Stinging the Invader

GIS-Powered Eradication of the Yellow-Legged Hornet

2024 - 2026
Operational Efficiency

State of Georgia
Department of Agriculture

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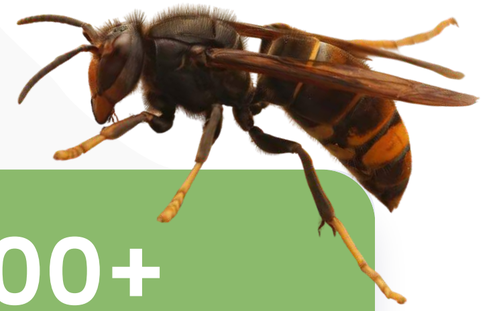
EXECUTIVE SUMMARY

In 2022, Georgia confirmed the presence of the invasive Yellow-Legged Hornet (YLH), a rapidly spreading predator threatening pollinators, biodiversity, and Georgia's $74 billion agricultural economy.

To coordinate a large-scale, multi-agency eradication effort, the Georgia Department of Agriculture (GDA) developed a GIS-powered operational platform using the Esri ArcGIS ecosystem. The platform integrated mobile field operations, public reporting, spatial analytics, and real-time dashboards into a unified operational environment that transformed invasive species response into a coordinated, data-driven operation.

KEY RESULTS

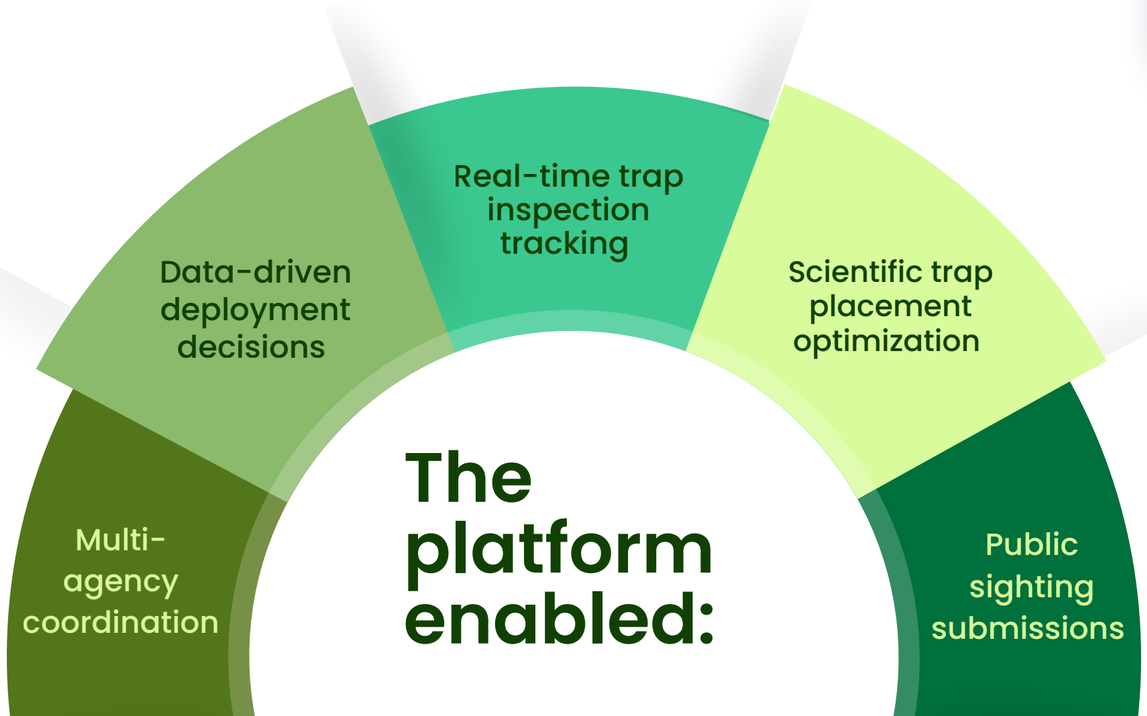


100,000+
trap inspections completed

7,500+
Yellow-Legged Hornets captured

73+ nests eradicated

5,000+
public sighting reports submitted



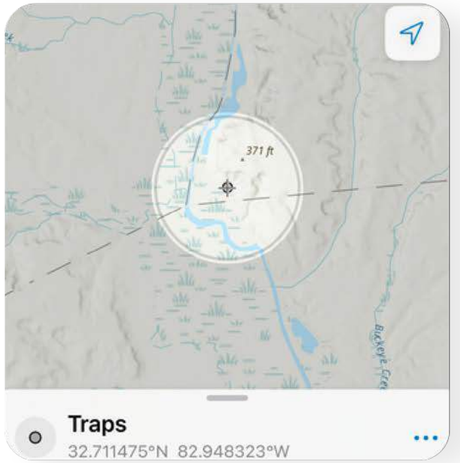
The initiative demonstrates how existing enterprise GIS infrastructure can rapidly modernize complex government field operations without major new procurement costs, creating a scalable model for technology-enabled operational efficiency and crisis response that combines geospatial intelligence, public engagement, cross-agency collaboration, and real-time operational awareness — positioning Georgia as a national leader in technology-enabled invasive species management.

THE IDEA

Transforming Invasive Species Response Through Real-Time Operational Coordination

The Challenge

The Yellow-Legged Hornet (YLH) poses a significant threat to Georgia's agricultural economy, pollinator populations, and ecosystem health. A single unmanaged nest can produce hundreds of new queens, making rapid detection and coordinated response critical.



The Operational Problem

Traditional invasive species response methods — including spreadsheets, paper-based tracking, and disconnected field operations — could not support the scale or urgency of statewide eradication efforts. Key challenges included:

- **Delayed reporting and data sharing**
- **Inconsistent trap monitoring**
- **Limited visibility into infestation hotspots**
- **Fragmented multi-agency coordination**

The Innovation

The Georgia Department of Agriculture developed a centralized GIS-powered operational platform integrating:

- **Public crowdsourced reporting**
- **Mobile field operations**
- **Real-time GIS dashboards**
- **Spatial hotspot analysis**
- **Scientific trap placement modeling**
- **Multi-agency coordination tools**

What Makes It Distinct

Using National Land Cover Database (NLCD) data and custom spatial grids, GDA optimized trap placement based on risk analysis and real-time sightings rather than manual estimation.

The initiative also introduced the YLH Ledger and interactive public dashboards, creating a transparent feedback loop between citizens, field teams, and decision-makers that improved operational awareness and public engagement.

THE IMPLEMENTATION

Building a Statewide GIS-Driven Eradication Operational Platform

The Georgia Department of Agriculture developed the platform using its existing enterprise GIS environment, enabling rapid deployment without significant new infrastructure investment.

Enterprise GIS Architecture

The solution integrated multiple tools within the Esri ArcGIS ecosystem to support end-to-end operations:

- **ArcGIS Survey123 —** Public sighting submissions and field reporting
- **ArcGIS Field Maps —** Mobile inspections, navigation, and field coordination
- **ArcGIS Dashboards —** Real-time operational monitoring and public transparency
- **NLCD Spatial Data & Custom Grids —** Scientific trap placement and hotspot analysis

Phased Deployment Strategy

The platform was implemented through an iterative rollout that included:

This phased approach allowed GDA to rapidly operationalize the program while continuously refining workflows based on field feedback.

Cross-Agency Collaboration

The initiative brought together project partners, including agricultural specialists, GIS professionals, county governments, mosquito control teams, academic researchers and environmental agencies.

- **Georgia Department of Natural Resources**
- **Chatham County GIS**
- **Chatham County Mosquito Control**
- **Georgia Coastal Regional Commission**
- **Clemson University**

This shared operational model improved data consistency, accelerated response coordination, and enabled a unified statewide eradication effort.

Operational Improvements

The platform transformed field operations by replacing manual tracking processes with mobile GIS-enabled workflows that provide:

- **Turn-by-turn navigation to trap locations**
- **Real-time inspection logging**
- **Shared visibility across inspection teams**
- **Historical trap activity records**
- **Dynamic hotspot monitoring and trap redeployment**

The result was faster coordination, improved situational awareness, and more efficient field operations statewide.

THE IMPACT

Delivering Results Through Geospatial Intelligence Technology

Before implementation, Georgia lacked a scalable system for coordinating a statewide invasive species response of this complexity. Today, the Georgia Department of Agriculture operates a proactive, GIS-enabled program with real-time visibility into field activity, infestation patterns, and eradication progress.

Quantitative Outcomes

Operational Impact	Results
Trap inspections completed	**100,000+**
Yellow-Legged Hornets captured	**7,500+**
Confirmed nests eradicated	**73+**
Public sightings submitted	**5,000+**
Confirmed public reports supporting operations	**73**
Regional coordinated surveillance	**Multi-county deployment**

Operational Efficiency Gains

The GIS-driven platform enabled:

- Faster field deployment decisions
- Dynamic trap placement adjustments
- Reduced administrative overhead
- Real-time operational awareness
- Improved multi-team coordination
- Elimination of manual reporting delays

Public Engagement & Transparency

Interactive dashboards, public reporting tools, and the YLH Ledger increased citizen participation and operational transparency.

Citizens became active contributors through:

- Real-time sighting submissions
- Public dashboard engagement
- Community awareness campaigns
- Educational outreach initiatives

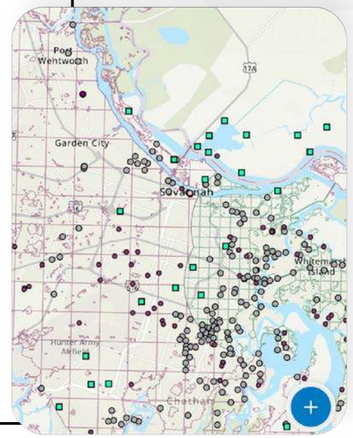
This feedback loop improved field intelligence, accelerated reporting, and strengthened public trust in the eradication effort.

Qualitative Impact

Field inspectors reported significant workflow improvements, including:

- **Easier navigation to trap locations**
- **Faster inspection logging**
- **Better visibility into inspection history**
- **Improved coordination across field teams**

Partner agencies also identified the shared GIS platform as a major improvement over fragmented communication and manual coordination methods previously used during field operations.



Improved Decision-Making

Real-time hotspot analysis and surveillance data enabled operational leaders to dynamically reposition traps and concentrate resources in emerging high-risk areas, improving response speed and operational effectiveness.

THE IMPACT

LONG-TERM SUSTAINABILITY & REPLICABILITY

GDA will continue to expand and enhance the GIS platform as Yellow-Legged Hornet surveillance and eradication efforts evolve across Georgia.

The growing repository of trap locations, capture trends, nest eradication records, and hotspot analytics will provide a valuable long-term dataset to guide future invasive species response strategies and resource allocation.

The platform's success demonstrates how existing enterprise GIS capabilities can be rapidly adapted to address complex environmental and agricultural threats without significant new infrastructure investments. By integrating geospatial intelligence, public reporting, scientific analysis, and multi-agency coordination into a single operational framework, GDA has established a sustainable model for data-driven field operations.

Beyond the Yellow-Legged Hornet response, this approach is readily adaptable to other statewide challenges, including invasive species management, agricultural threat monitoring, environmental response, and emergency field operations. The initiative provides a scalable, cost-effective framework that can be replicated by agencies across Georgia and nationwide.

Testimonial

"The GDAs trapping dashboard and reporting form made it easy for our team to stay informed and contribute meaningfully to the eradication effort. The real-time data gave us feedback on where to set more traps and confidence that the program was working."

- GDA Live Plant Program Stakeholder