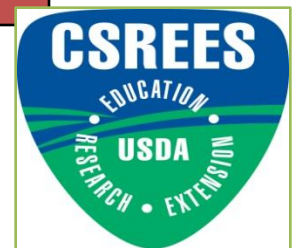


The Importance of Inter-Regional Standards and Coordination for Detection, Phytosanitary Alert and Timely Control of Pests of Quarantine Significance

Kitty F. Cardwell, PhD
CSREES, USDA, Washington, DC
International Workshop on Citrus Quarantine
Villahermosa, Tabasco, Mexico
July 27-31, 2009



Purpose of this Presentation

- What is needed for early detection
- How phytosanitary alerts promote early detection
- What happens when quarantine pests can't be eradicated?
- How soybean rust is related to citrus quarantine pests
- Monitoring and management options
- The call for a unified North and Meso-American Citrus Pest Management System

National Plant Diagnostic Network Mission

- The mission of the NPDN is to protect US agricultural and natural plant systems by:
 - Facilitating early detection of pests and pathogens through outreach and education of first detectors,
 - Performing rapid and accurate diagnoses,
 - Ensuring timely reporting, and
 - Supporting response through partnerships and coordinated surge capacity.



Figure 1. The National Plant Diagnostic Network (NPDN) is Administered by Five Regional Centers Located in Universities

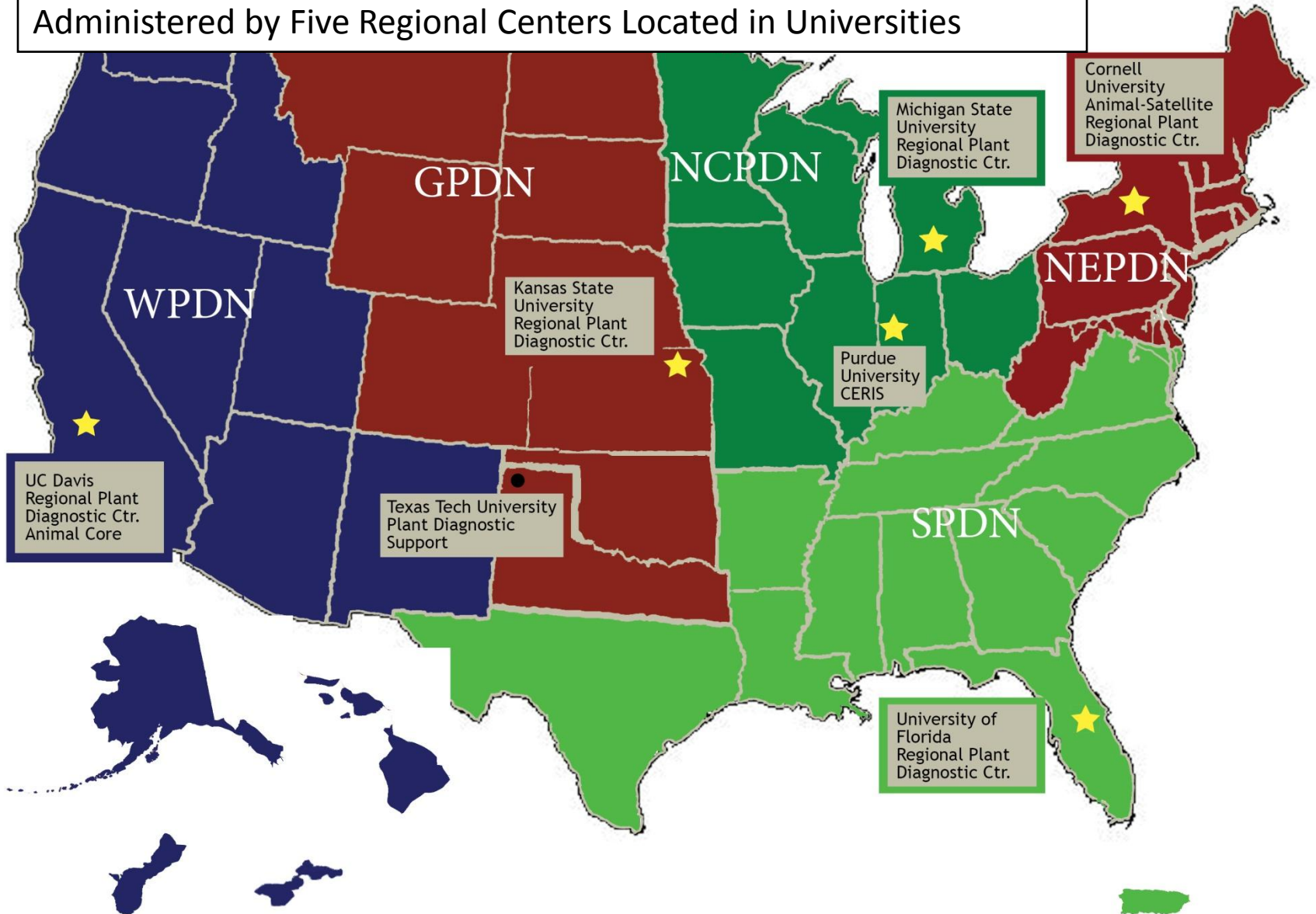


Figure 2. Regional Diagnostic Centers Push Data into a Central Repository in CERIS, at Purdue University

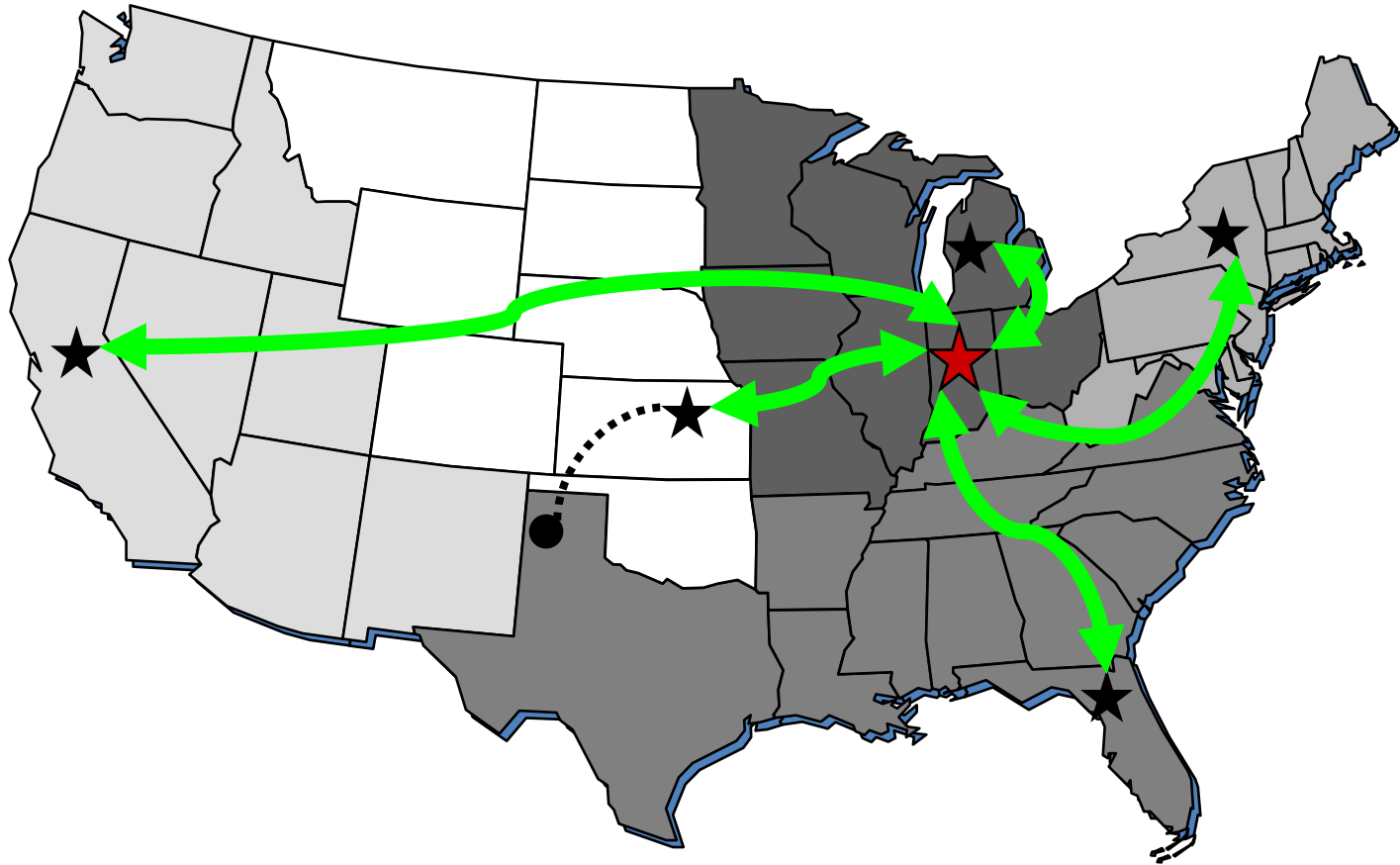
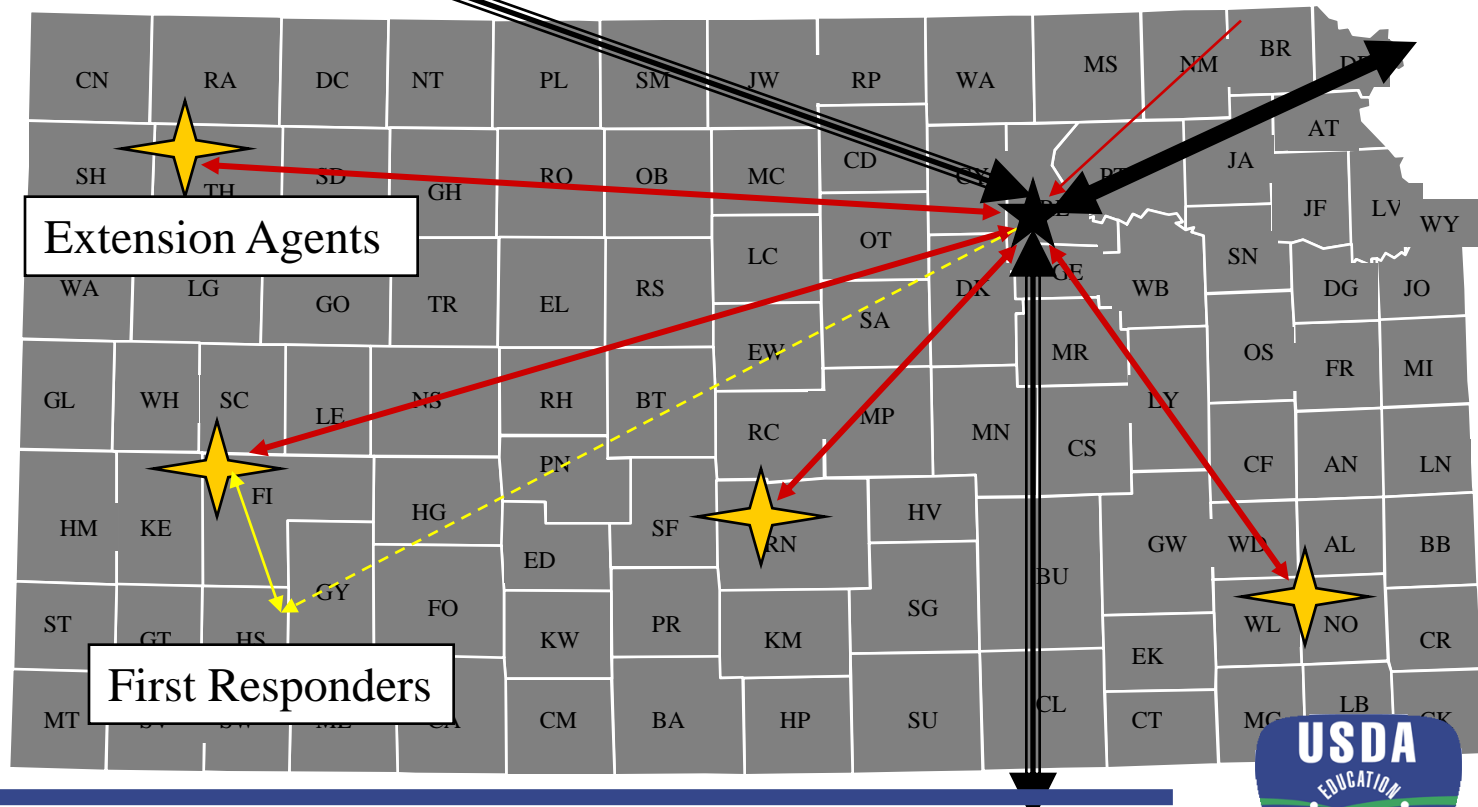


Figure 3. Regional Diagnostic Centers Serve As Central Point for Information Flow from within the State

GPDN Member

NC/EPDN
NAPIS



Extension Agents

First Responders

GPDN Member



Figure 4. Each NPDN Regional Center Serves as a Central Hub for Advanced Diagnostics & Information Flow Creating Expanded Capacity for High Consequence Events and Rapid Turn-around for Diagnostics

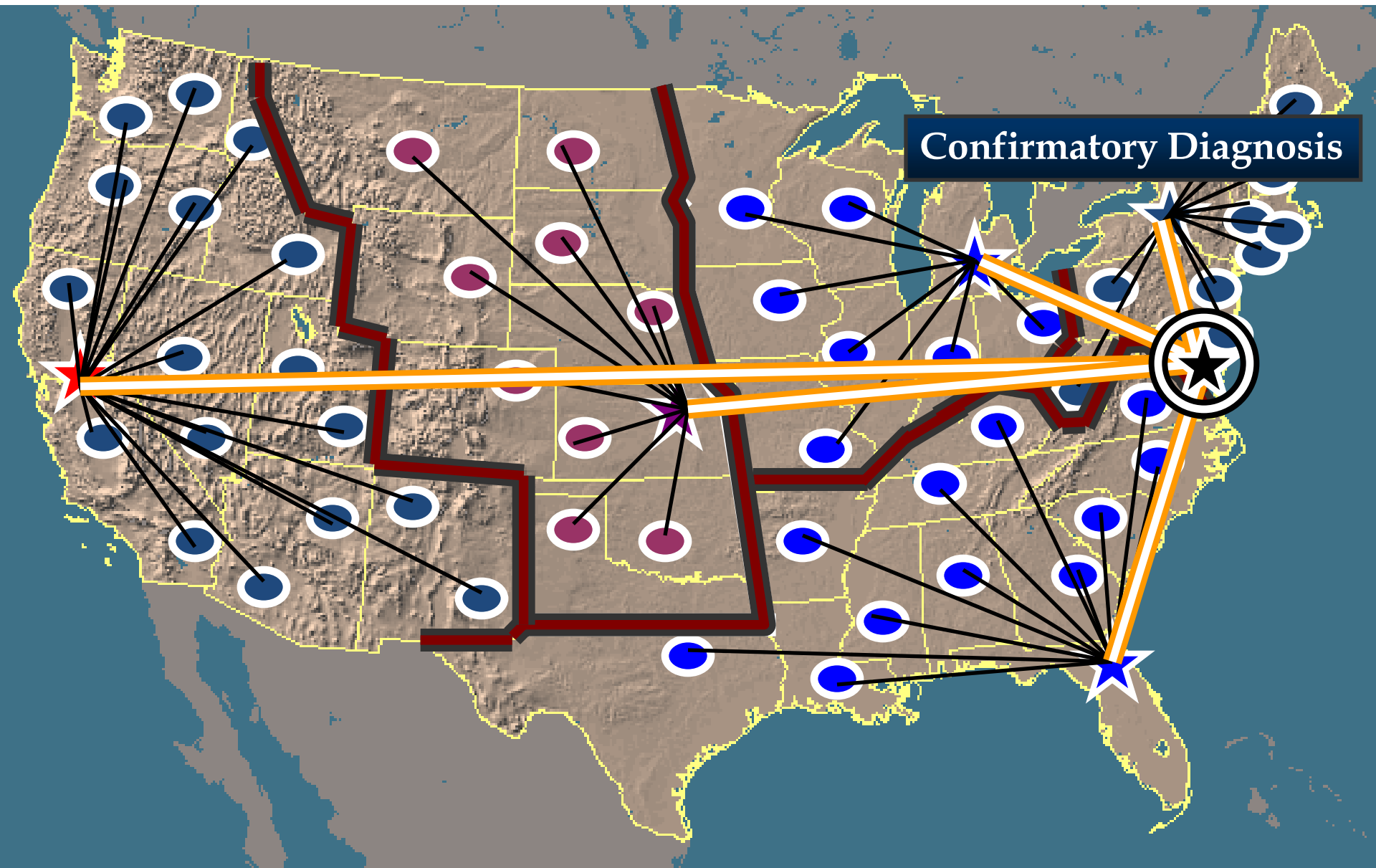


Table 1. National Plant Diagnostic Network 2008 Sample Type, Distribution, and National Data Repository Submission Numbers from the Western (WPDN), North Central (NCPDN), Southern (SPDN), Great Plains (GPDN) and North East (NEPDN) Diagnostic Laboratories

Region (# of labs)	Samples Processed	Pathogen	Insect	Weed	Nematode	Other	Repository Submissio ns June 1 2008- April 1, 2009	CERIS reported submissio s 2008
WPDN (17)	268,635	166,667	79,390	2,015	10,944	8,151	26,169	20,266
NCPDN (8)	17,910	6,916	2,319	219	5,152	1,651	12,186	10,335
SPDN (14)*	33,574	15,721	2,568	680	9,762	2,824	17,484	23,172
GPDN (9)	15,957	10,618	2,062	404	990	0	15,692	15,898
NEPDN (13)	9,136	4,217	830	178	435	0	7,918	10,335
Totals (61)	345,212	345,649	87,169	3,496	27,283	12,626	79,449	85,186

Table 2. Proportion of Samples Confirmed, Suspected, Inconclusive, Not Detected by the North East (NEPDN), North Central (NCPDN), Southern (SPDN), Great Plains (GPDN), and Western (WPDN) Plant Diagnostic Network Laboratories

	Confirmed	Suspected	Inconclusive	Not Detected	Total
NEPDN	4703	2225	276	714	7918
NCPDN	7279	1997	614	2296	12186
SPDN	8880	3112	2189	3303	17484
GPDN	6878	2657	985	5172	15692
WPDN	23568	930	339	1332	26169
Totals	27740	9991	4064	11485	53280
Proportion	0.52	0.19	0.08	0.22	1

The Importance of Phytosanitary Alerts

- First Detector Network News : The newsletter for the NPDN First Detector Community
<http://www.sepdn.org>
- NPDN Diagnostics SOPS and Training
- First Detector and FD Educators: modules and manuals <http://cbc.at.ufl.edu>
- **Laboratory surge preparation:**



Models, Monitors, Maps and Management

- Established pests and diseases need on-going management
- Farmers are the ones who manage them, whether regulatory, invasive or endemic
- Accurate information is crucial to effective control
- Extension agents and scientists need a way to inform farmers about risk and control options

Figure 6. Arrival of Hurricane Ivan September, 2005, Brought an Unwelcome Guest

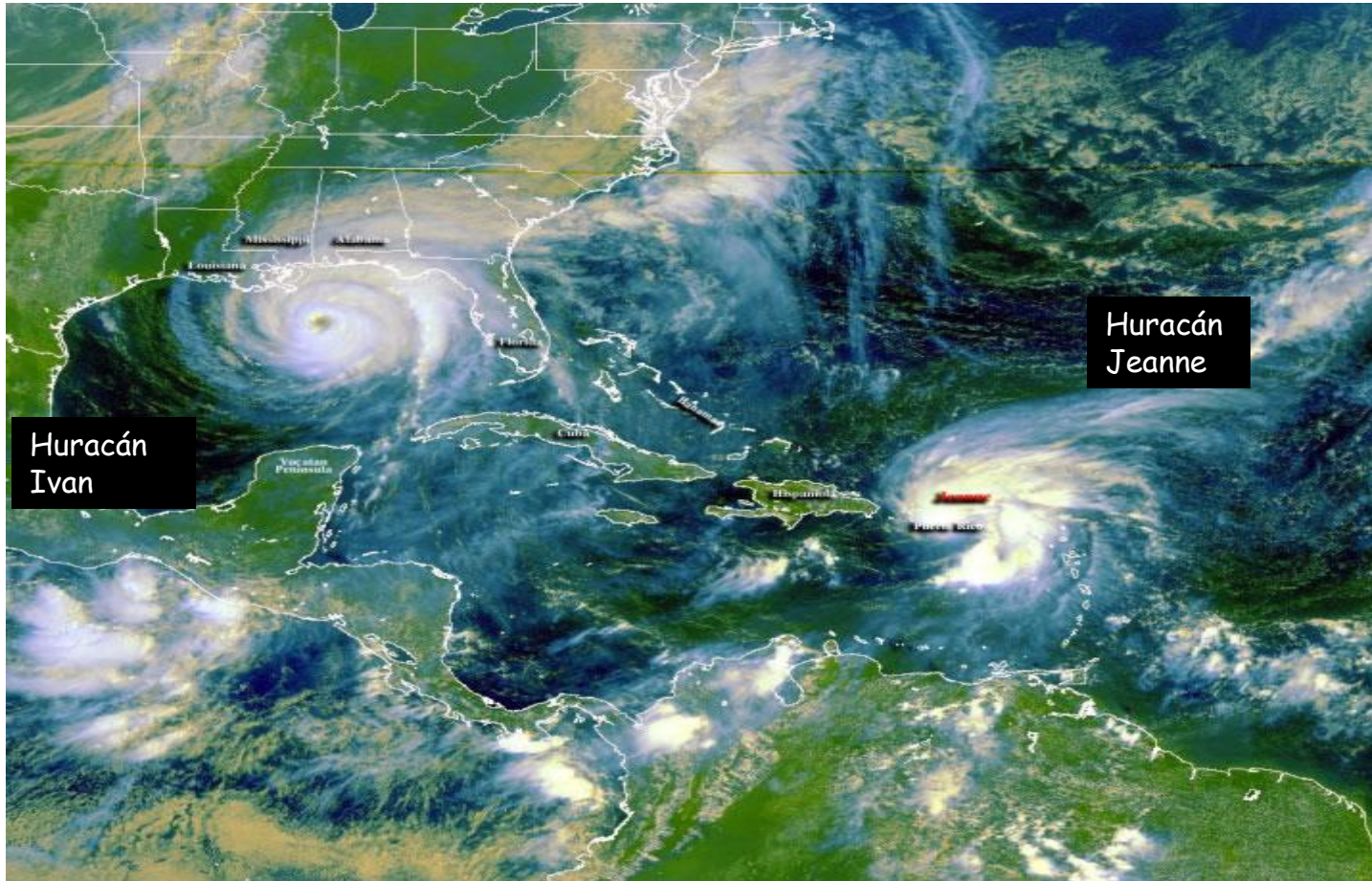


Figure 7. Models predicted Soybean Rust Spore Delivery on Hurricane Ivan

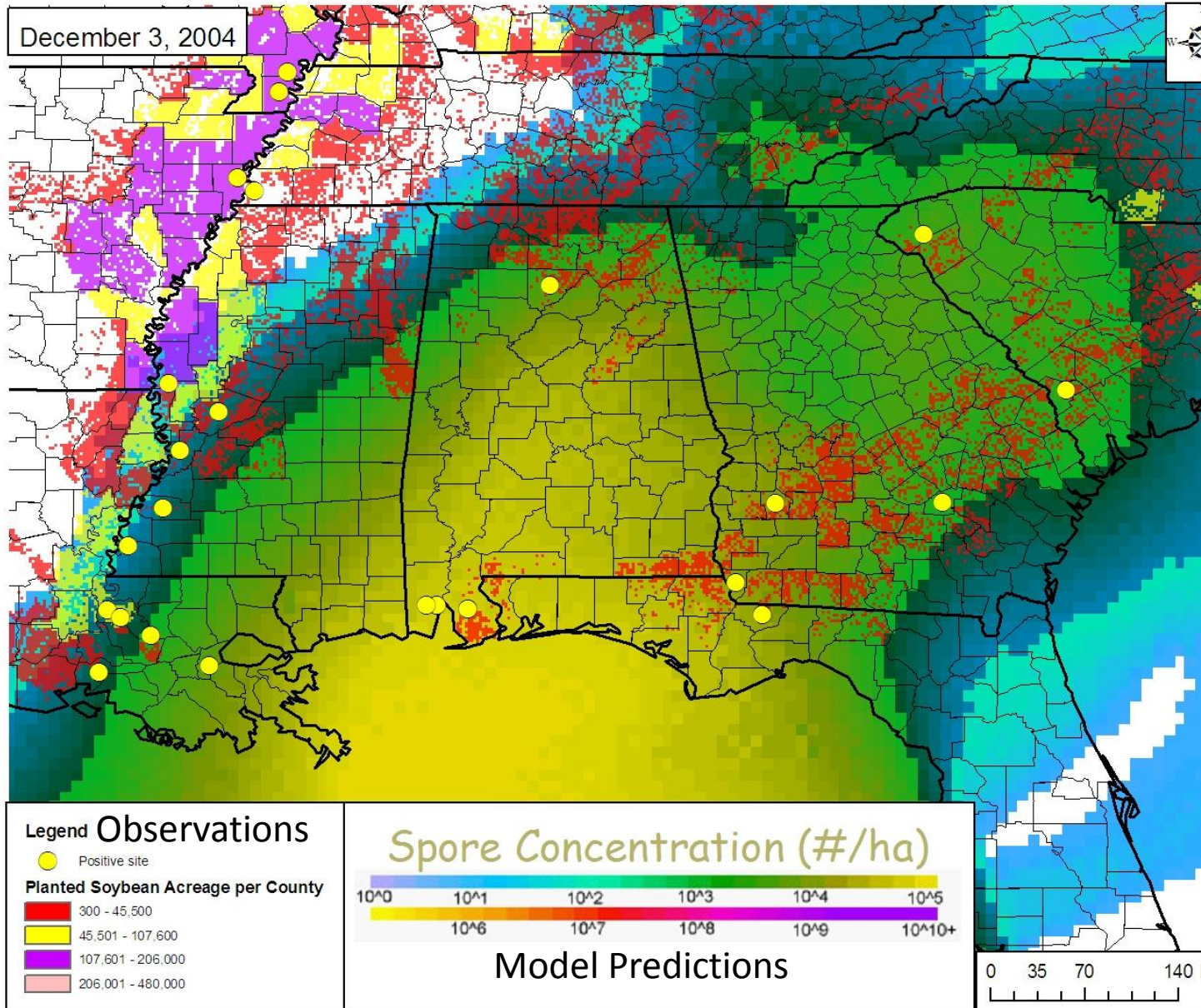
APHIS
ZedX, Inc.

Aerobiological Risk Analysis for Soybean Rust
A project funded by APHIS to examine the risk of the aerial incursion of soybean rust into North America.

PENNSYLVANIA STATE UNIVERSITY
ILLINOIS STATE UNIVERSITY
NC STATE UNIVERSITY



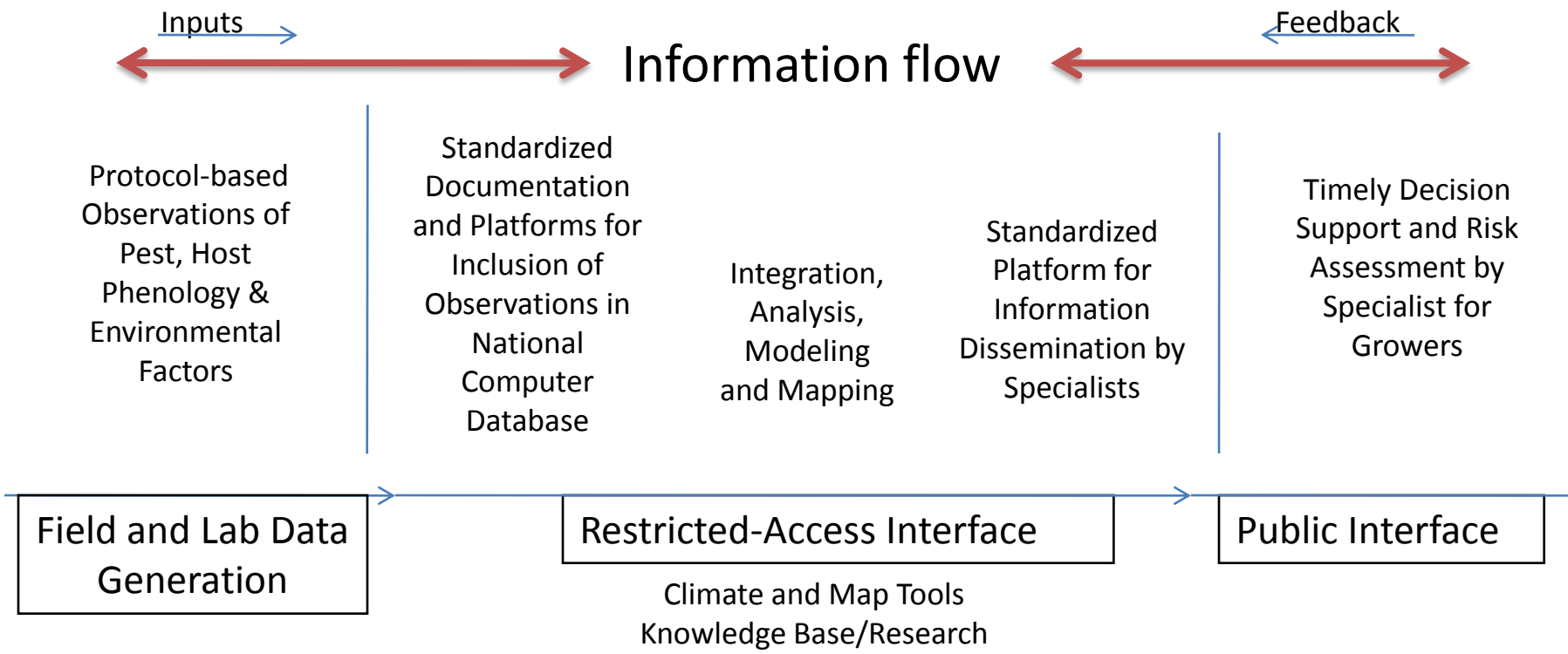
Figure 7. Rust IncurSION into Southeastern U.S. Defined by the Hurricane Impact Zone



Integrated Frameworks

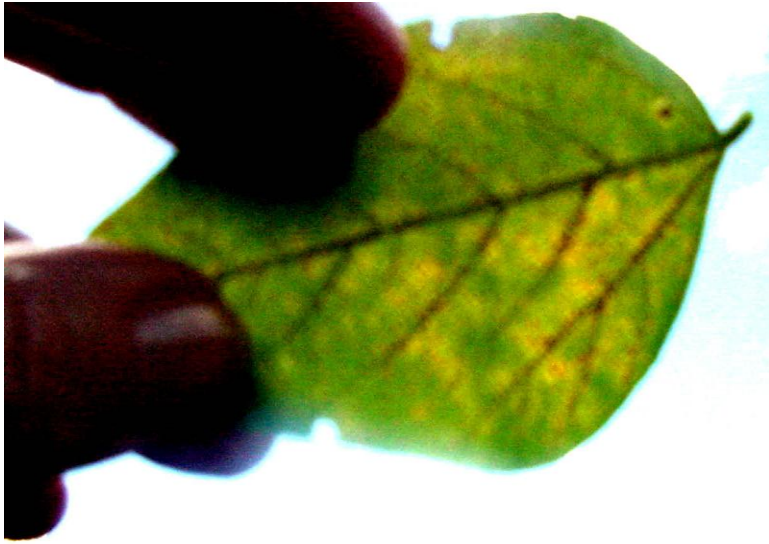
- Pest Information Platform for Extension and Education
- Sistema Coordinado de Operaciones para el Manejo de Plagas Reglamentadas y su Epidemiología

Figure 9. Pest Information Platform for Extension & Education (PIPE)



People and computers linked by “state-of-the-art” Information Technology

Sentinel Plot Monitoring



First Detector Training, Florida



Scouting in Chiapas, Mexico



Source APHIS
Observer Scott Isard

Plot Setup Form

Obs Date 2005 Sep 29

Country USA

State --

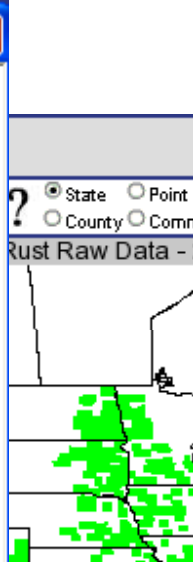
County --

Location Type --

Location Name - Select one or enter below -

Longitude (DD)

Latitude (DD)



Source APHIS

Lab ID

Obs Date

Country

State

County

Location Type

Location Name

Longitude (DD)

Latitude (DD)

Diagnostic Laboratory Form



e Usage

Source APHIS

Obs Date 2005 Sep 29

Country USA

State --

County --

Location Type --

Location Name - Select one or enter below -

Longitude (DD)

Latitude (DD)

Plot 1

Plot ID

Host --

Cultivar

Plant Date 2005 Sep 29

Height --

Veg Stage --

Rep Stage --

Canopy Closure --

Continue

Save Obs

Observation Forms Help

- Location Type -

Location Name Setup

Online Entry Download Excel Upload Excel

PDA Edit

Soybean kudzu and appropriate eight diff 28 coun Louisiar active as plant sa prevailed in the spore source regions and movement to new areas has been slow. Please consult your state commentary for more detailed information about conditions in your state.

Figure 10. Data Entry Options and Formats

Save Obs

Figure 11. Data Manipulation and Access

APHIS researcher

Sentinel Protocol | Map Description | Download Geotiff | SBR Images | Help

Up

August - 2005

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September - 2005

			1	2	3	
4	5	6	7	8	9	10
11	12	13	14	15	16	

Observation Researcher - 2005-09-29

State Point
County Commentary

Sentinel Plots Load

Chronology of Positive Detections

Observation Researcher

Sim Daily Spore Transport

Sim Daily Wet Dep Land

Sim Acc Wet Dep Land

Additional Links

[Aerobiology Risk Analysis](#)
[American Phytopath. Society Home Page](#)
[Animated Hurricane Maps](#)
[Soybean rust Identification card](#)

ed. suspected scouted, confirmed
 ot + Lab ▲ Industry

ational Commentary

mentary (updated: 09/21/05)

y to report soybean rust. Oconee County in Georgia is the
 has been found in 2005. Calhoun County in SC is the furthest
 arl River County in Mississippi is the furthest west that rust
 unties reported positive with rust; Florida has 22; Georgia has

ID	County	Date	Loc Type	Loc Name	Host	Cultivar	Reproductive Growth Stage	Vegetative Growth Stage	Pest	Status
11725	Jefferson	2006-07-27	Sentinel in-season	JEFFERSONnursery-7	SOYBEAN	DP7220	R5	--	Soybean Rust	Positive
11053	Marion	2006-07-27	Kudzu/wild legumes	MARION4	KUDZU	--	--	--	Soybean Rust	Negative
11054	Marion	2006-07-27	Kudzu/wild legumes	MARION5	KUDZU	--	--	--	Soybean Rust	Negative
11057	Marion	2006-07-27	Kudzu/wild legumes	MARION6	KUDZU	--	--	--	Soybean Rust	Positive
11055	Hernando	2006-07-26	Kudzu/wild legumes	hernando1	KUDZU	--	--	--	Soybean Rust	Negative
11056	Hernando	2006-07-26	Kudzu/wild legumes	hernando2	KUDZU	--	--	--	Soybean Rust	Negative
10999	Gadsden	2006-07-24	Kudzu/wild legumes	NFRECO-6	KUDZU	--	--	--	Soybean Rust	Positive
11086	Gadsden	2006-07-21	Sentinel in-season	GADSDEN1Arotplots-3	SOYBEAN	DP7220	R6	--	Soybean Rust	Positive
11087	Gadsden	2006-07-21	Sentinel in-season	GADSDEN1Arotplots-5	SOYBEAN	DP7220	R5	--	Soybean Rust	Negative
11088	Gadsden	2006-07-21	Sentinel in-season	GADSDEN1Arotplots-7	SOYBEAN	DP7220	R4	--	Soybean Rust	Negative

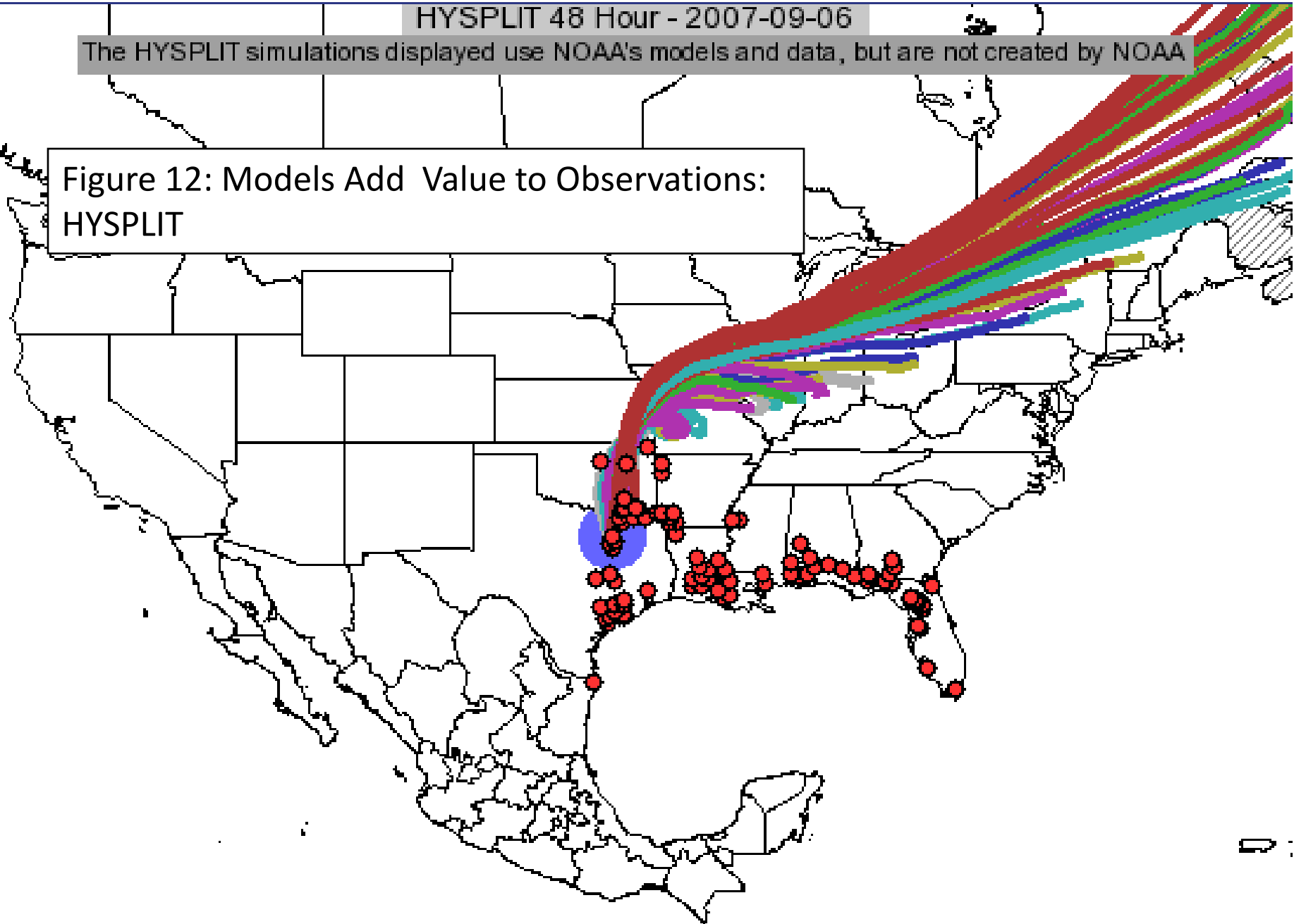
Done Inter

Restricted Access Website

HYSPLIT 48 Hour - 2007-09-06

The HYSPLIT simulations displayed use NOAA's models and data, but are not created by NOAA

Figure 12: Models Add Value to Observations:
HYSPLIT



HYSPLIT Model Release Time (CDT)

● Release Point

Figure 13. Models Add Value to Observations: Wet Deposition of Spores, Sept 2007

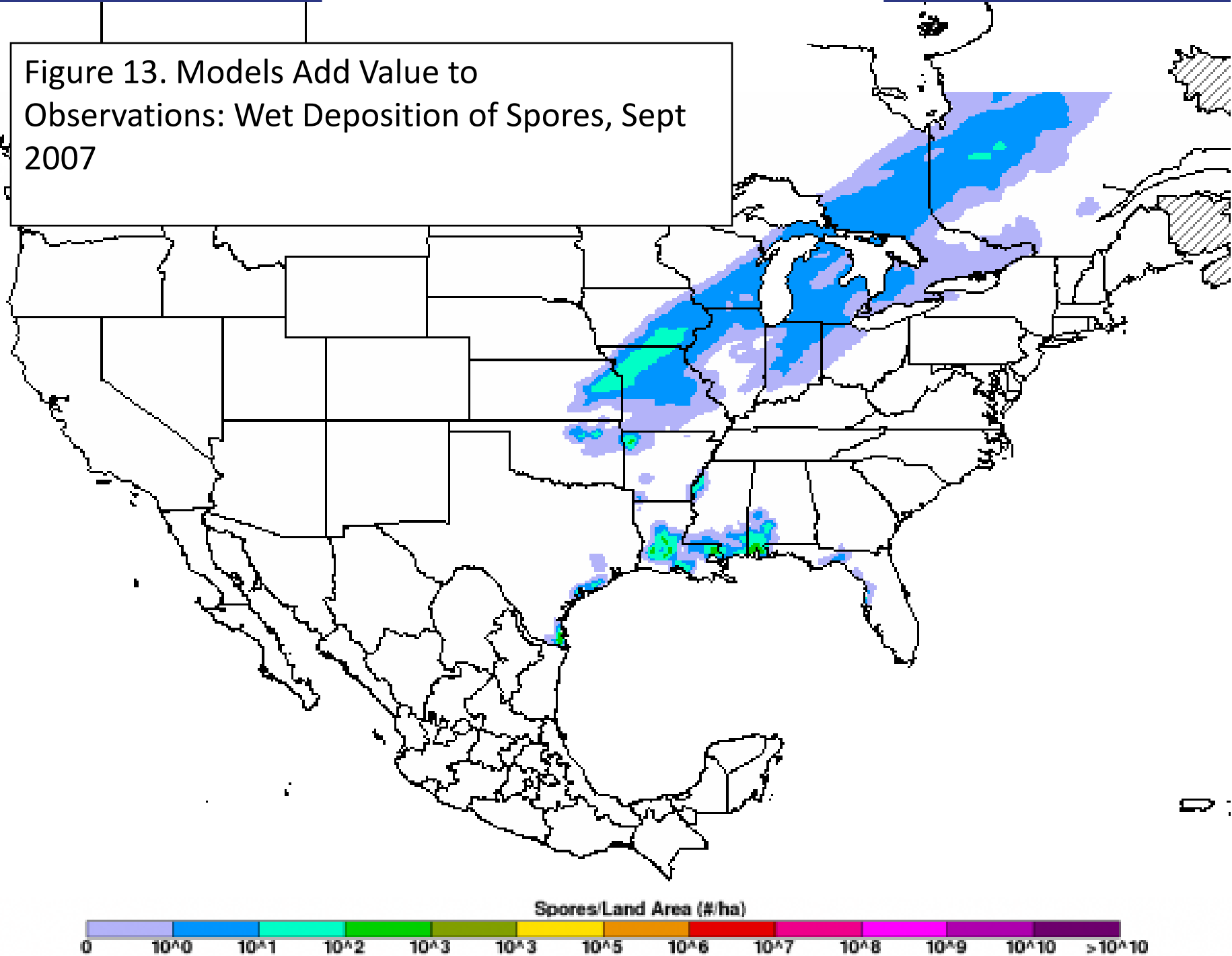


Figure 14. Models Add Value to Observations: Ensemble risk evaluation

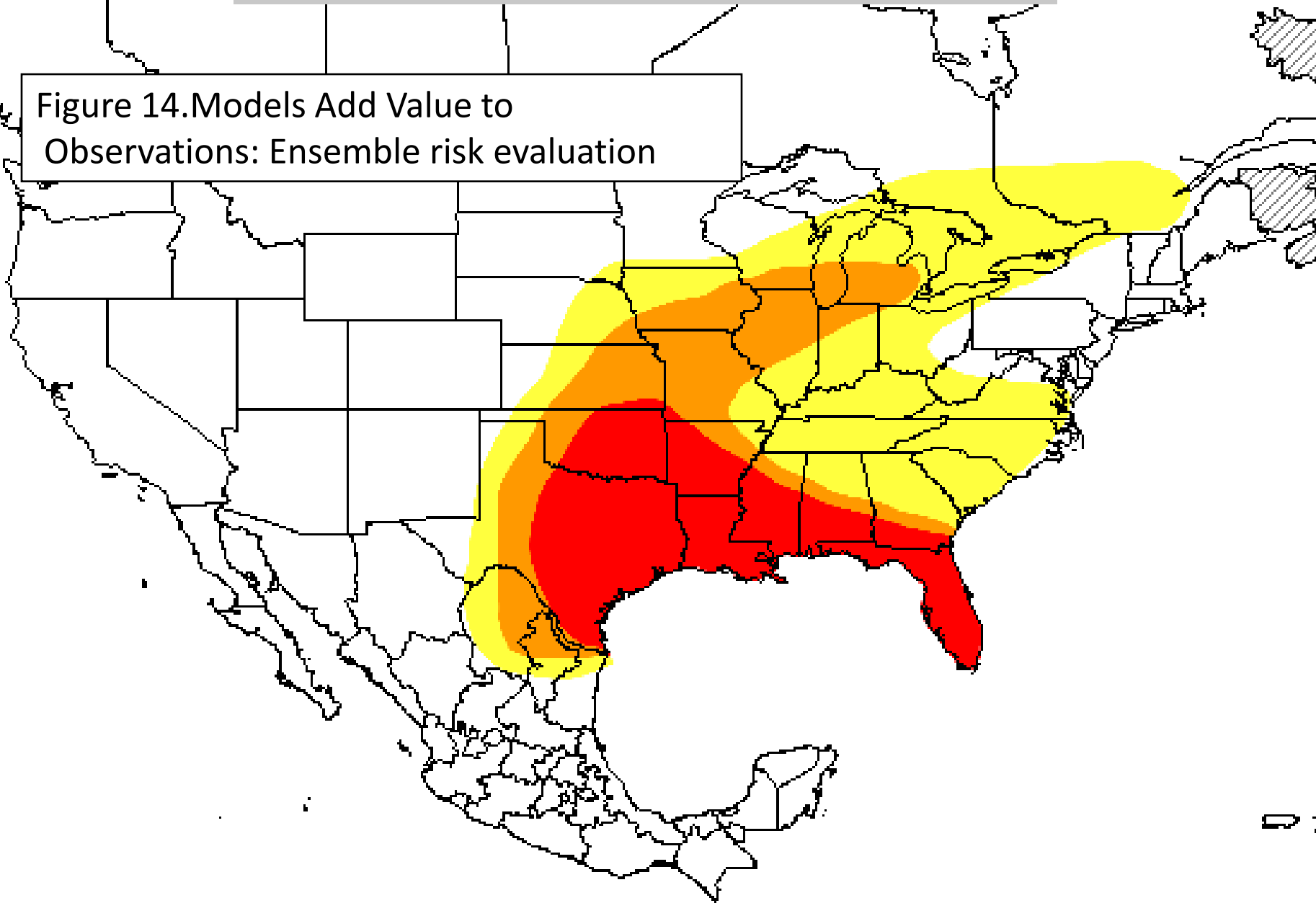


Figure 15. Models Add Value to Observations: Simulated Disease Severity

APHIS researcher
Sentinel Protocol
Map Description
Download Geotiff
SBR Images
Help

Up

August - 2005

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September - 2005

				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

October - 2005

						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Down

USDA Links

[APHIS-PPQ Soybean Rust Site](#)

[CSREES Web site](#)

[National Plant Diagnostic Network site](#)

[Return to: USDA SBR website](#)

[USDA Position on Spore trapping](#)

State Point
 County Commentary

- Overlay -
Load

Sim Lead Dis Sev Soy - 2005-09-29

crop spores % infection (lesion formation)

no crop no spores latent 0-20 21-40 41-60 61-80 81-100

Sim Lead Soy LAI

Sim Acc Dep Soy Leaf

Sim Lead Dis Sev Soy

Sim Soy Scouting Areas

Observation Public

Edit National Commentary

National Map Commentary (updated: 08/16/05)

By August 24th, rust is expected to be light to moderate to heavy in Georgia, part of Alabama and Florida. New light infestation is expected in Louisiana. All other states are expected to have either latent or no infection.

[Additional Links](#)

[Aerobiology Risk Analysis](#)

[American Phytopath. Society Home Page](#)

[Animated Hurricane Maps](#)

[Soybean rust Identification card](#)

Figure 16. Communications Tools for Specialists; Maps and Text Upload

APHS <http://aphis.zedxinc.com> - APHS - Microsoft Internet Explorer

Florida **Observation** 2005 Sep 29 Help

No Entry
 Not Found
 Suspect
 Confirmed

County: Dixie

Florida **Public Commentary** 2006 Aug 2

Florida Commentary

Crop Growth Stage Last Modified: 07/25/06 10:56 AM [Expand](#)

Most commercial soybeans are planted and at late vegetative stages or early reproductive stages.

Observation and Outlook - Disease Last Modified: 07/28/06 01:45 PM [Expand](#)

A soybean sentinel plot in Jefferson County in North Florida was PCR positive for soybean rust on MGVII leaves collected 7/27/06. Two MGVII leaves were found to have 2% disease severity; another MGVI leaf from the same plot was also identified to have...

Scouting and Management - Disease Last Modified: 07/25/06 10:56 AM [Expand](#)

Start scouting when you reach R1 or when nearby infections are identified. You should be ready to act in case disease does develop in your region.

[Save Changes](#)

Florida Hyperlinks

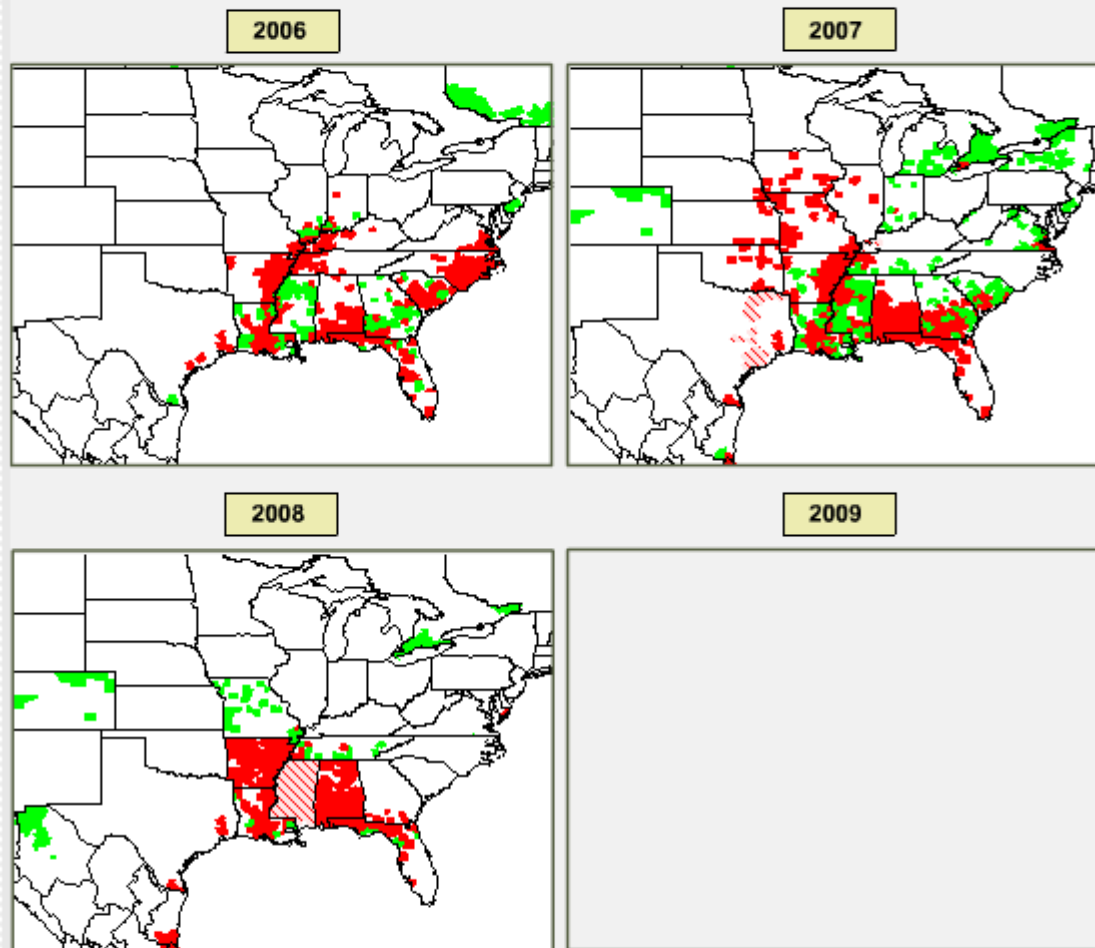
[New Hyperlink](#)

Active	Category	Display Name	Address	
<input checked="" type="checkbox"/>	State Link	FDACS Information	http://www.doacs.state.fl.us/pi/enpp/pa	Delete
<input checked="" type="checkbox"/>	State Link	SPDN Information	http://spdn.ifas.ufl.edu/soybean_rust.htm	Delete
<input checked="" type="checkbox"/>	State Link	FL Soybean Rust page	http://spdn.ifas.ufl.edu/Florida_Soybean	Delete

[Save Changes](#)

Return to: [USDA Position](#) [Save Changes](#) [APHS](#)

These four animations depict counties with confirmed observations of soybean rust infections in soybean and/or Kudzu for 2006, 2007, 2008, and 2009. The frames were extracted from the 2006, 2007, 2008, and 2009 Pest Information Platform for Extension and Education (PIPE) at weekly intervals.



█ recently scouted, not found
 █ scouted, confirmed
 ▨ confirmed, no longer found

Days on the calendar below are clickable

05 Jan	12 Jan	19 Jan	26 Jan	02 Feb	09 Feb	16 Feb	23 Feb	02 Mar	09 Mar	16 Mar	23 Mar	30 Mar	06 Apr	13 Apr	20 Apr	27 Apr	04 May	11 May	18 May	25 May	01 Jun	08 Jun	15 Jun	22 Jun	29 Jun
06 Jul	13 Jul	20 Jul	27 Jul	03 Aug	10 Aug	17 Aug	24 Aug	31 Aug	07 Sep	14 Sep	21 Sep	28 Sep	05 Oct	12 Oct	19 Oct	26 Oct	02 Nov	09 Nov	16 Nov	23 Nov	30 Nov	07 Dec	14 Dec	21 Dec	28 Dec

- IAMS
- Ensemble Forecasting
- Historical Risk Assessment
- Epidemiology
- Spore Exposure
- Canopy Escape
- Spore Deposition
- Infection Timeline
- Spore Trapping
- PIPE
- Blog
- Ragweed**
- International Collaboration
- Forecasting Model
- Discussion Group
- UG99 - TKKS Wheat Stem Rust
- Risk of Incursion
- Preparing for Incursion
- Pest Detection**
- Citrus Greening
- Grasshopper
- Facilities
- Personnel
- Publications
- Links
- Home

Source Region Monitoring

- What if the source region of a pest or disease is far from where the management must occur?
- What if the infection is polyetic and trans-regional?
- Do national borders stop pests?
- The United States and Mexico share contagion
- Citrus diseases and vectors are trans-regional.

Figure 18. Simulated Transport (HYSPLIT) and Daily Wet Deposition on October 9th, 2007

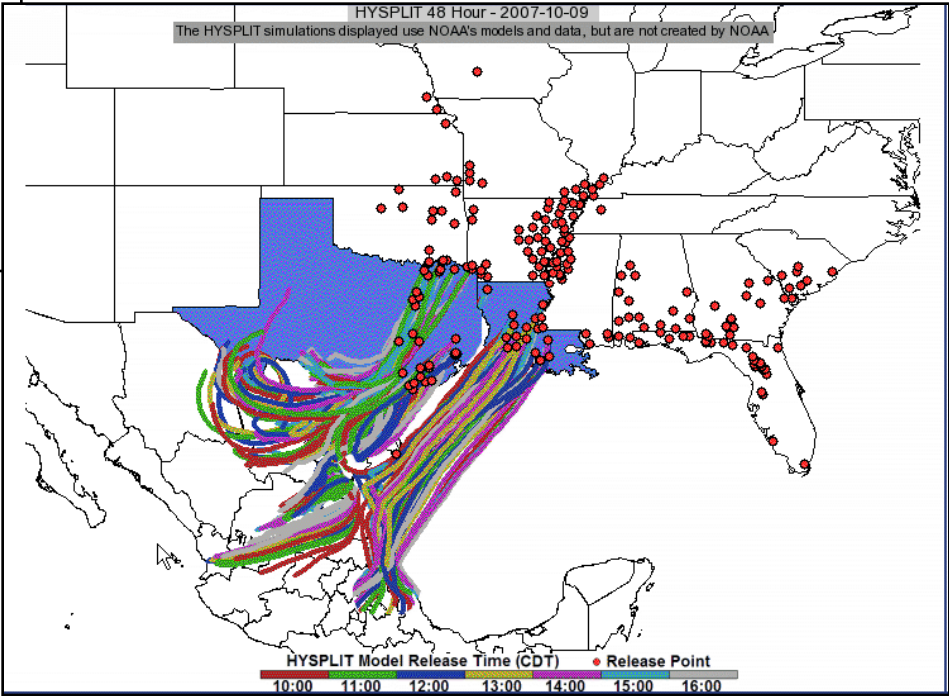
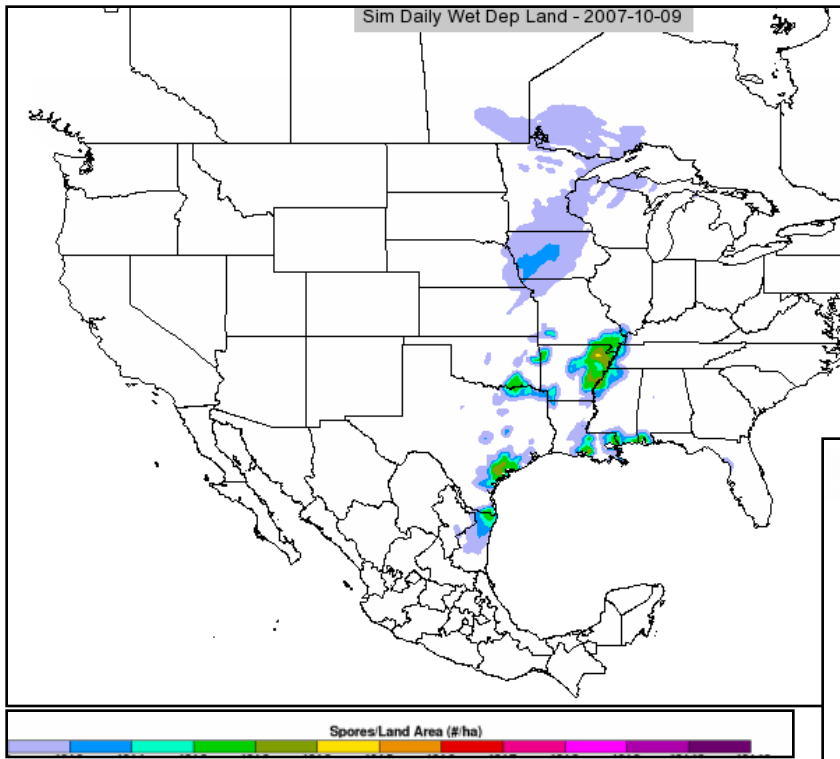


Figure 19. Simulated Transport (HYSPLIT) and Daily Wet Deposition on October 11th, 2007

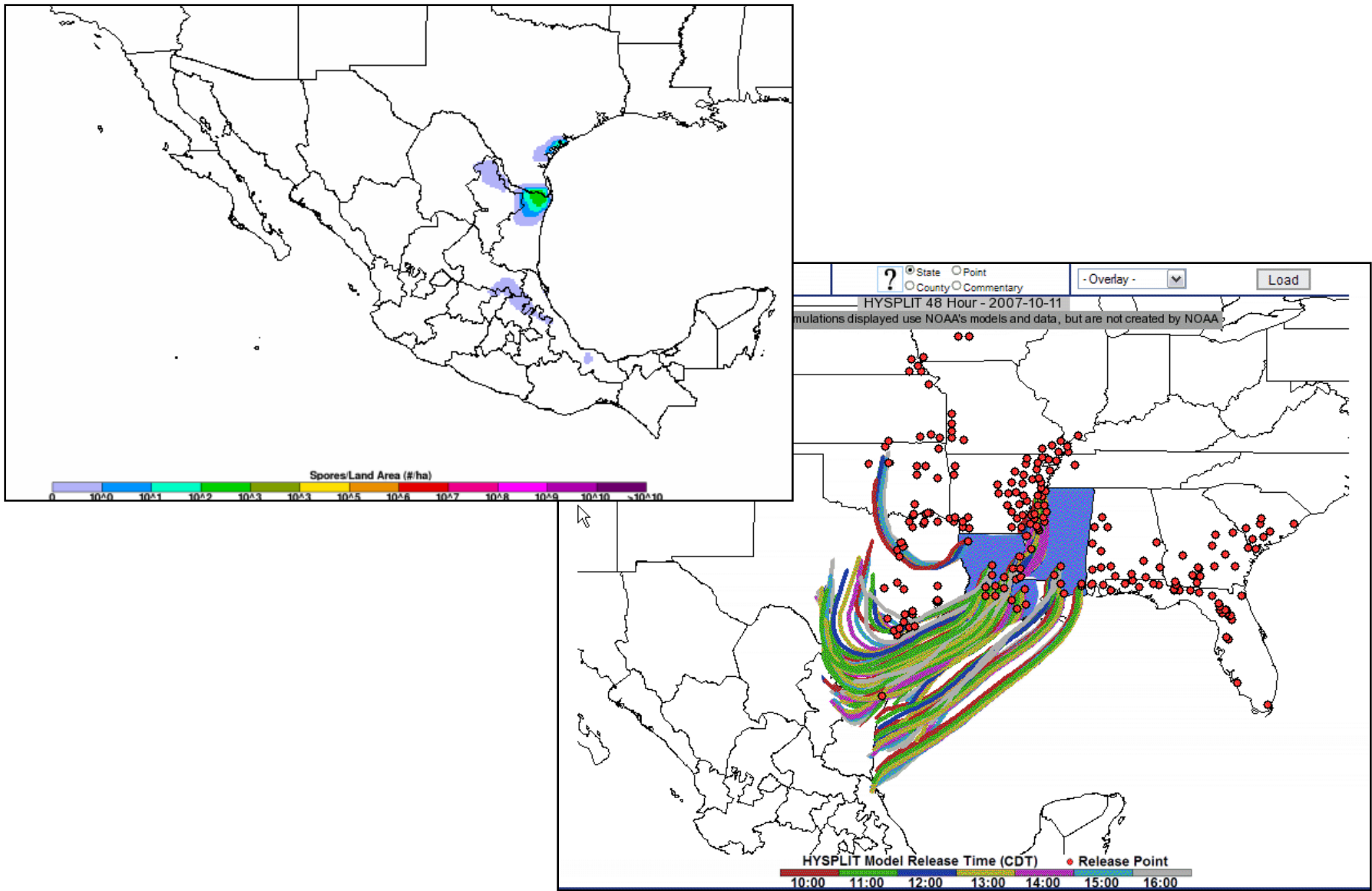


Figure 20. Posible Trayectoria de Huracan Ike

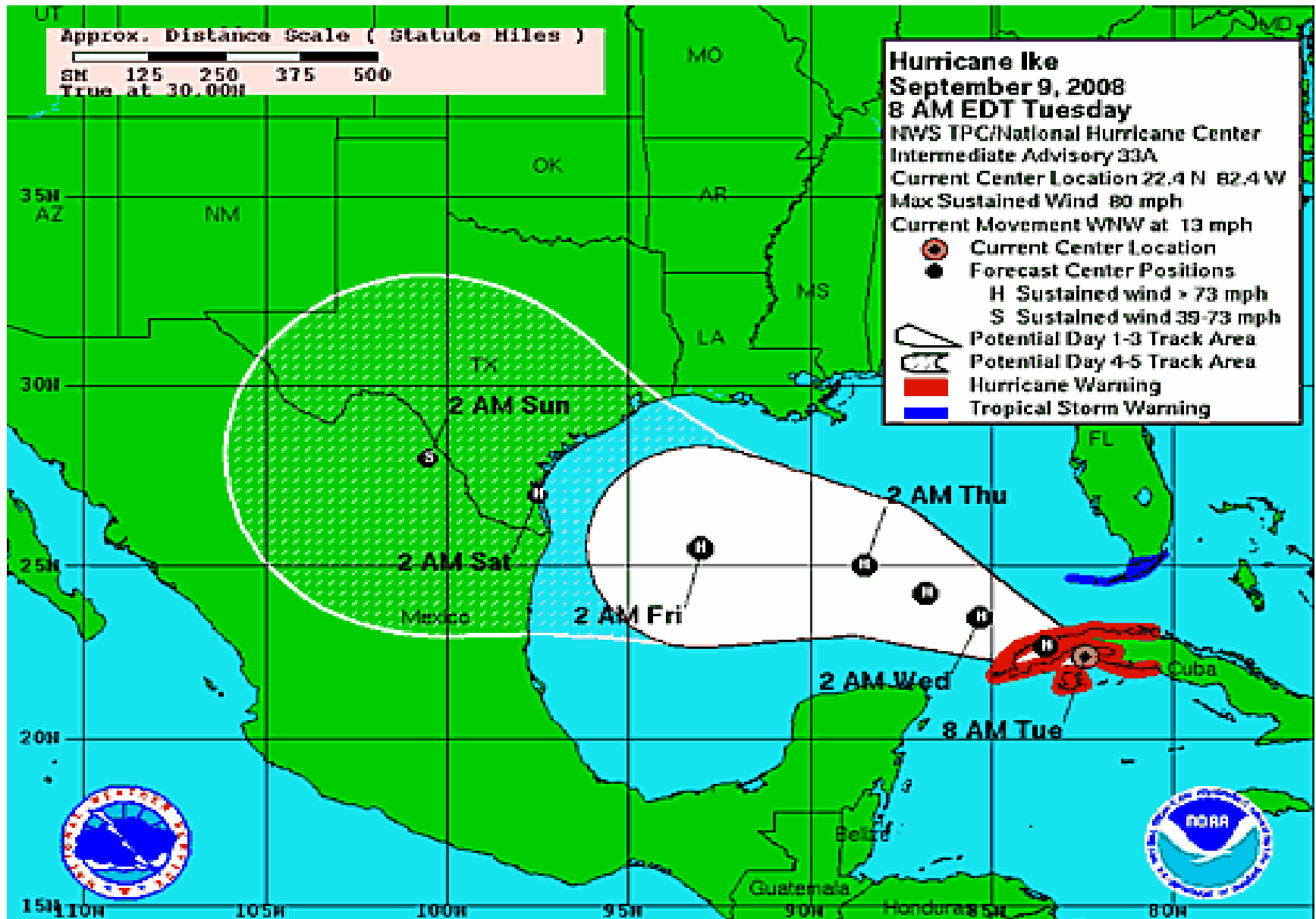
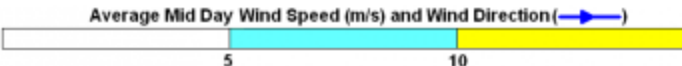
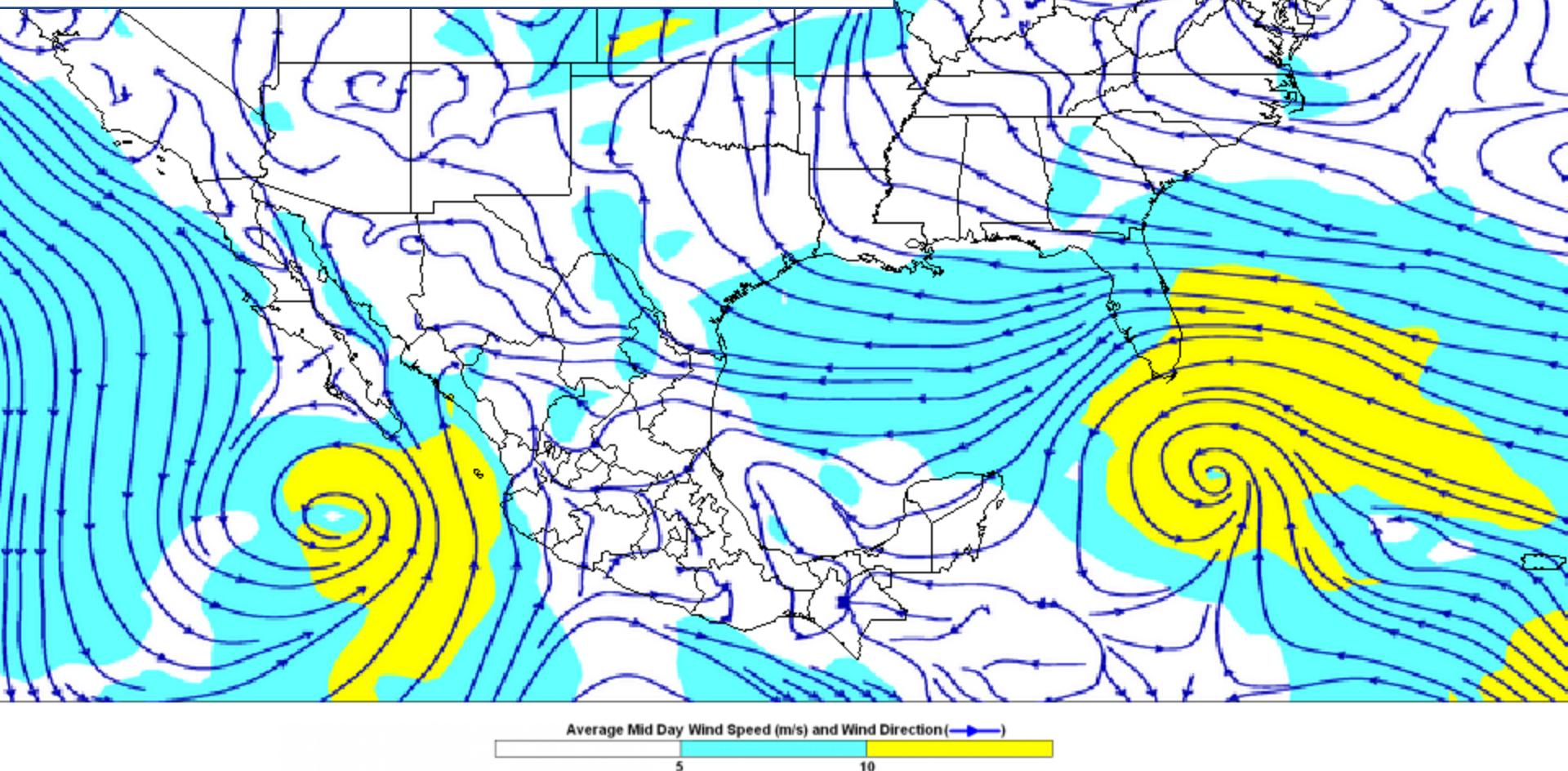


Figure 21. Average Mid-day Wind Speed and Directions – Hurricane Ike, September 9 2008



Soybean Rust Research Forecast (issued: 2008-09-08)

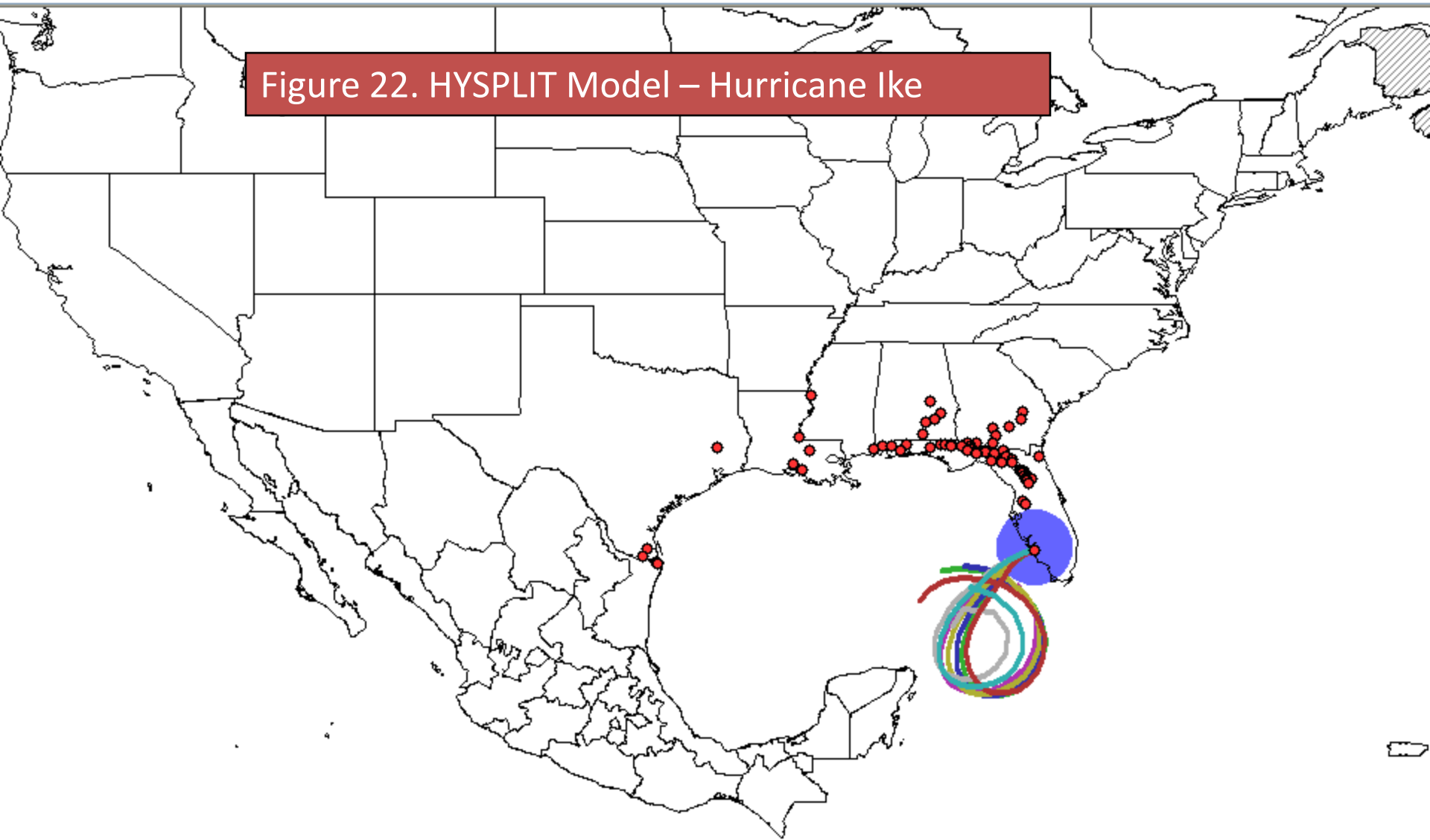
Current Conditions

Current Conditions □ September 8th

High pressure situated over Appalachia is keeping most of the South dry this afternoon with the exception of some isolated thunderstorms, especially over the Florida Peninsula. Western and Central portions of Texas are currently observing heavy rain and strong storms associated with a cold front over the central U.S.

Risk Area: Spore transport, deposition, and survival are all currently notable throughout the state of Texas as the disturbance moves through, putting them at risk for the spread of the

Figure 22. HYSPLIT Model – Hurricane Ike

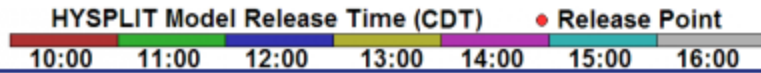
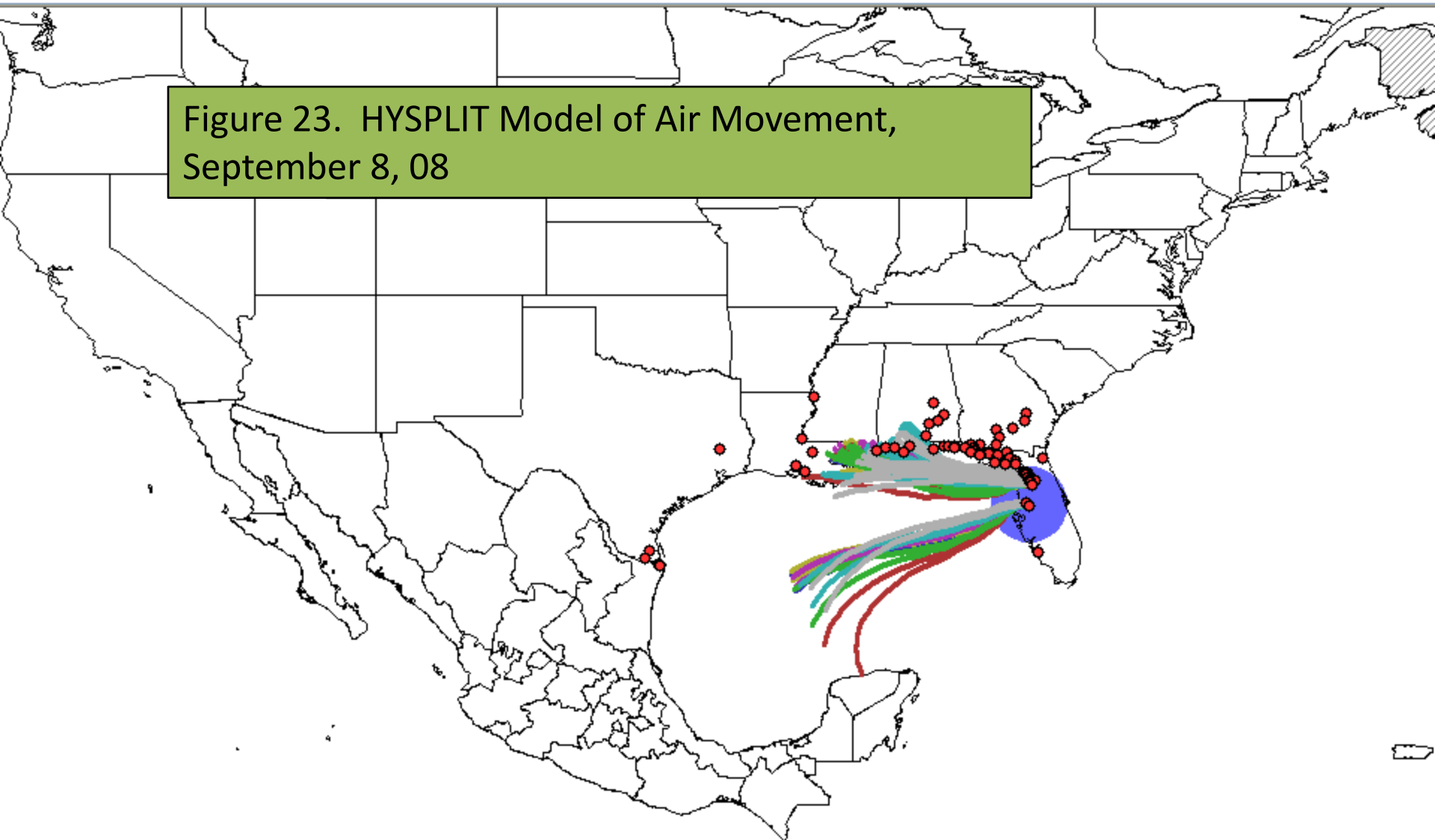


HYSPLIT Model Release Time (CDT) • Release Point
10:00 11:00 12:00 13:00 14:00 15:00 16:00

United States Soybean Rust Commentary (updated: 09/08/08)

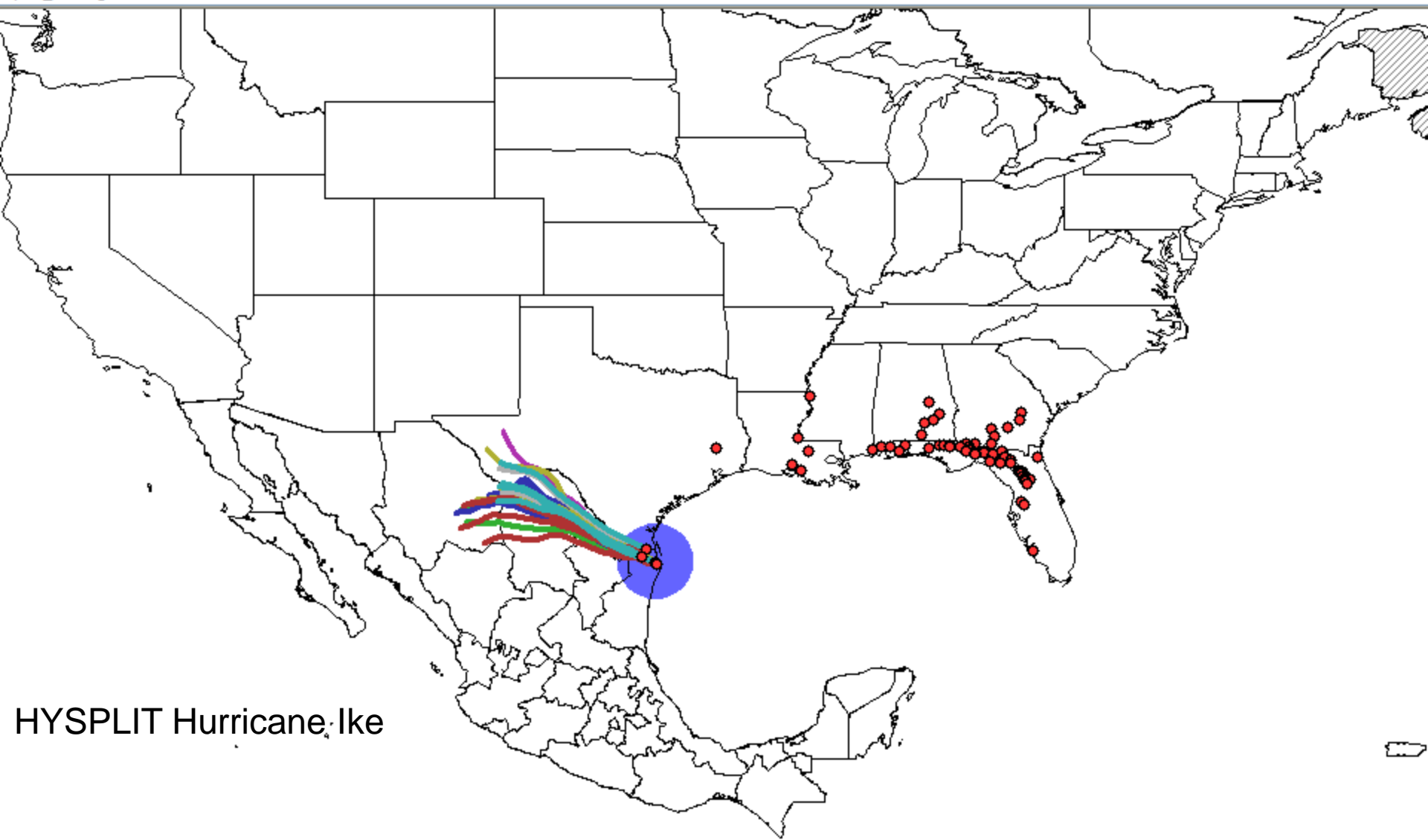
September, soybean rust was reported from Holmes County, Florida and from Ashley County, Arkansas on soybeans. Rust was also reported once again in Liberty County, Texas on adzu. On 6 September, soybean rust was reported in Issaquena County, Mississippi. On 5 September, soybean rust was reported in Elmore (soybean) and Bullock and Pike counties (cudzu) in Alabama, and in Coffee and Toombs Counties in Georgia.

Figure 23. HYSPLIT Model of Air Movement, September 8, 08

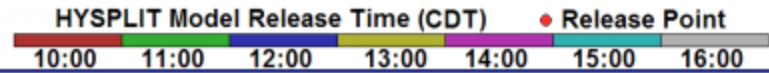


United States Soybean Rust Commentary (updated: 09/08/08)

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HYSPLIT Hurricane Ike



United States Soybean Rust Commentary (updated: 09/08/08)

September, soybean rust was reported from Holmes County, Florida and from Ashley County, Arkansas on soybeans. Rust was also reported once again in Liberty County, Texas on adzu. On 6 September, soybean rust was reported in Issaquena County, Mississippi. On 5 September, soybean rust was reported in Elmore (soybean) and Bullock and Pike counties (cudzu) in Alabama, and in Coffee and Toombs Counties in Georgia.

Figure 24. HYSPLIT Model of Post-Impact Air Movement

HYSPLIT 48 Hour - 2008-12-30
The HYSPLIT simulations displayed use NOAA's models and data, but are not created by NOAA

Figure 25. HYSPLIT Projection of Easterly Flow of Airmass, December 2008

HYSPLIT Model Release Time (CDT) • Release Point
10:00 11:00 12:00 13:00 14:00 15:00 16:00

HYSPLIT Model Release Time (CDT) • Release Point
10:00 11:00 12:00 13:00 14:00 15:00 16:00

United States Soybean Rust Commentary (updated: 09/08/08)

September, soybean rust was reported from Holmes County, Florida and from Ashley County, Arkansas on soybeans. Rust was also reported once again in Liberty County, Texas on adzu. On 6 September, soybean rust was reported in Issaquena County, Mississippi. On 5 September, soybean rust was reported in Elmore (soybean) and Bullock and Pike counties (adzu) in Alabama, and in Coffee and Toombs Counties in Georgia

HYSPLIT 48 Hour - 2008-12-26

The HYSPLIT simulations displayed use NOAA's models and data, but are not created by NOAA

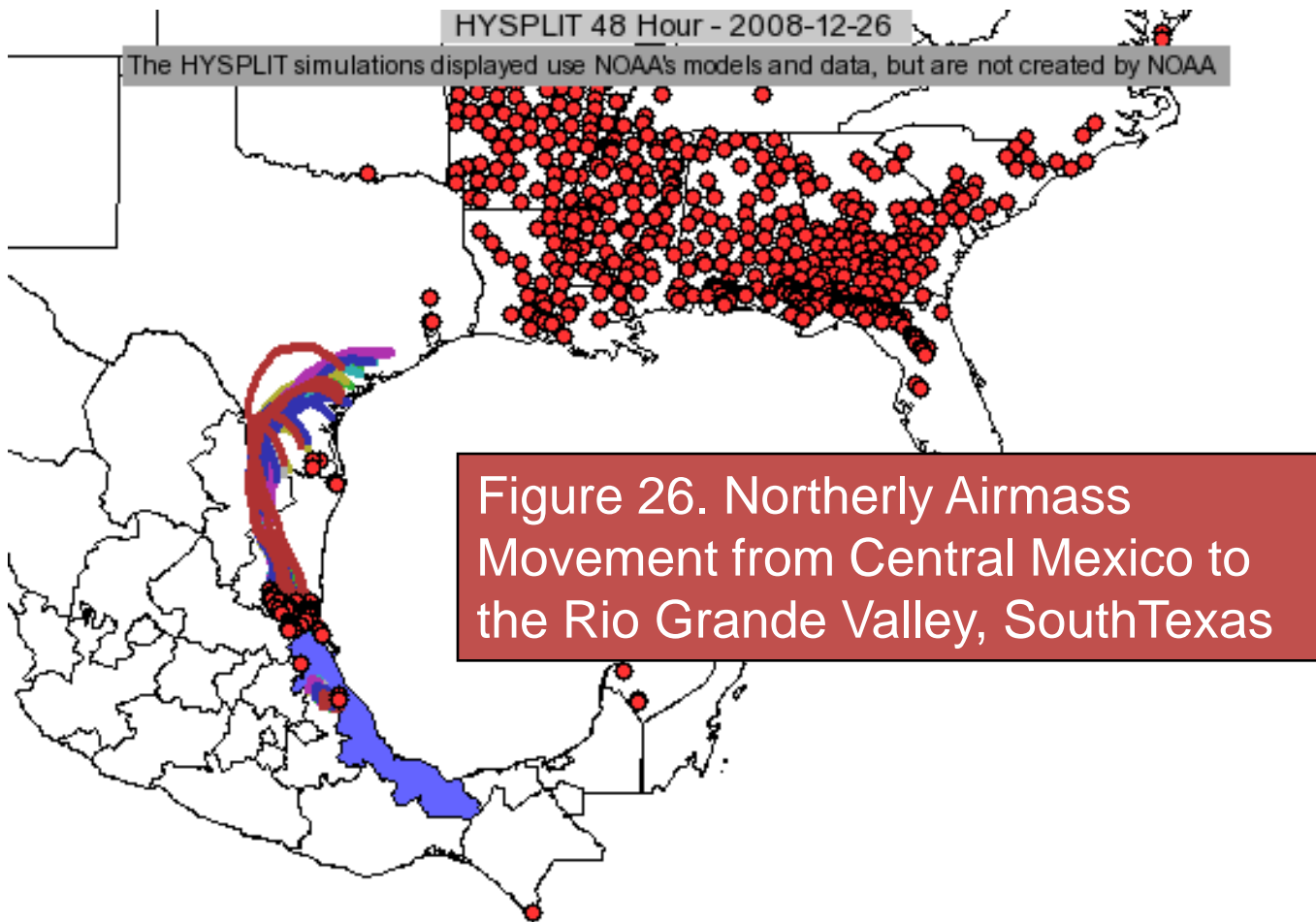


Figure 26. Northerly Airmass Movement from Central Mexico to the Rio Grande Valley, South Texas

HYSPLIT Model Release Time (CDT)

• Release Point

10:00

11:00

12:00

13:00

14:00

15:00

16:00

Figure 27. Meso-American Scale Coordination in Control of Citrus Pests and Diseases Is Called For!



Recommendations

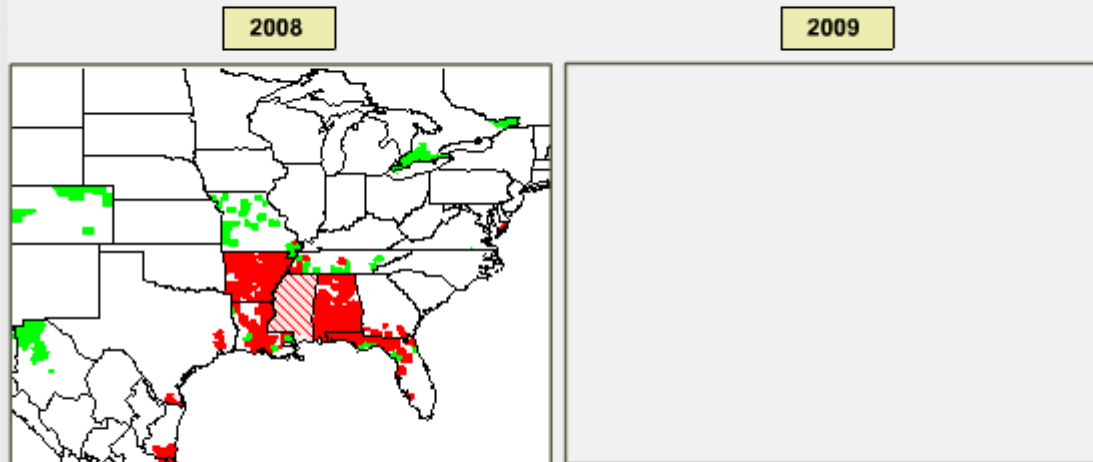
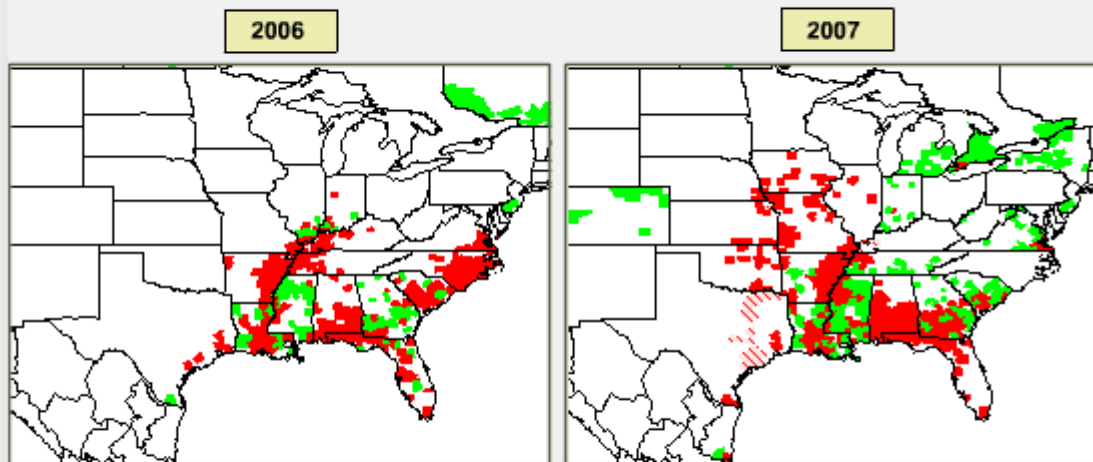
- Build and strengthen the framework for regional collaboration, from the Caribbean to Mexico and the United States.
- Identify and prepare more laboratories
- Adopt field protocols for uniform monitoring
- Adopt or create a common information platform for monitoring and managing vectors

Conclusions

- Successful management of citrus pests and diseases will require comprehensive, pan-regional tool sets and coordination
- A network of laboratories is already in preparation
- A network of field detectors, using agreed upon protocols is needed
- An information platform with risk analysis tools is available in PIPE or SCOPE
- Anything less than a pan-regional solution for the problems of the citrus industry, is likely to fail.

Preguntas?/Questions?

- IAMS
- Ensemble Forecasting
- Historical Risk Assessment
- Epidemiology
- Spore Exposure
- Canopy Escape
- Spore Deposition
- Infection Timeline
- Spore Trapping
- PIPE
- Blog
- Ragweed**
- International Collaboration
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- UG99 - TKKS Wheat Stem Rust
- Risk of Incursion
- Preparing for Incursion
- Pest Detection**
- Citrus Greening
- Grasshopper
- Facilities
- Personnel
- Publications
- Links
- Home



recently scouted, not found
scouted, confirmed
confirmed, no longer found

Calendar

28 December

Start Animation

Stop Animation

Days on the calendar below are clickable

05 Jan	12 Jan	19 Jan	26 Jan	02 Feb	09 Feb	16 Feb	23 Feb	02 Mar	09 Mar	16 Mar	23 Mar	30 Mar	06 Apr	13 Apr	20 Apr	27 Apr	04 May	11 May	18 May	25 May	01 Jun	08 Jun	15 Jun	22 Jun	29 Jun
06 Jul	13 Jul	20 Jul	27 Jul	03 Aug	10 Aug	17 Aug	24 Aug	31 Aug	07 Sep	14 Sep	21 Sep	28 Sep	05 Oct	12 Oct	19 Oct	26 Oct	02 Nov	09 Nov	16 Nov	23 Nov	30 Nov	07 Dec	14 Dec	21 Dec	28 Dec