Sugarcane Insects Management

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Outline:

- Sugarcane borer natural enemies
  Impact of Hurricane Rita storm surge
- Sugarcane borer insecticides
- Sugarcane aphid management
- Mexican rice borer movement

The sugarcane borer (SCB)

Diatraea saccharalis (F.)

- Traditional key pest
- Management: insecticides, varieties, cultural practices, natural enemies

Reagan 2001

SCB natural enemies

- **Red imported fire ants, *Solenopsis invicta* Buren**
- **Spiders (Salticidae, Lycosidae, etc)**
- **Predaceous beetles (Carabidae, Elateridae, and Staphylinidae)**
- **Earwigs**

Save 1 to 2 insecticide applications

Bessin et al. 1990, Reagan et al. 1972, Sauer 1982

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Collectively,
Second in importance

J. O. Howell, www.insectimages.org

Ali and Reagan 1985, Negm and Hensley 1967, 1969

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B. Marlin, www.cirrusimage.com

Negm and Hensley 1967, 1969

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D. Cappaert, www.insectimages.org

Negm and Hensley 1967, 1969

September 24, 2005: Hurricane Rita

30,000 to 40,000 acres of sugarcane were flooded by the hurricane storm surge

Viator et al. 2006

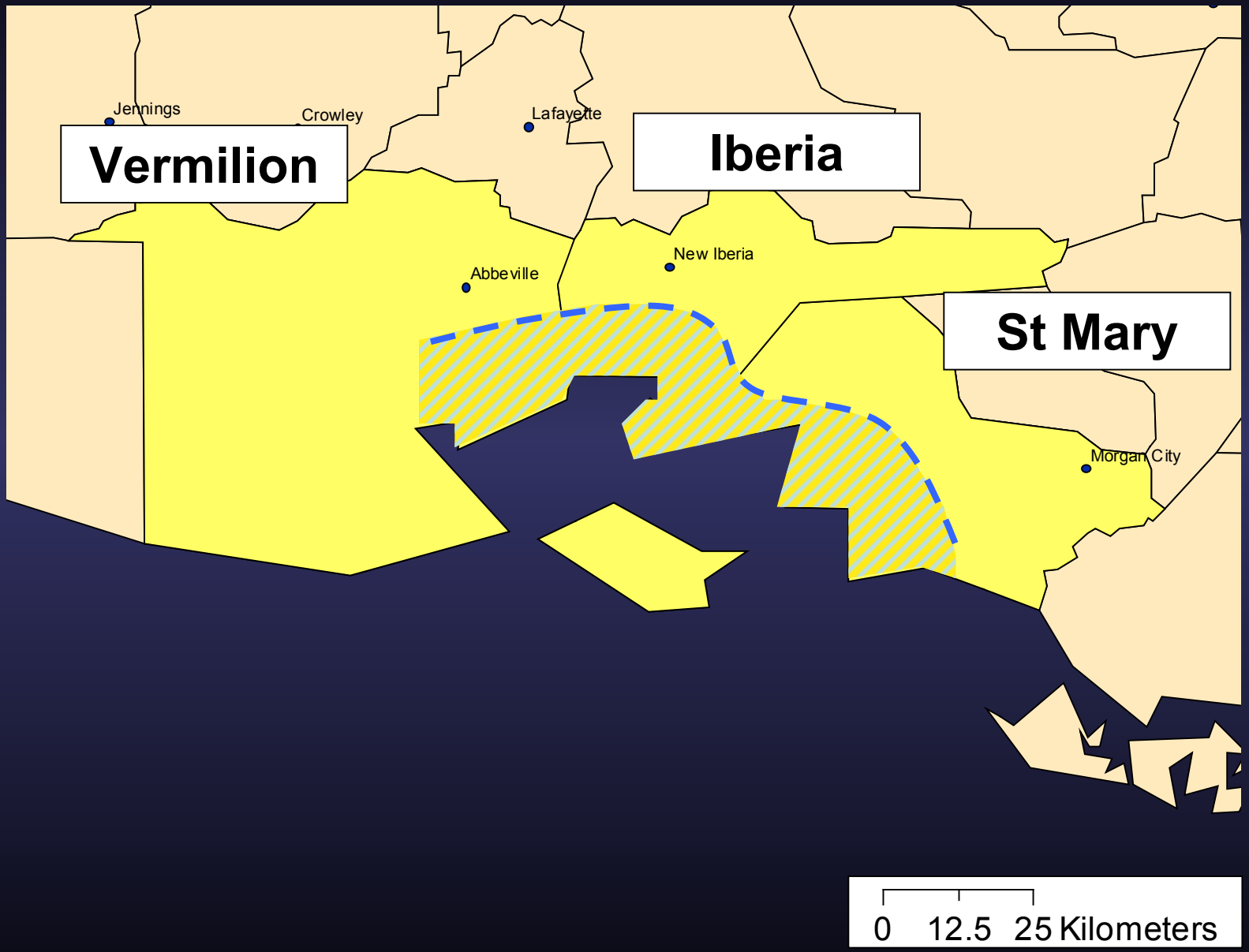
Late spring 2006: Consequences?

Flooded areas

- Higher SCB infestations
- Earlier and more frequent insecticide applications

Did Hurricane Rita storm surge decrease natural enemy populations; thus increasing* SCB *infestations?

48 fields were surveyed (12 replications)



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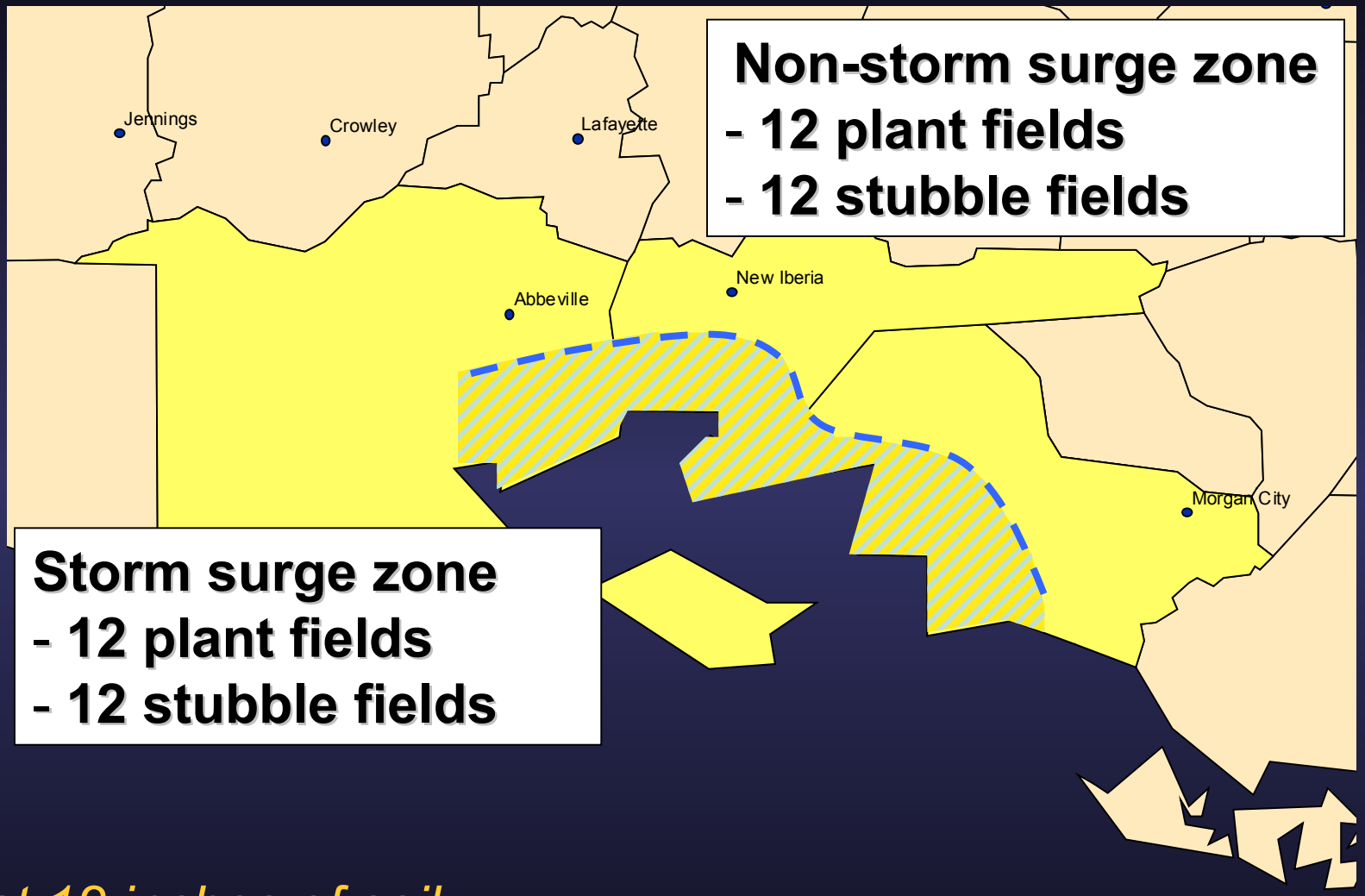

First 12 inches of soil:

806 ppm vs. 161 ppm of salts

Pitfall traps were used to monitor soil-associated arthropod abundance

- Two traps per field
- From Jul. 22 to Sep. 09

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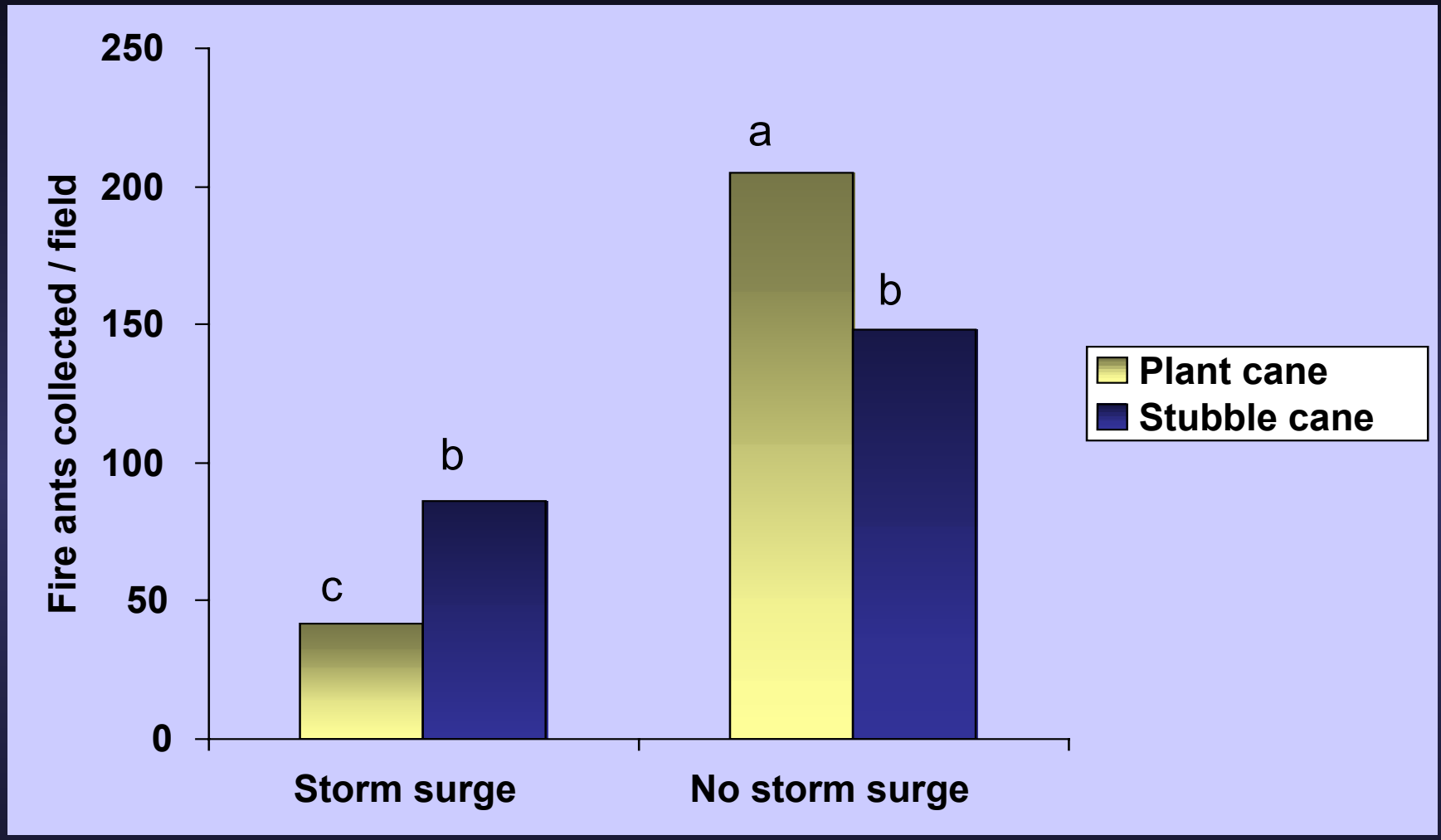
End of season SCB injury was recorded

- Proportion of bored internodes
- 25 sugarcane stalks per field

- Number of insecticide applications

F.P.F. Reay-Jones

Effect of storm surge on imported fire ants



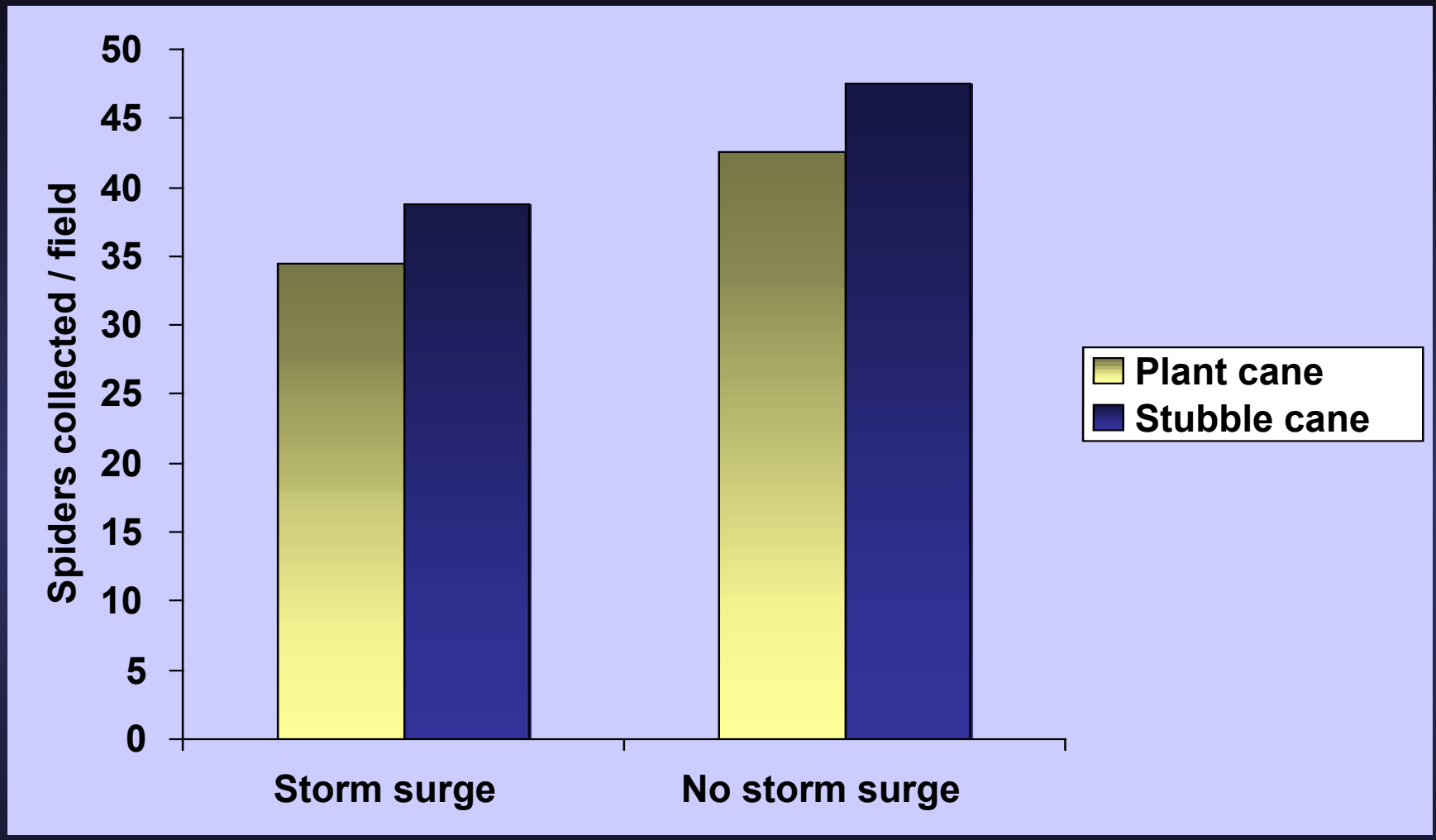
SAS, Proc Glimmix, Poisson distribution
Tukey's HSD, α = 0.05

Storm surge: F= 14.62 ; df = 1,21.46 ; p= 0.001

Crop: F= 39.91; df = 1,44 ; p< 0.0001

Tidal surge * Crop: F= 279.13 ; df = 1,44 ; p< 0.0001

Effect of storm surge on spiders



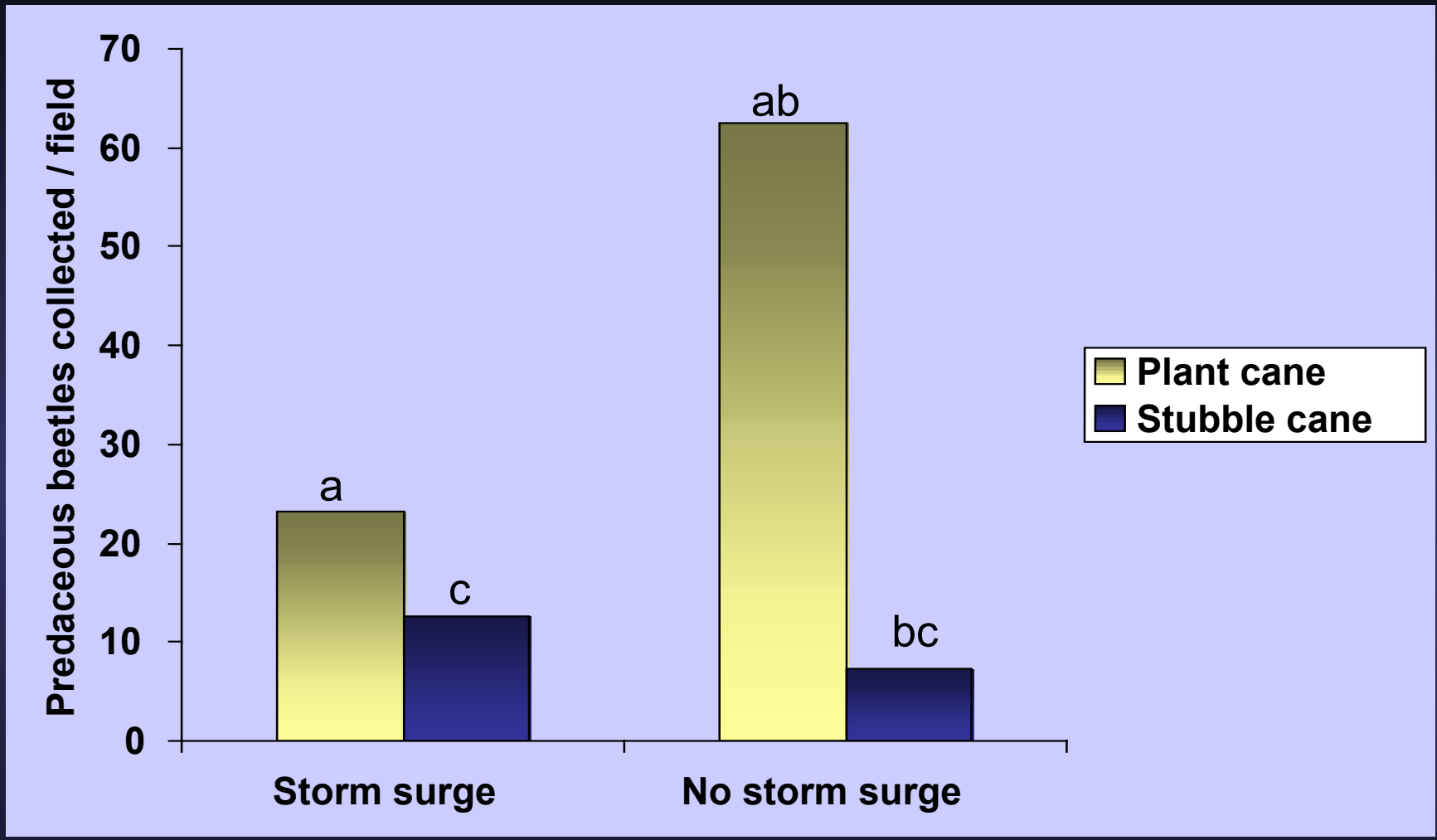
SAS, Proc Glimmix, Poisson distribution
Tukey's HSD, α = 0.05

Storm surge: F= 3.50 ; df = 1,21.96 ; p= 0.0746

Crop: F= 6.49; df = 1,44 ; p= 0.0144

Tidal surge * Crop: F= 0.01 ; df = 1,44 ; p= 0.9154

Effect of storm surge on predaceous beetles



SAS, Proc Glimmix, Poisson distribution
Tukey's HSD, α = 0.05

Storm surge: F= 0.51 ; df = 1,22.59 ; p= 0.4824

Crop: F= 332.04 ; df = 1,44 ; p< 0.0001

Stom surge * Crop: F= 104.26 ; df = 1,44 ; p< 0.0001

Effect of storm surge on earwigs

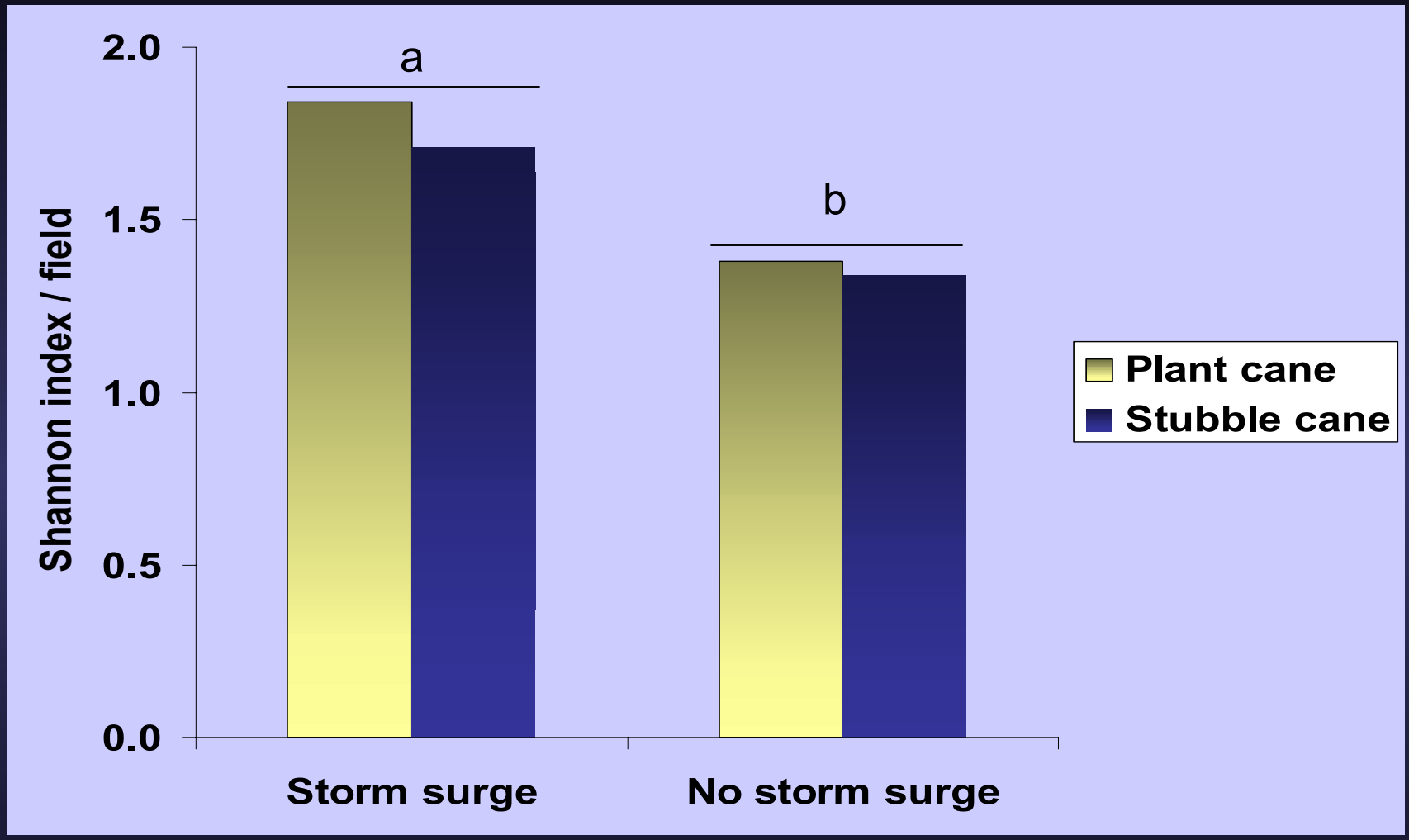
SAS, Proc Glimmix, Poisson distribution
Tukey's HSD, α = 0.05

Storm surge: F= 2.13 ; df = 1,17.91 ; p= 0.1614

Crop: F= 49.40; df = 1,44 ; p< 0.0001

Storm surge * Crop: F= 19.13 ; df = 1,44 ; p< 0.0001

Effect of storm surge on soil-inhabiting arthropod diversity



SAS, Proc Glimmix, Gaussian distribution
Tukey's HSD, α = 0.05

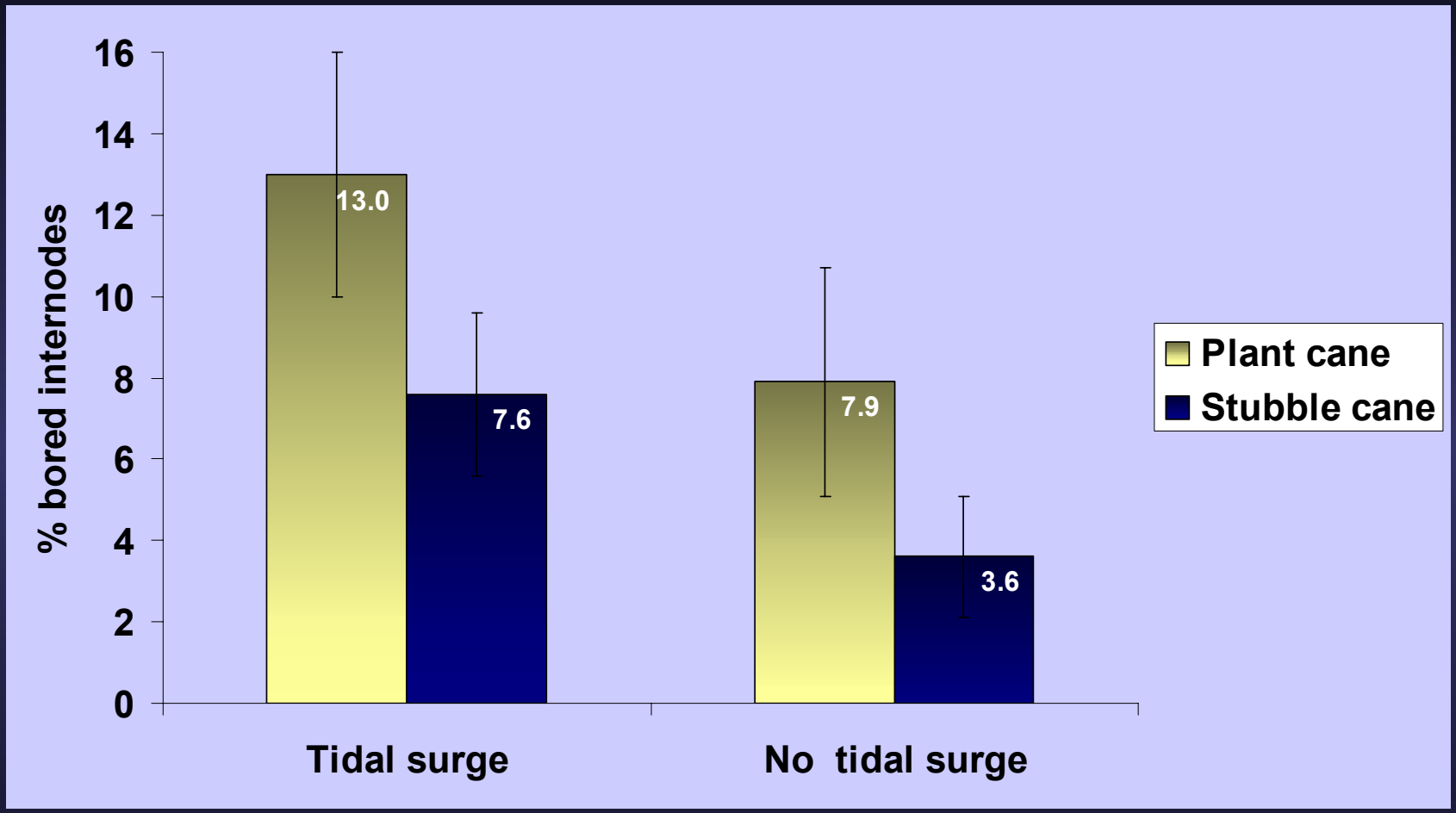
Storm surge: F= 15.51 ; df = 1,22 ; p= 0.0007

Crop: F= 0.99; df = 1,22 ; p= 0.3315

Storm surge * Crop: F= 0.32 ; df = 1,22 ; p= 0.5798

Effect of storm surge on SCB infestations

Effect of storm surge on SCB injury



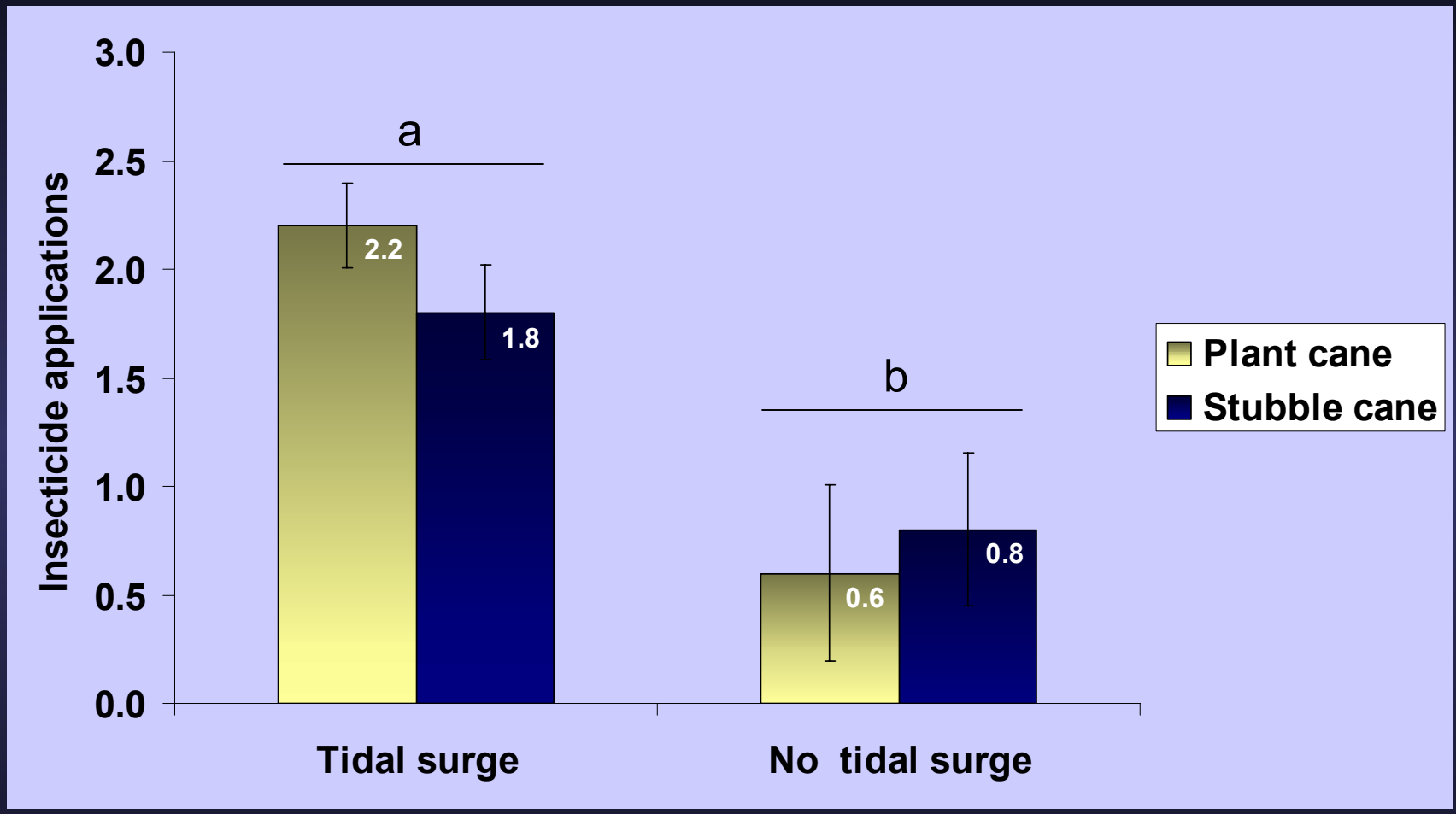
SAS, Proc Glimmix, binomial distribution
Tukey's HSD, α = 0.05

Storm surge: F= 0.25 ; df = 1,35 ; p= 0.6186

Crop: F= 0.29; df = 1,35 ; p= 0.5906

Storm surge * Crop: F= 0.01 ; df = 1,35 ; p= 0.9320

Effect of storm surge on insecticide application number



SAS, Proc Glimmix, Poisson distribution
Tukey's HSD, α = 0.05

Storm surge: F= 8.04 ; df = 1,21.44 ; p= 0.0098

Crop: F< 0.01 ; df = 1,44 ; p= 0.9809

Storm surge * Crop: F= 0.60 ; df = 1,44 ; p= 0.4444

Summary – Storm surge impact on arthropods

- **Hurricane storm surge had adverse effects on populations of major SCB predators**

  - 40% to 80% less fire ants
  - 15 % less spiders (strong trend)

- **Hurricane storm surge, overall, increased soil arthropod diversity**

  - Role of fire ants as dominant predators

Summary – Storm surge impact on arthropods

- **Hurricane storm surge had adverse effects on populations of major SCB predators**

- **Hurricane storm surge very likely increased SCB infestations**

  - 2-fold increase in number of insecticide applications
  - an increase in SCB *injury (?)*

Did Hurricane Rita storm surge decrease natural enemy populations; thus increasing SCB infestations?

- **Emphasized the importance of balanced pest management tactics in Louisiana sugarcane**
- **Preservation of natural enemies is essential**
- **Importance of environmentally friendly chemistry (e.g. Confirm, Diamond)**

Sugarcane aphids

Melanaphis sacchari
Sipha flava

Economic thresholds

- Examine 20-25 stalks at several locations in field
- If >20 aphids/leaf on 3rd and 4th leaf <u>for more than 2 weeks</u>, treat with insecticides

Sugarcane aphid insecticidal control

Insecticide	Rate (lbs ai/acre)	Pretreatment Counts	4-day Post treatment counts	11-day Post treatment counts
Control		**464a**	**379.1a**	**93.2a**
Karate-Z	0.030	400a	36.6b	6.7b
Prolex 1.25EC	0.020	576a	27.9b	6.4b
Carbine 50WG	0.063	539a	18.3b	7.6b
Centric 40WG	0.050	740a	18.1b	5.9b
Trimax Pro	0.050	590a	9.2b	5.8b
Intruder WSP	0.035	674a	7.7b	6.1b

Counts represent mean # of aphids per leaf.
Means within columns followed by the same letter are not significantly different (P > .05, Tukey's HSD).

Sugarcane aphids

Melanaphis sacchari
Sipha flava

Insecticides

- Confirm has **no effect** on aphids

- Pyrethroids:
  - Karate 1.6 to 2.56 fl oz/ac
  - Prolex 1.28 to 2.05 fl oz/ac

} Broad spectrum

Insecticides and application rates (SCB)

- **Insect growth regulators:**
  - Confirm 6 to 8 fl oz/ac
  - Diamond (Section 18 for 2006)

Narrow range, minimum risk

- **Pyrethroids:**
  - Asana 5.8 to 9.6 fl oz/ac
  - Baythroid 2.1 fl oz/ac
  - Karate 1.6 to 2.56 fl oz/acre
  - Mustang Max 3 to 4 fl oz/acre
  - Prolex 1.28 to 2.05 fl oz/acre

Broad spectrum

Susceptibility of SCB to Confirm

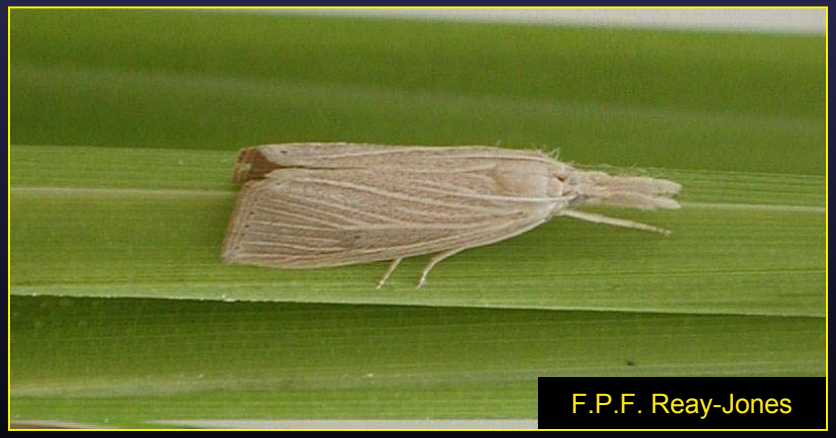
Strain	LC_{50}	LC_{90}	RR_{50}	RR_{90}
Alexandria	0.14	0.31	1	1
Duson	0.20	1.23	1.42	3.96
Duson selection	3.34	83.69	23.8	269.9

Resistance ratios were obtained with Alexandria strain as ratio divisor

The Mexican rice borer (MRB)

Eoreuma loftini

When?



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- USDA (CSREES) Critical Issues Program
- USDA (CSREES) Southern Region IPM Program (Research and Extension)
- USDA (CSREES) Crops at Risk Program
- EPA Strategic Agricultural Initiative
- American Sugarcane League
- Texas Rice Research Foundation

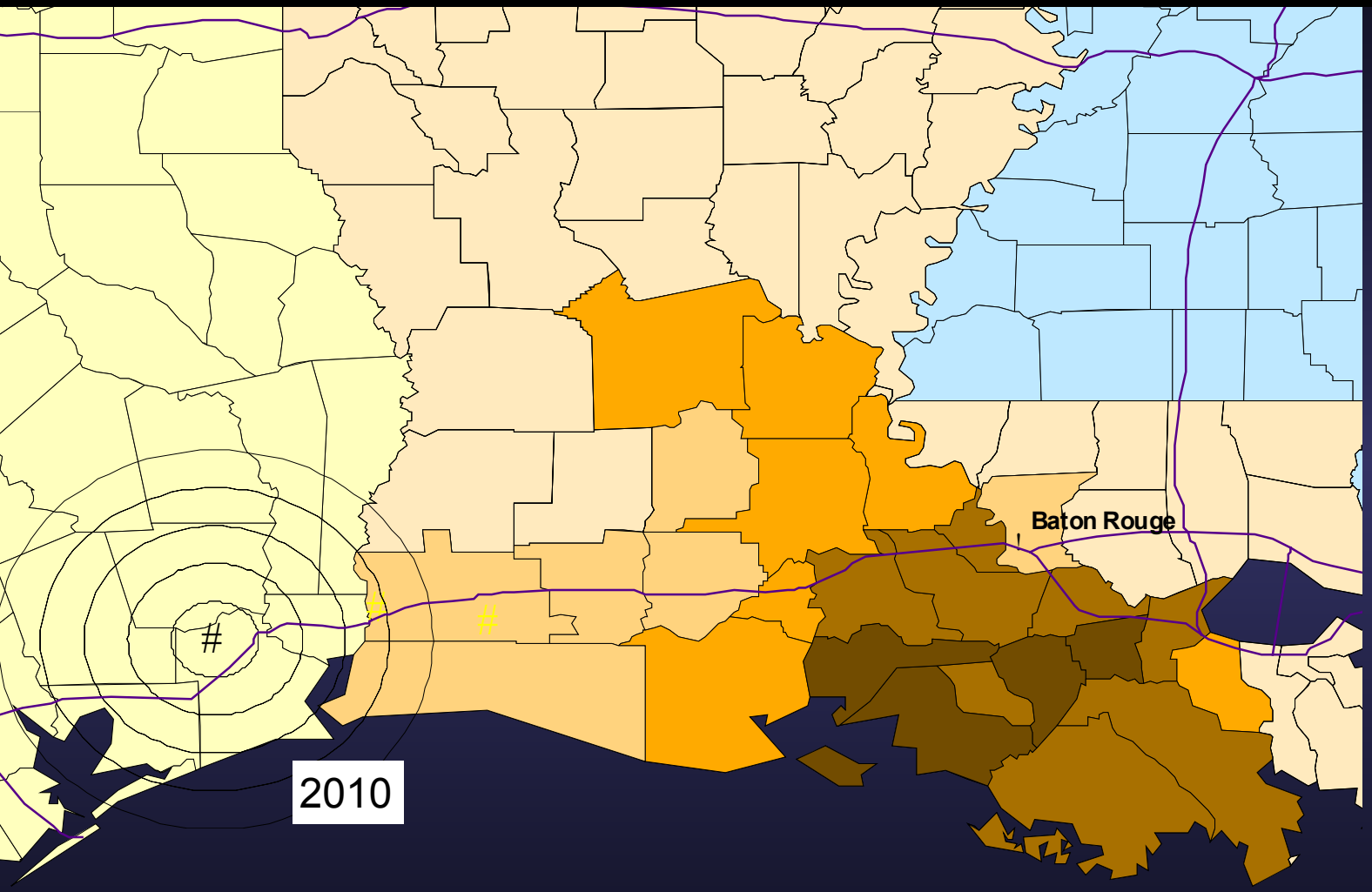
Sugarcane Insect Management

Questions?

Julien Beuzelin and Gene Reagan

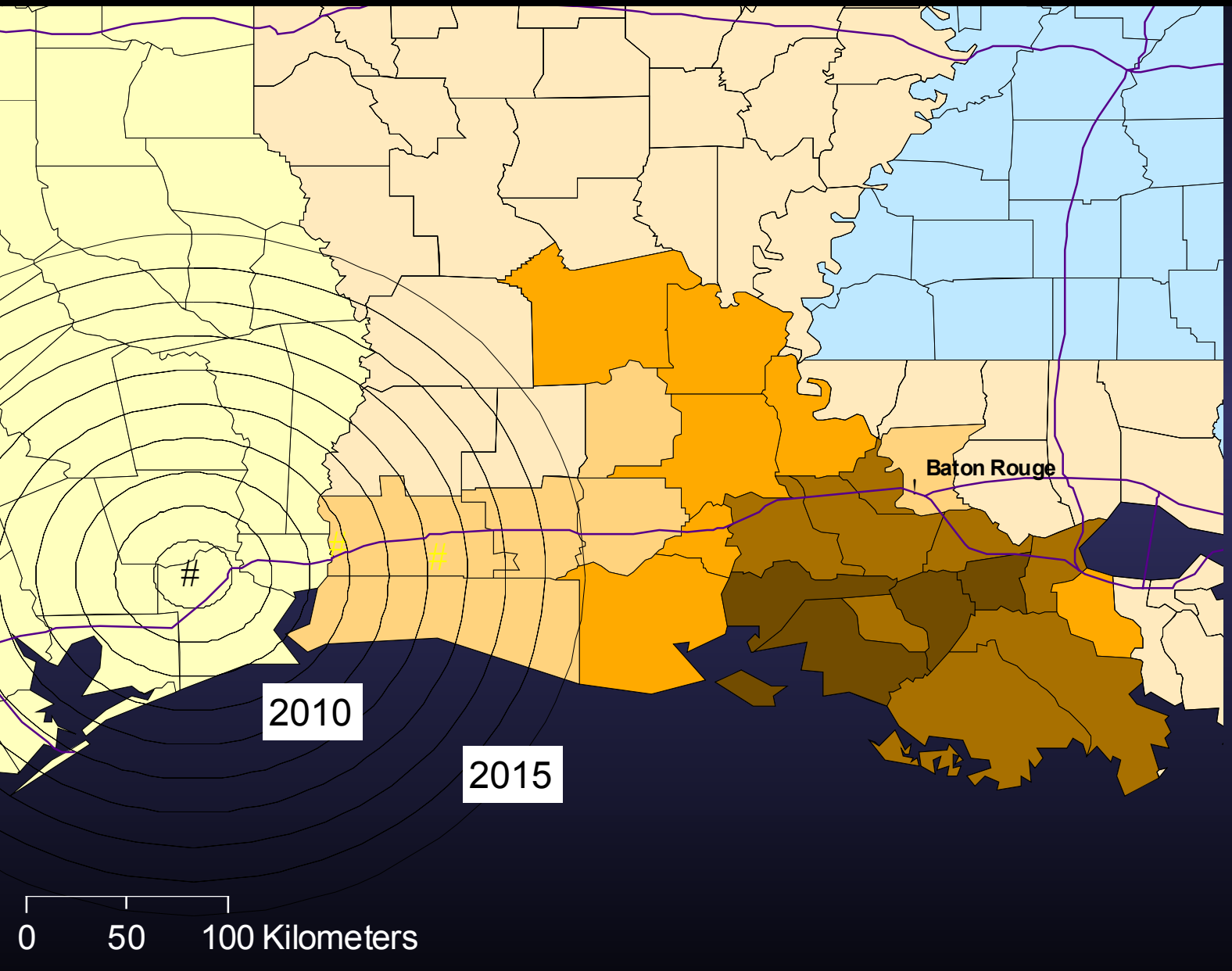
LSU AgCenter Research & Extension

Expected movement through Louisiana at an estimated speed of 16.5 Km/year



MRB expected in Louisiana by 2009

Expected movement through Louisiana at an estimated speed of 16.5 Km/year



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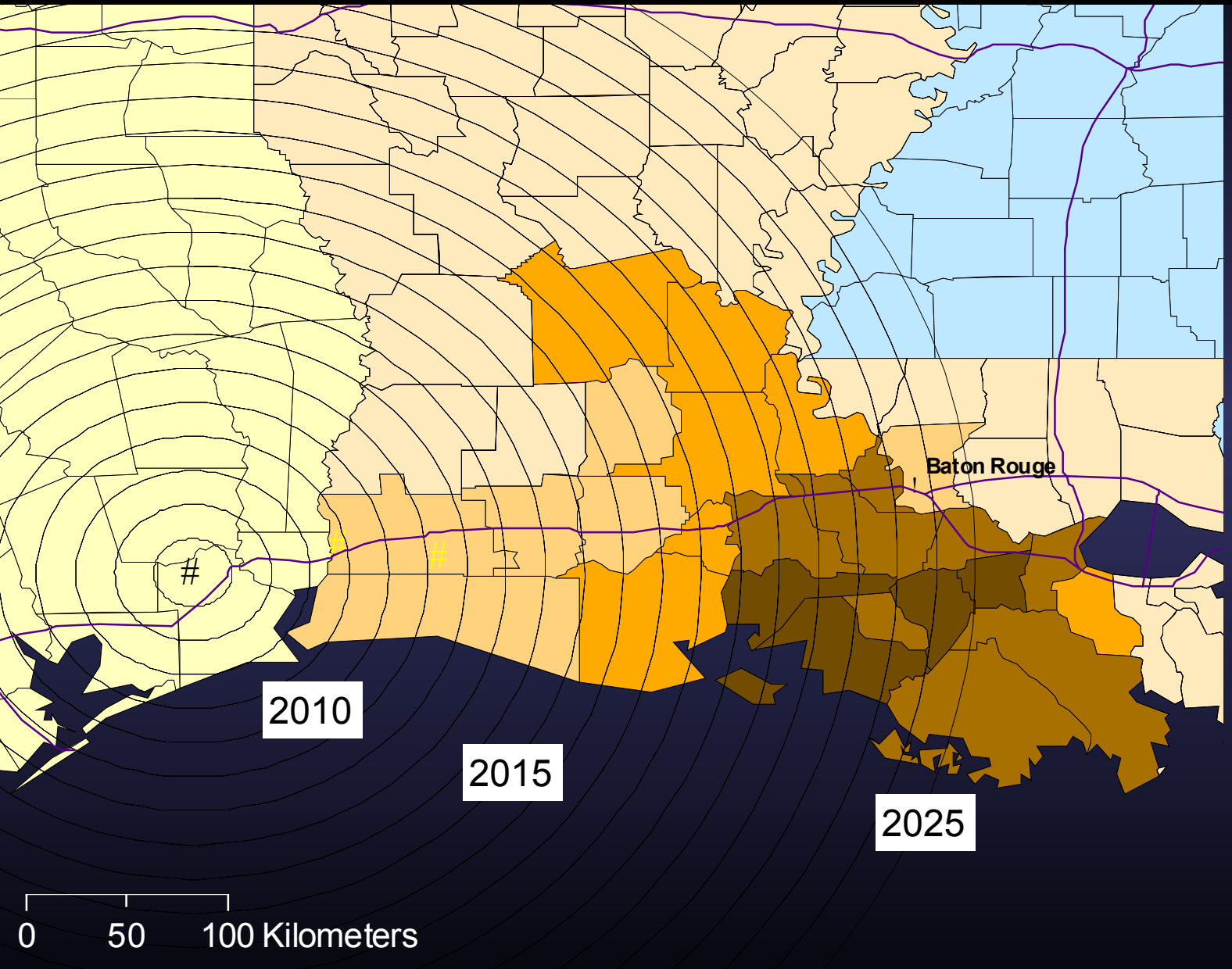

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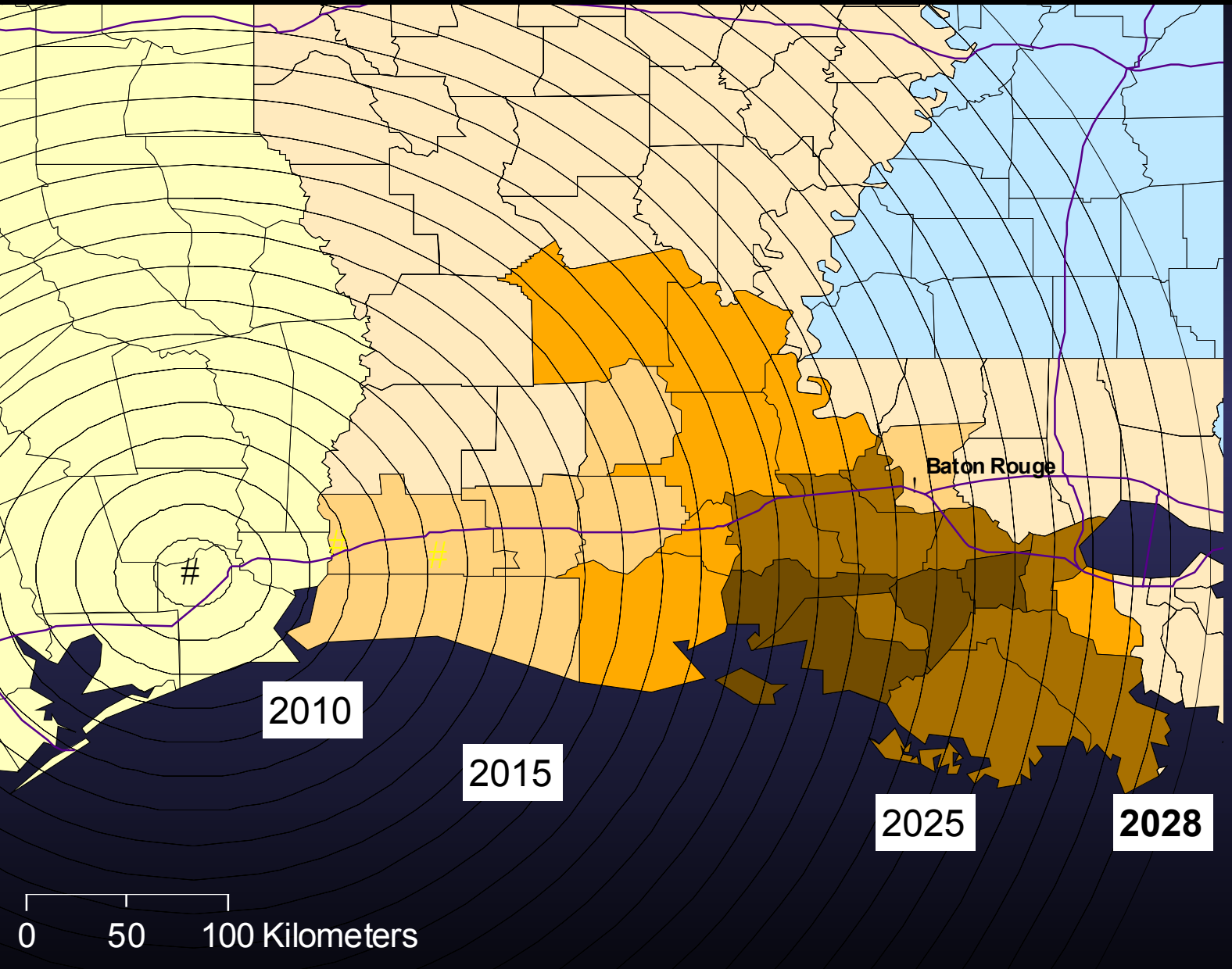
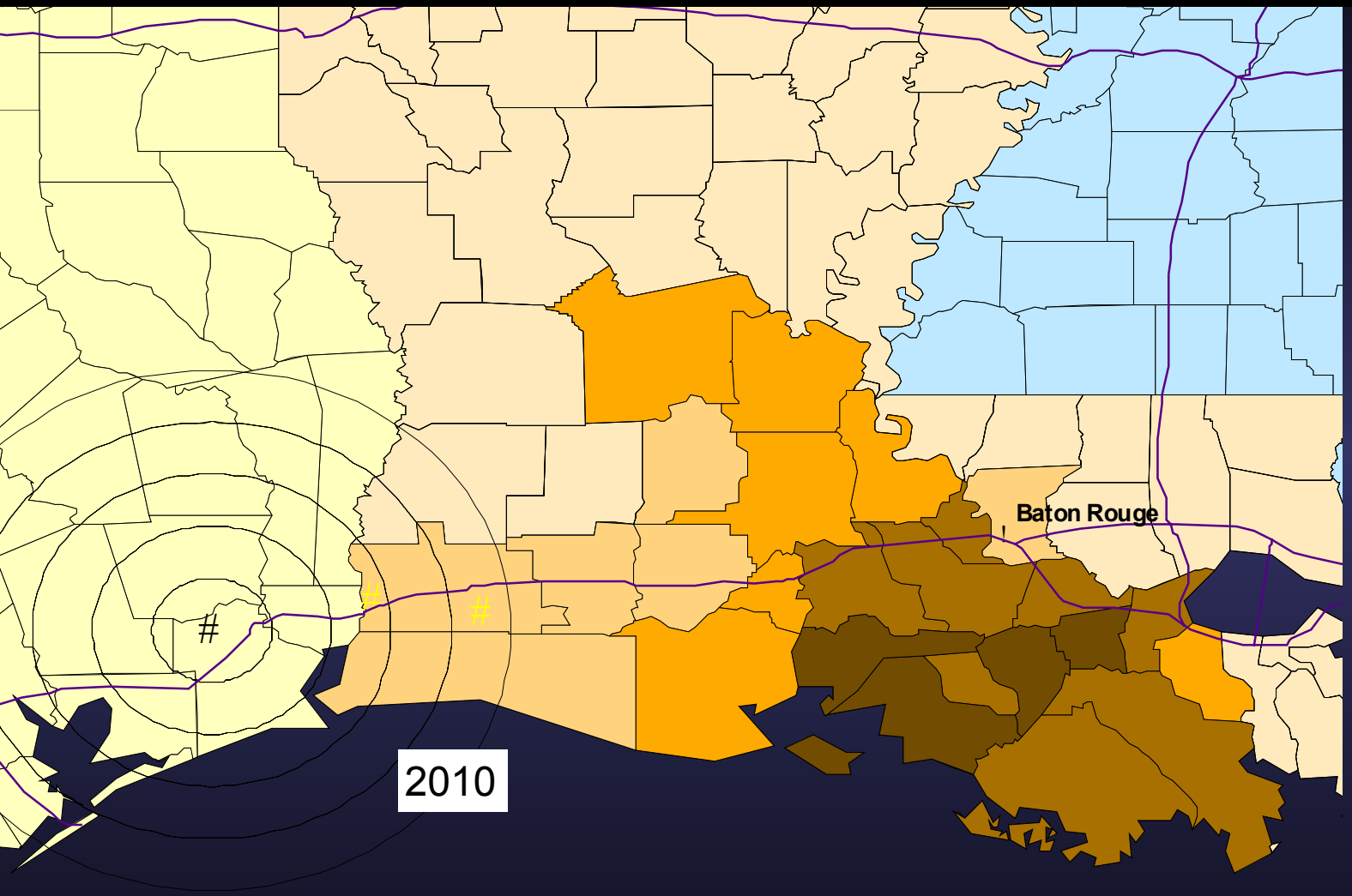


Expected movement through Louisiana at an estimated speed of 23 Km/year



MRB expected in Louisiana by 2008

Expected movement through Louisiana at an estimated speed of 23 Km/year