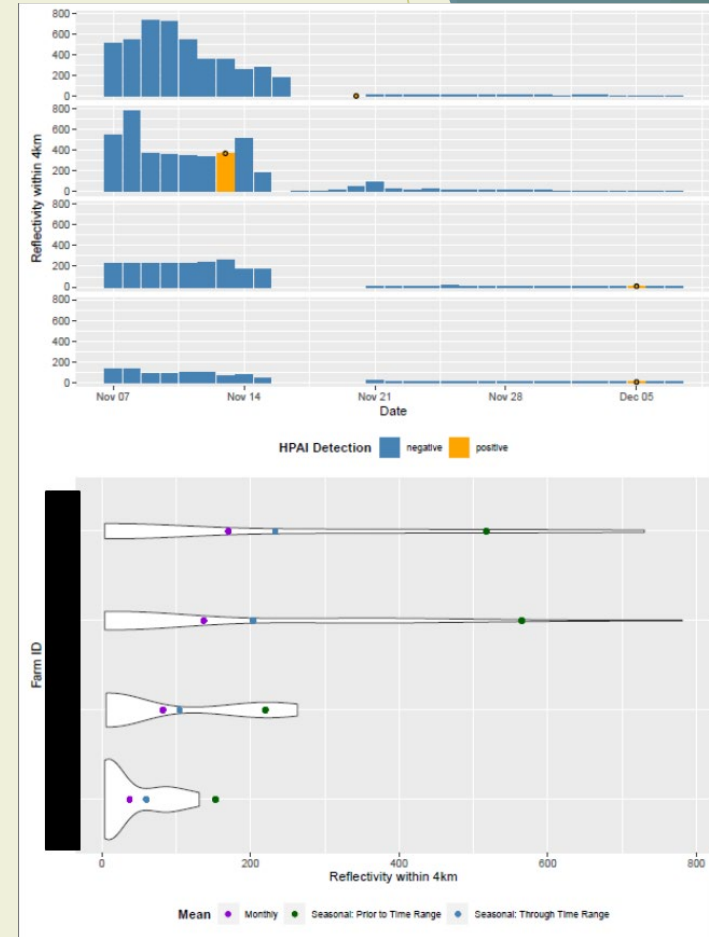
Big picture: The WaterFowl Alert Network represents a novel method of combining both on and off-farm variables to help forecast which farms (and when those farms) are at highest risk of exposure to HPAI from HPAI positive waterfowl



# WFAN Linkage of Data

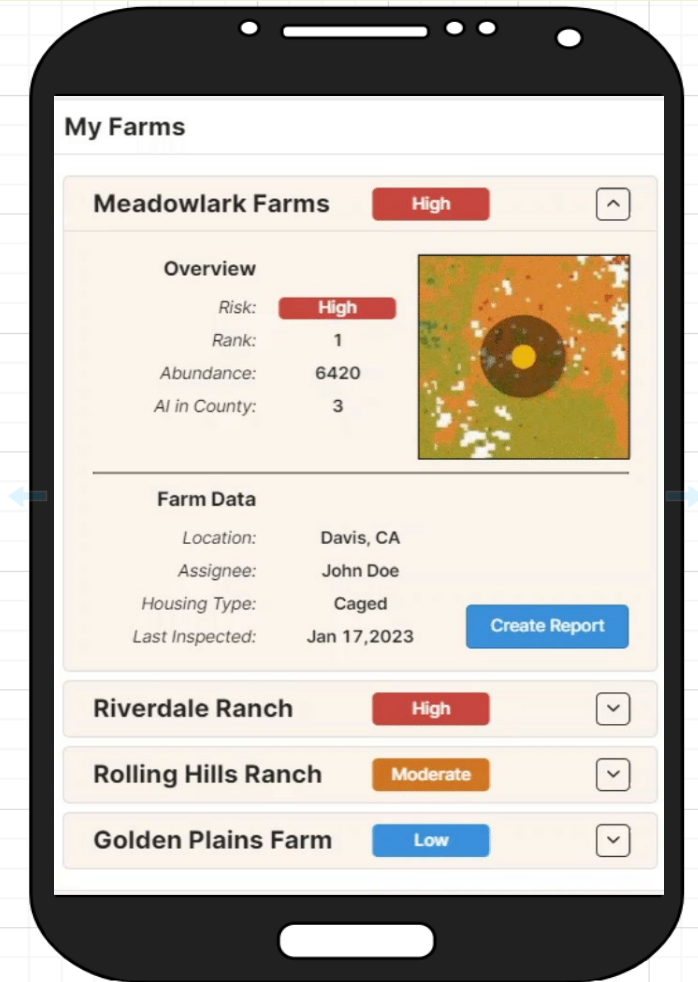
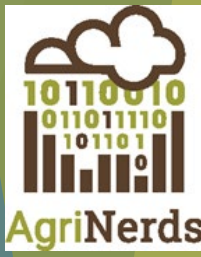


## Monthly Report



- Linking data from outside the barn to the inside data
- Triaging which barns need maintenance based on risk and infrastructure needs

# New Features



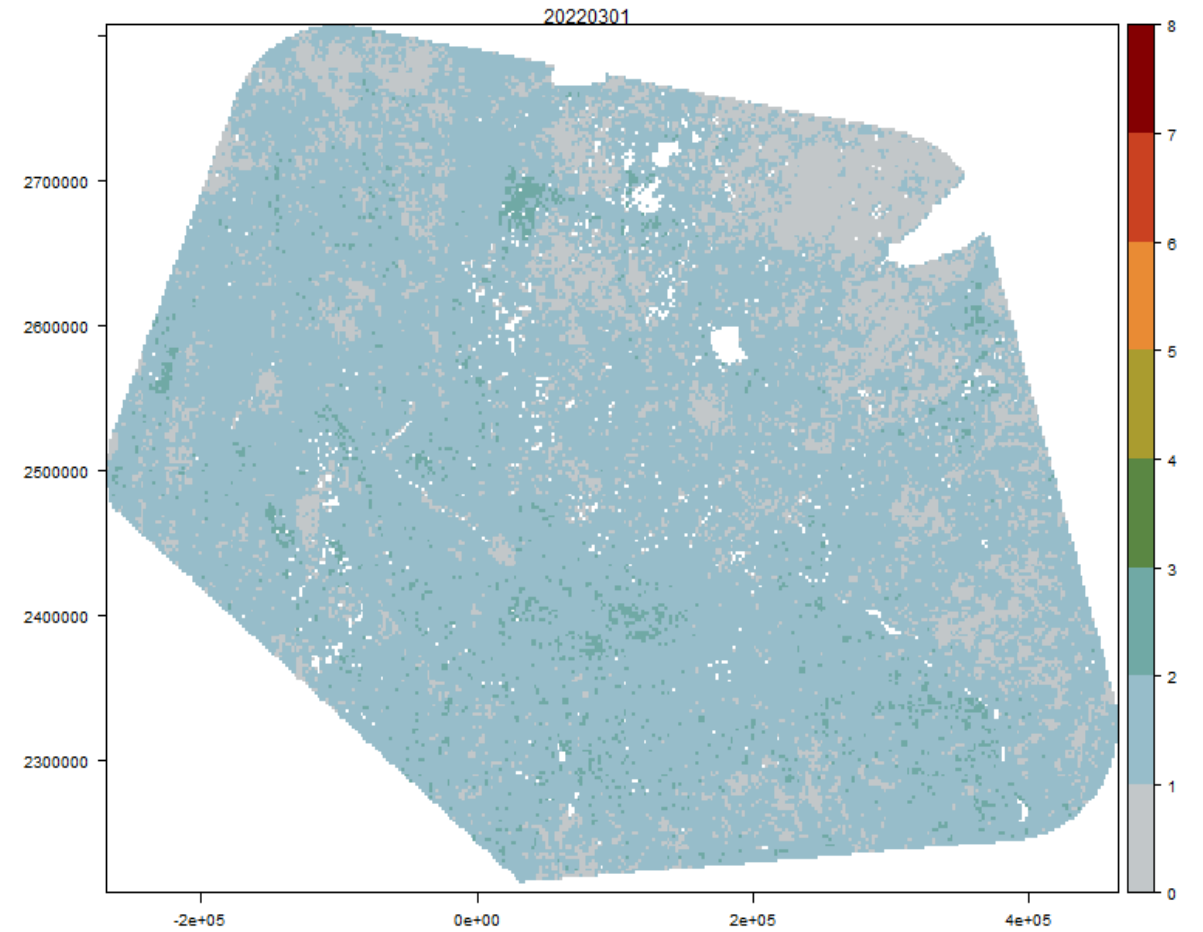
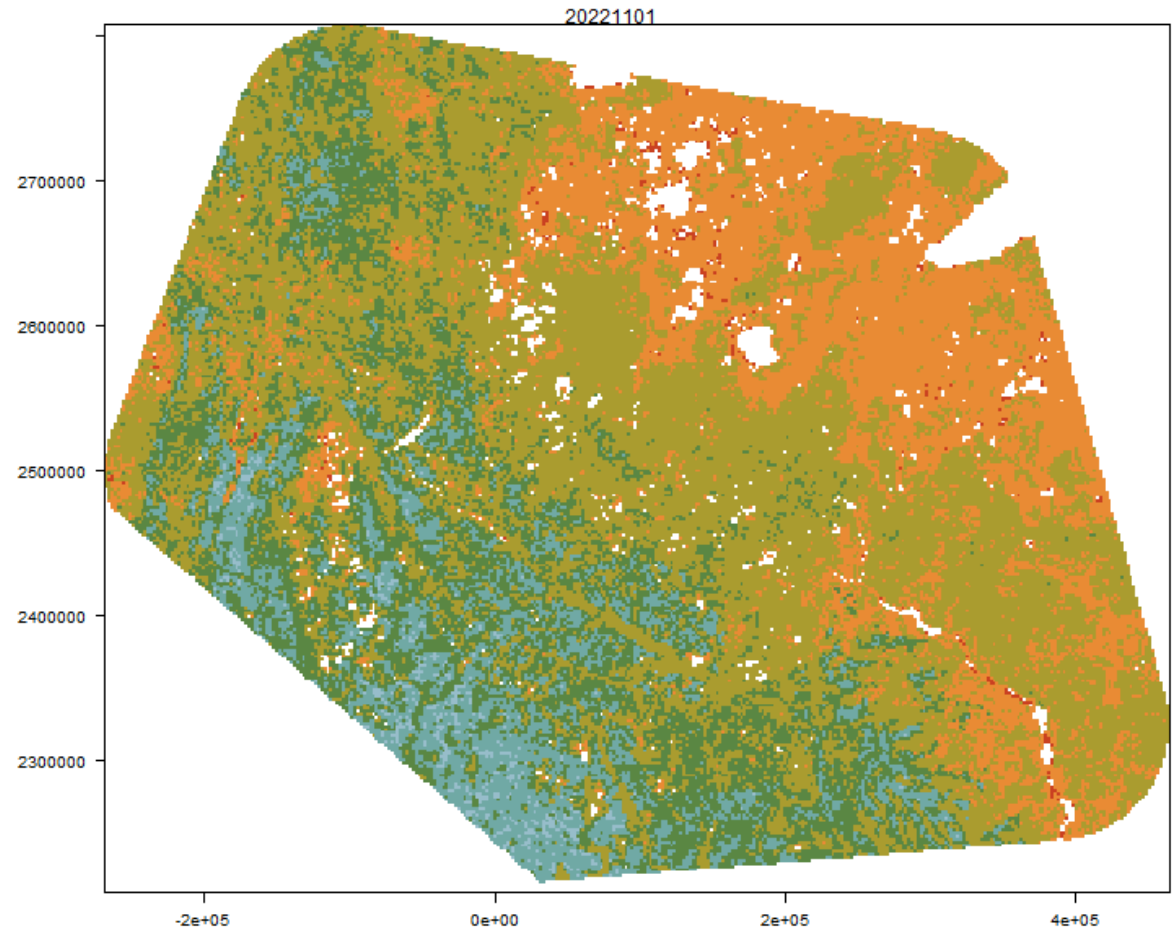
## Improvements in the WFAN:

- 3-day forecasting
- HPAI Risk Scoring
- Easier to use UI
- Wind speed
- Expansion into Canada
- Linking data from outside the barn to the inside data

# State/Regional Level Predictions

Nov/Dec

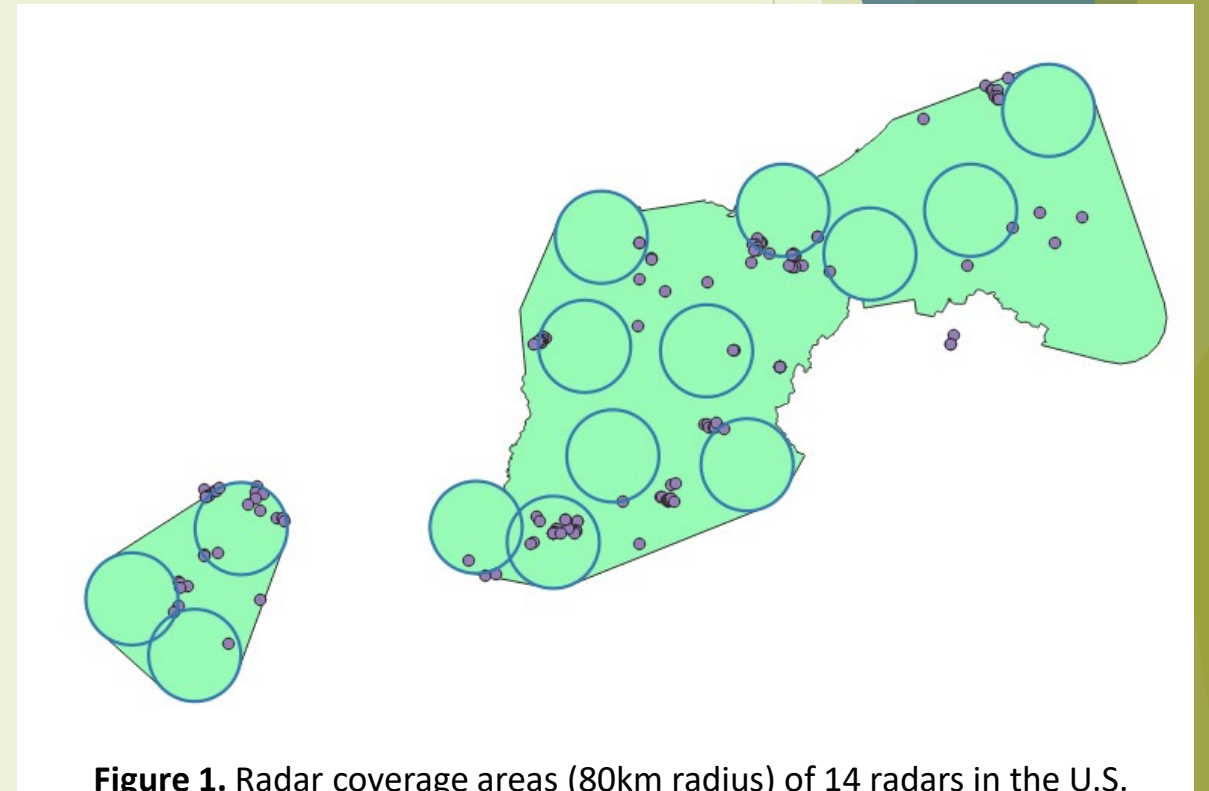
Mar



# Utilizing the Waterfowl Alert Network for a Generic Company/State etc...

1. Identify locations of farms
2. Identify which radars overlap with farms
3. Develop statistical model based on at least 3 years of historic radar data. Note: the model uses various predictors including satellite imagery and various environmental measurements to make a continuous model that interpolates the area between the radars
4. Integrate farms and unique model into software
5. Onboard stakeholders
6. Subscription fee: \$50/farm per month (10% discount every 100 farms).

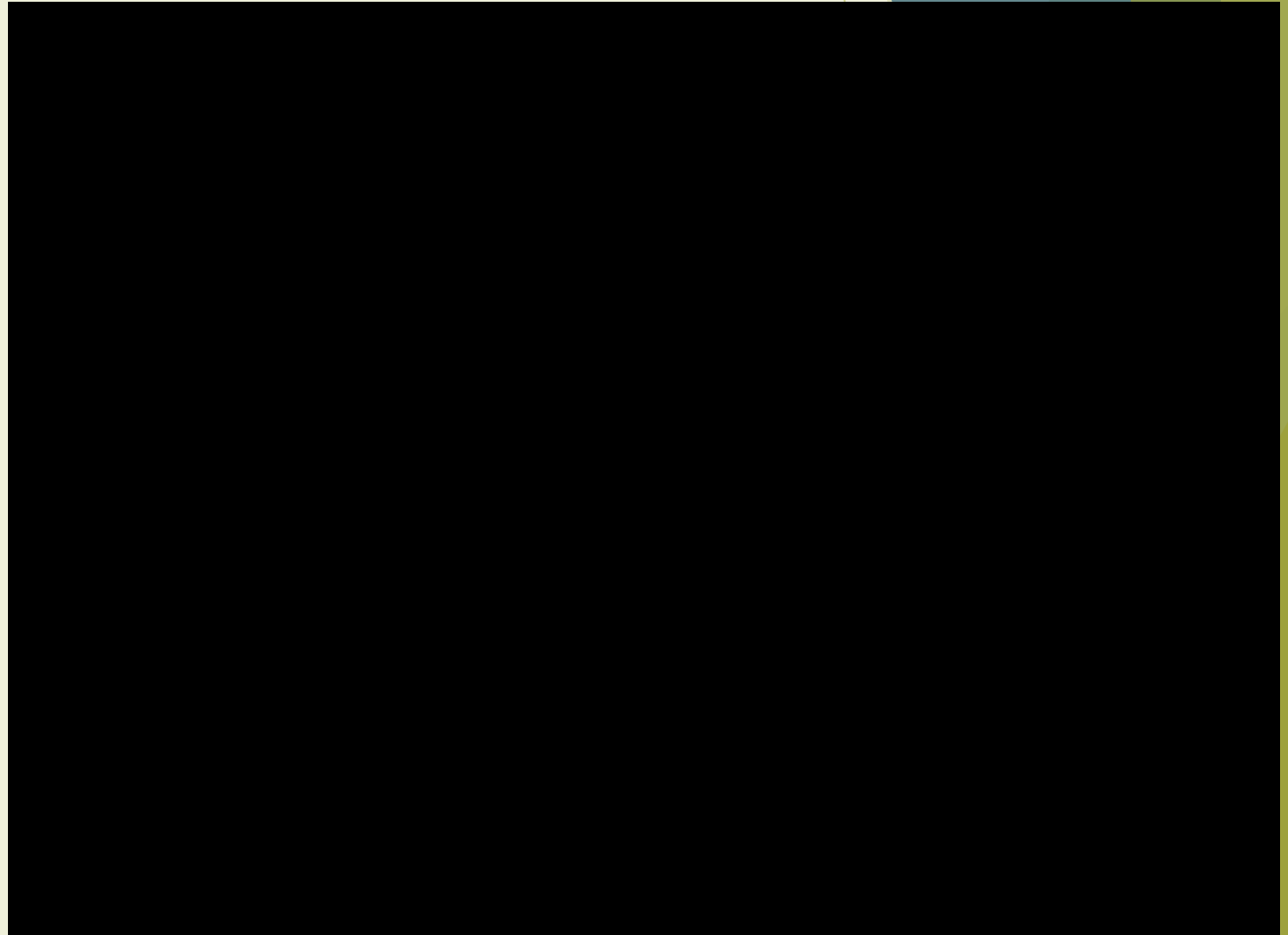
## Waterfowl Tracker Example





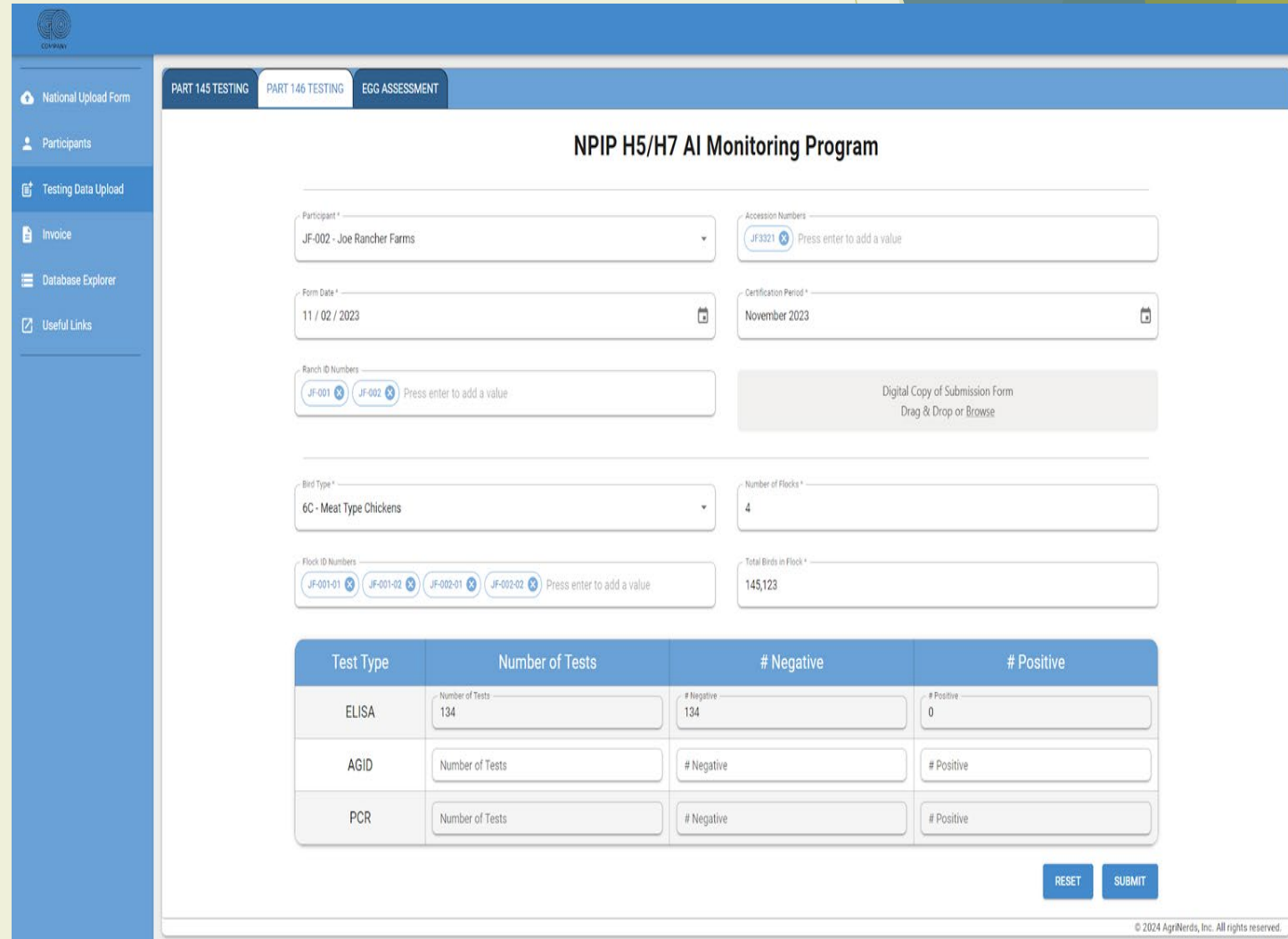
# Participant Management

- ▶ Manage Participant Details
  - ▶ Enrollment Status
  - ▶ Contact and Billing Information
- ▶ Generate Automated Alerts
  - ▶ Overdue Payments
  - ▶ Missing Testing Information
  - ▶ Annual Participation Fee Generation



# Data Submission

- ▶ Customizable Upload Forms
  - ▶ Part 145 Testing
  - ▶ Part 146 Testing
  - ▶ Egg Assessments
  - ▶ Additional Forms Available
- ▶ Automated Fee Generation
  - ▶ Customizable Fee Schedules and Rules
- ▶ Secure Cloud Data Storage
  - ▶ Remotely Accessible Data



The screenshot shows a web application interface for the NPIP H5/H7 AI Monitoring Program. The interface includes a sidebar with navigation options: National Upload Form, Participants, Testing Data Upload, Invoice, Database Explorer, and Useful Links. The main content area is titled 'NPIP H5/H7 AI Monitoring Program' and contains several input fields and a table.

Navigation tabs at the top indicate 'PART 145 TESTING', 'PART 146 TESTING', and 'EGG ASSESSMENT'.

Form fields include:

- Participant \* (Dropdown menu): JF-002 - Joe Rancher Farms
- Accession Numbers (Text input): JF3321 (with a refresh icon) and 'Press enter to add a value'
- Form Date \* (Text input): 11 / 02 / 2023
- Certification Period \* (Text input): November 2023
- Ranch ID Numbers (Text input): JF-001 (with a refresh icon), JF-002 (with a refresh icon), and 'Press enter to add a value'
- Bird Type \* (Dropdown menu): 6C - Meat Type Chickens
- Number of Flocks \* (Text input): 4
- Flock ID Numbers (Text input): JF-001-01 (with a refresh icon), JF-001-02 (with a refresh icon), JF-002-01 (with a refresh icon), JF-002-02 (with a refresh icon), and 'Press enter to add a value'
- Total Birds in Flock \* (Text input): 145,123

A button labeled 'Digital Copy of Submission Form' with the instruction 'Drag & Drop or Browse' is located below the Ranch ID Numbers field.

At the bottom of the form is a table with the following structure:

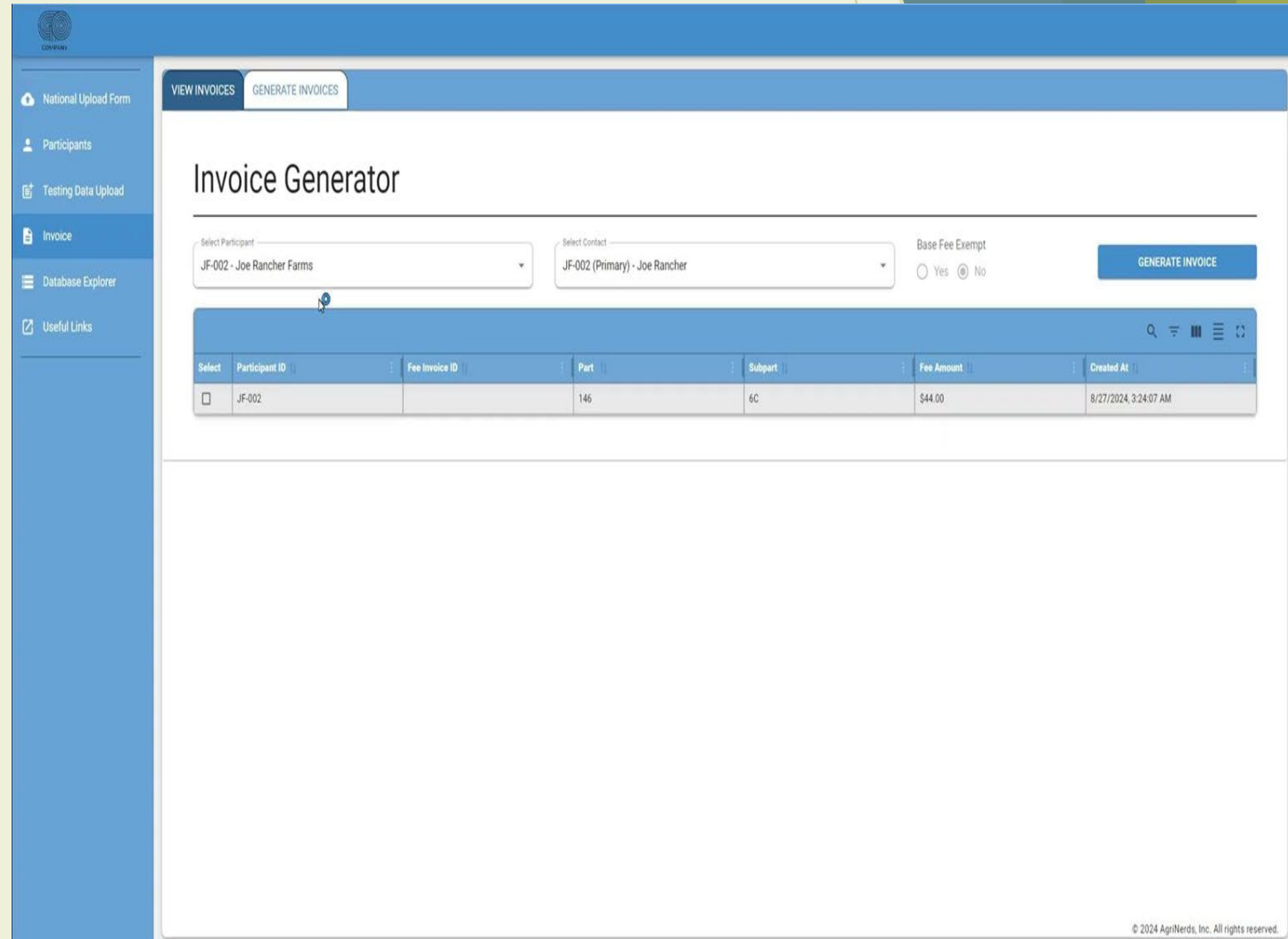
Test Type	Number of Tests	# Negative	# Positive
ELISA	Number of Tests 134	# Negative 134	# Positive 0
AGID	Number of Tests	# Negative	# Positive
PCR	Number of Tests	# Negative	# Positive

At the bottom right of the form are 'RESET' and 'SUBMIT' buttons.

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# Invoice Generation

- ▶ Customizable Invoice Generation
  - ▶ Annual Fee Invoices
  - ▶ Part 145 Testing Fee Invoices
  - ▶ Part 146 Testing Fee Invoices
  - ▶ Egg Assessment Fee Invoices
  - ▶ Additional Invoices Templates Available
- ▶ Secure Cloud Data Storage
  - ▶ Remotely Accessible Data



The screenshot shows the 'Invoice Generator' interface within the AgriNerds system. The interface includes a sidebar with navigation options: National Upload Form, Participants, Testing Data Upload, Invoice (selected), Database Explorer, and Useful Links. The main content area has tabs for 'VIEW INVOICES' and 'GENERATE INVOICES'. Below the tabs, there are two dropdown menus for 'Select Participant' (JF-002 - Joe Rancher Farms) and 'Select Contact' (JF-002 (Primary) - Joe Rancher). To the right of these dropdowns is a 'Base Fee Exempt' section with radio buttons for 'Yes' and 'No' (selected). A 'GENERATE INVOICE' button is located to the right of the 'Base Fee Exempt' section. Below this is a table with the following data:

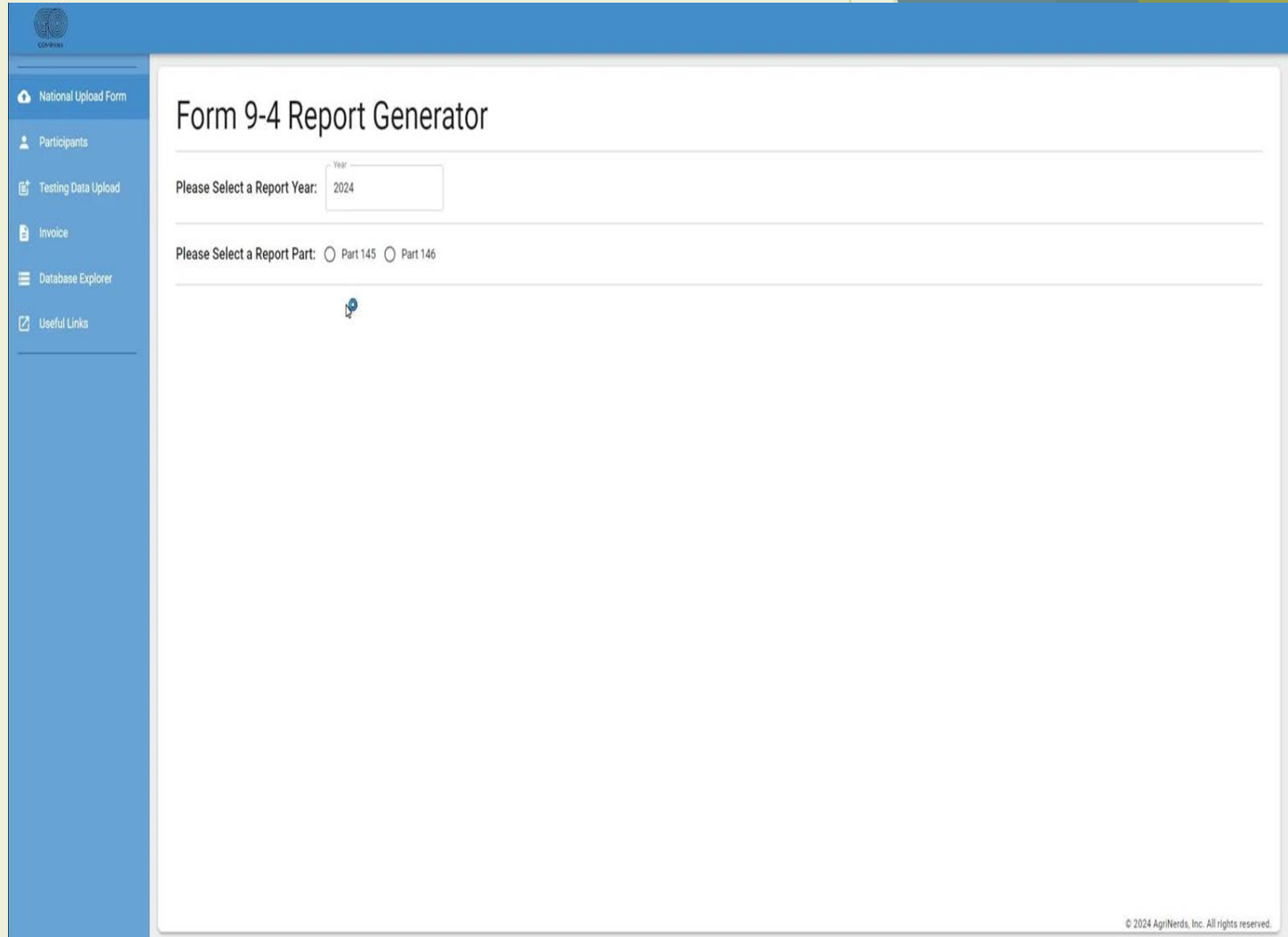
Select	Participant ID	Fee Invoice ID	Part	Subpart	Fee Amount	Created At
<input type="checkbox"/>	JF-002		146	6C	\$44.00	8/27/2024, 3:24:07 AM

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# Report Generation

- ▶ Customizable Report Generation
  - ▶ National Upload Form 9-4
    - ▶ Parts 145, 146, and all subparts
  - ▶ Additional Reports Available



The screenshot displays the 'Form 9-4 Report Generator' web application. On the left is a blue sidebar with navigation links: 'National Upload Form', 'Participants', 'Testing Data Upload', 'Invoice', 'Database Explorer', and 'Useful Links'. The main content area has a white background and is titled 'Form 9-4 Report Generator'. It contains two form fields: 'Please Select a Report Year:' with a dropdown menu showing '2024', and 'Please Select a Report Part:' with radio buttons for 'Part 145' and 'Part 146'. A small blue icon is visible below the radio buttons. At the bottom right of the page, there is a copyright notice: '© 2024 AgriNerds, Inc. All rights reserved.'

# Feature Roadmap

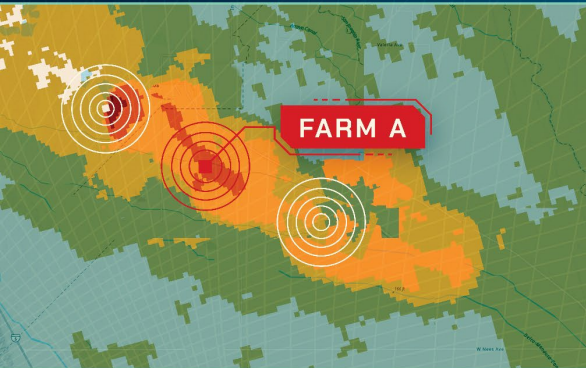
- ▶ Automated testing data submission
  - ▶ Utilizing AI computer vision to read accession forms
- ▶ Automated national data upload
- ▶ Automated participant communication via template emails
  - ▶ Send invoices and alerts easily to participants
- ▶ Verifying participant compliance with NPIP requirements
  - ▶ Check to ensure that participants are submitting testing results as expected
- ▶ Additional custom features that save time and cost for clients



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# WaterFowl Alert Network

## NPIP Navigator

better connected data = better decision-making (potential)

**NPIP Technical Advisory Committee Meeting**

August 27<sup>th</sup> 2024

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[mepitesky@ucdavis.edu](mailto:mepitesky@ucdavis.edu)

530-219-1407

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