

# Texas Phoenix Palm Decline

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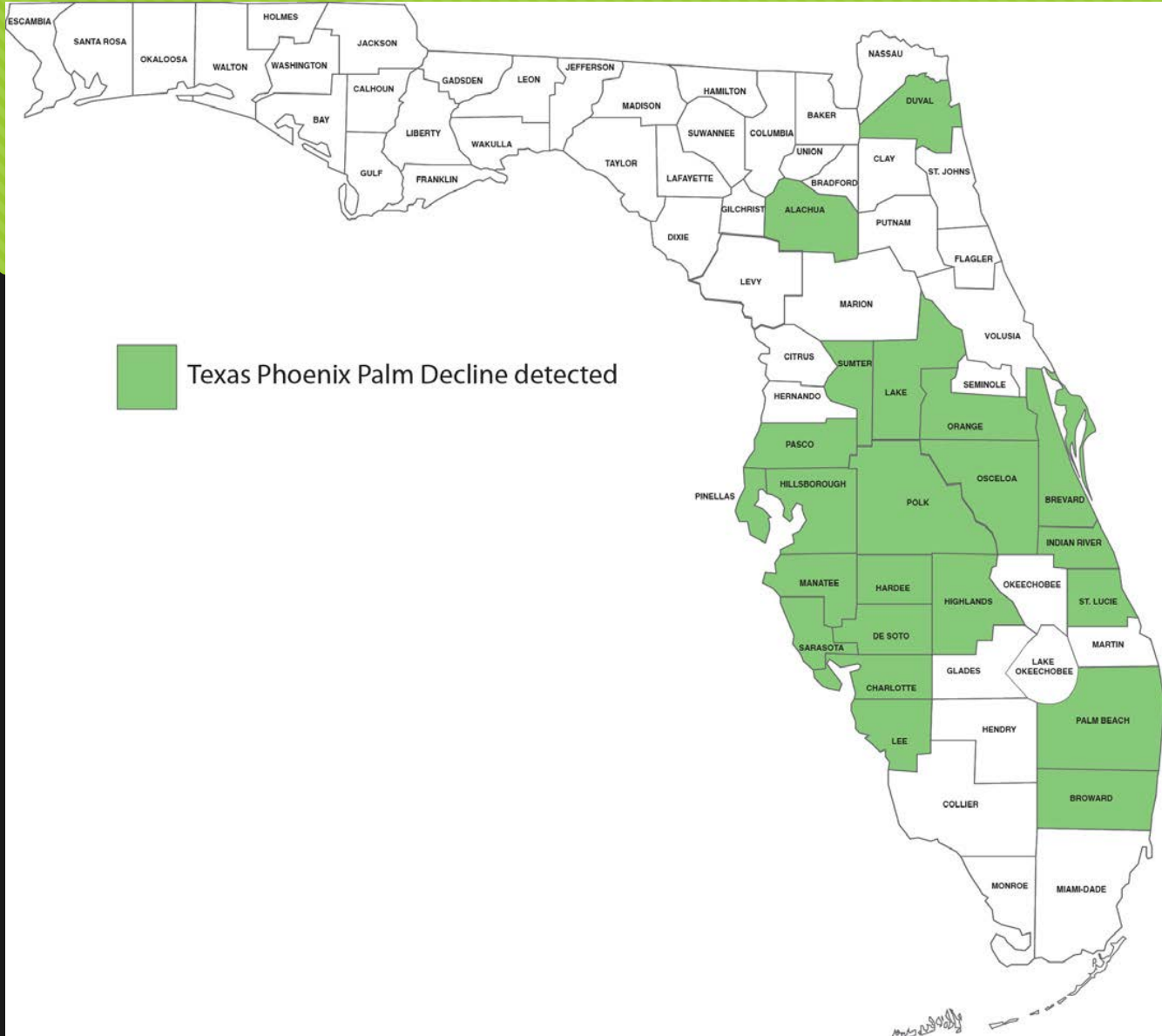


# 16SrIV Taxonomic Group

- 16SrIV-A → Lethal Yellowing (LY)
- 16SrIV-B → Yucatan Coconut Lethal Decline (YCLD)
- 16SrIV-C → Coconut Lethal Decline (CLD) → Africa and India
- 16SrIV-D → Texas Phoenix Palm Decline (TPPD)
- 16SrIV-E → Coconut Lethal Yellowing (CLY) → Dominican Republic
- 16SrIV-F

# History - TPPD

- Disease first described in 1980 in Texas
- Introduced to the west coast of Florida around 2006
- First report was in Hillsborough County
- Since 2006, TPPD has spread throughout much of the state



Texas Phoenix Palm Decline detected

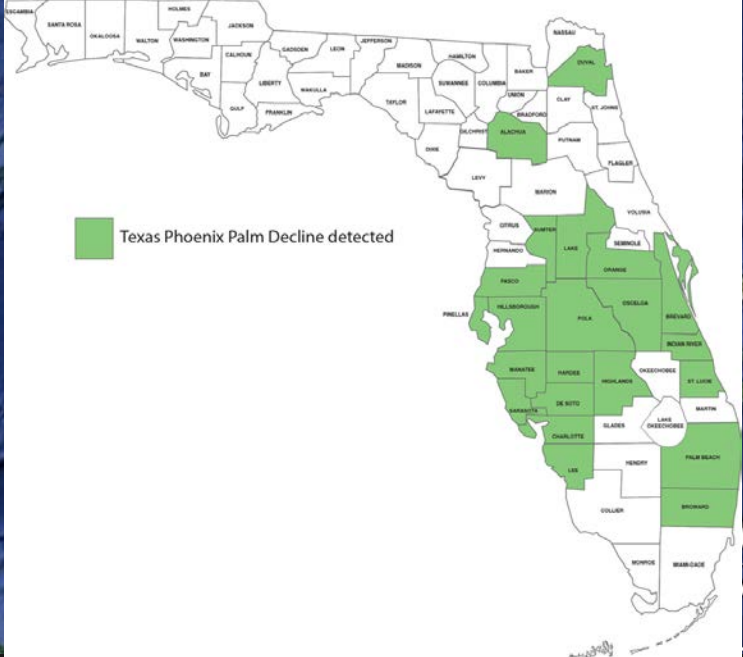
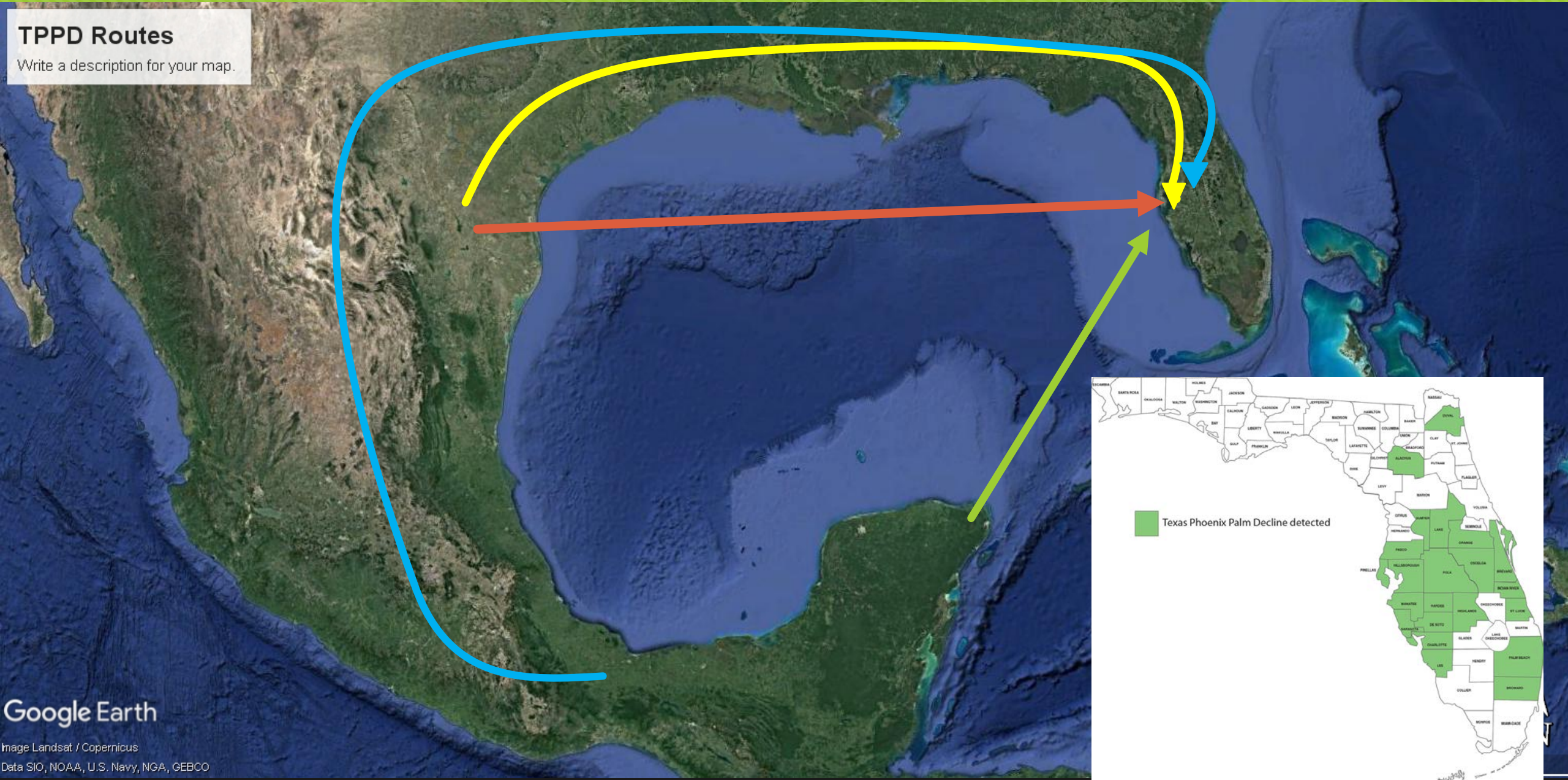
# Distribution

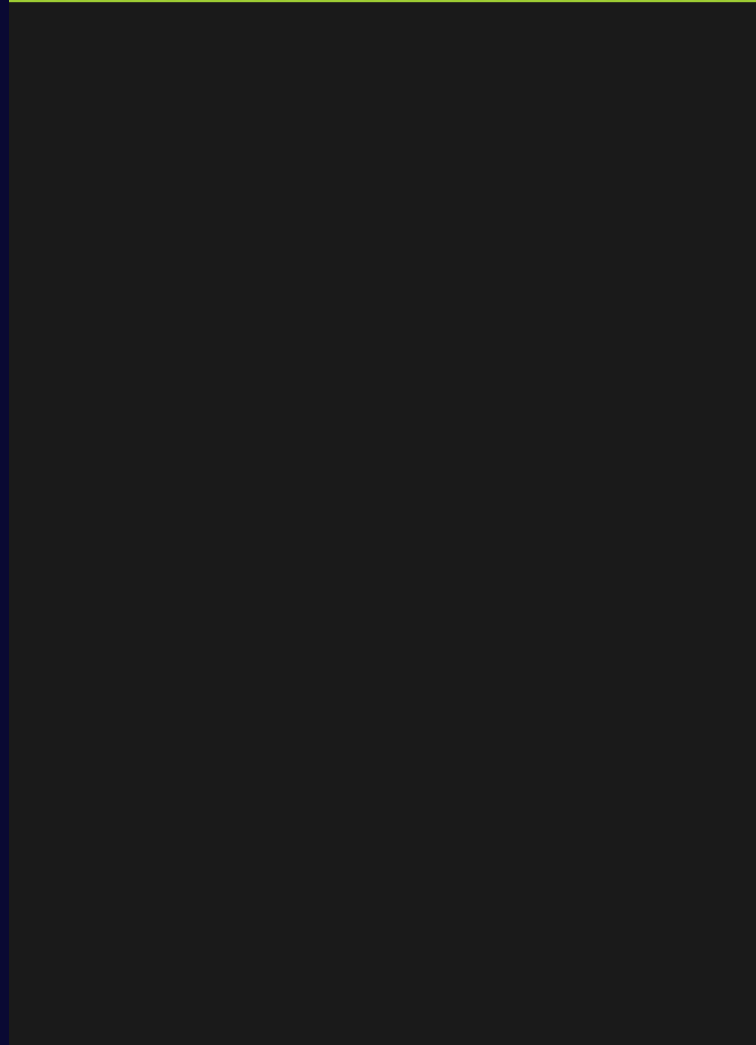
County	County	County
Duval	Brevard	Palm Beach
Alachua	Indian River	Broward
Sumter	Manatee	<b>Okeechobee*</b>
Lake	Hardee	<b>Martin*</b>
Orange	Highlands	<b>St. Johns*</b>
Pasco	St. Lucie	<b>Jefferson*</b>
Pinellas	De Soto	<b>Hernando*</b>
Hillsborough	Sarasota	<b>Seminole*</b>
Polk	Charlotte	
Osceola	Lee	28 total



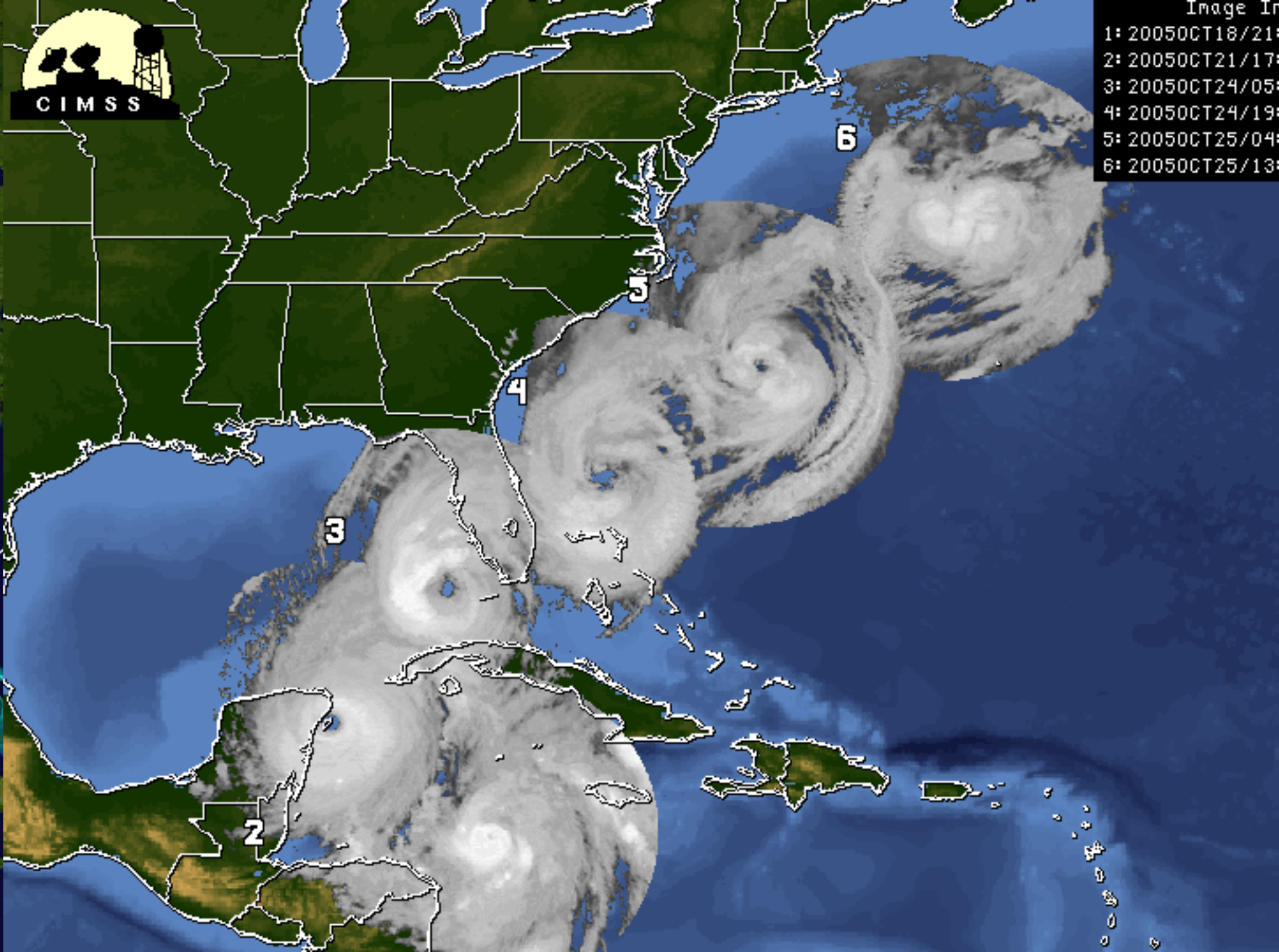
# TPPD Routes

Write a description for your map.









- Image In
- 1: 20050CT18/21
  - 2: 20050CT21/17
  - 3: 20050CT24/05
  - 4: 20050CT24/19
  - 5: 20050CT25/04
  - 6: 20050CT25/13



# Epidemiology – Insect Vectors

- Initially there were three species suspected as vectors of TPPD
  - *Haplaxius crudus*
  - *Ormenaria rufifascia*
  - *Omolicna joi*



# Epidemiology – Insect Vectors

- Current species being screened for ability to transmit TPPD
  - *Haplaxius crudus*
  - *Ormenaria rufifascia*
  - *Omolicna joi*
  - *Cedusa inflata*
  - *Dysmicoccus brevipes*
  - *Idioderma virescens*



# Epidemiology – Insect Vectors

Species	qPCR Results	Nested PCR
<i>Haplaxius crudus</i>	0/43	Negative
<i>Ormenaria rufifascia</i>	0/96	Negative
<i>Idioderma virescens</i>	0/5	Negative
<i>Dysmicoccus brevipes</i>	0/23	Negative
<i>Cedusa inflata</i>	0/4	Negative
<i>Omolicna joi</i>	N/A	N/A



# Epidemiology – Alternative Host

- Currently, herbaceous weeds and grasses are being surveyed for the presence of TPPD
  - *Bidens alba*: 0/20
  - *Parietaria floridana*: 0/20
  - *Cynodon dactylon*: 0/20
  - *Dactyloctenium aegyptium*: 0/20
- Immediately adjacent to TPPD infected palms





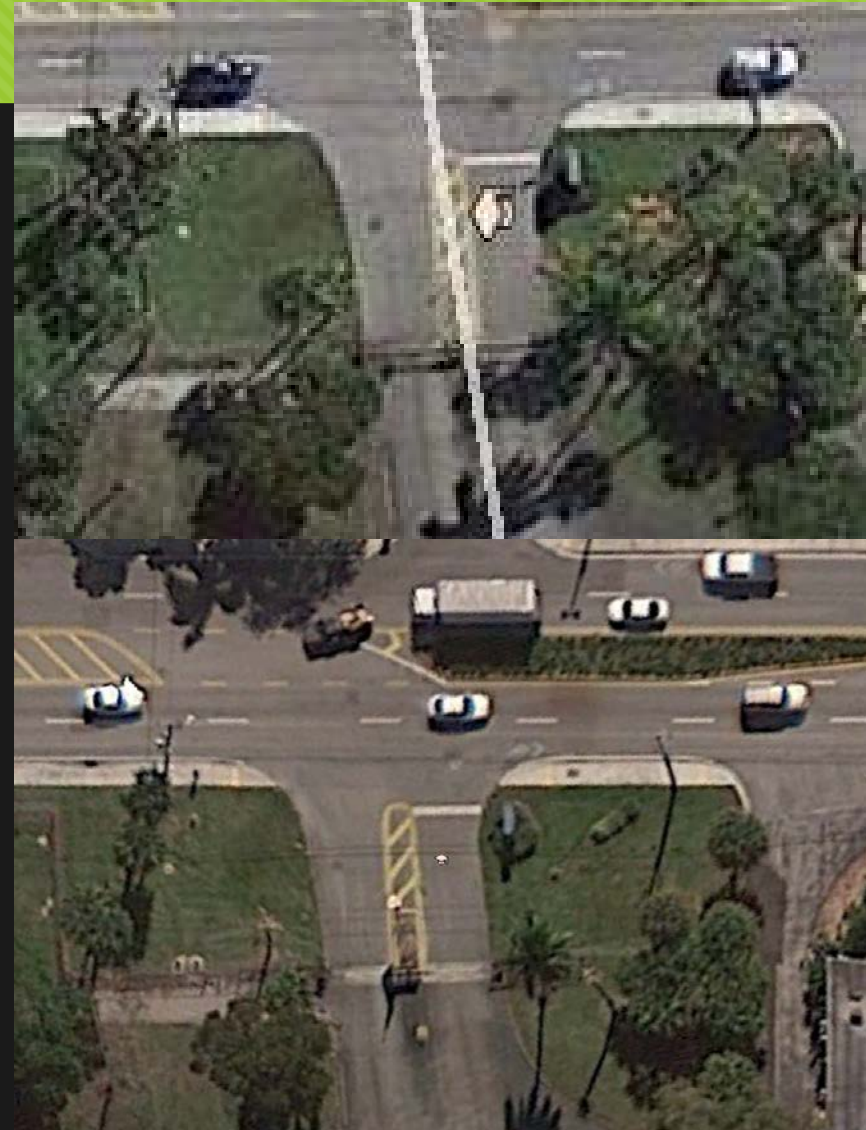
# Disease Progression

- TPPD first showed up at FLREC in 2014
- No nearby palms exhibited symptoms



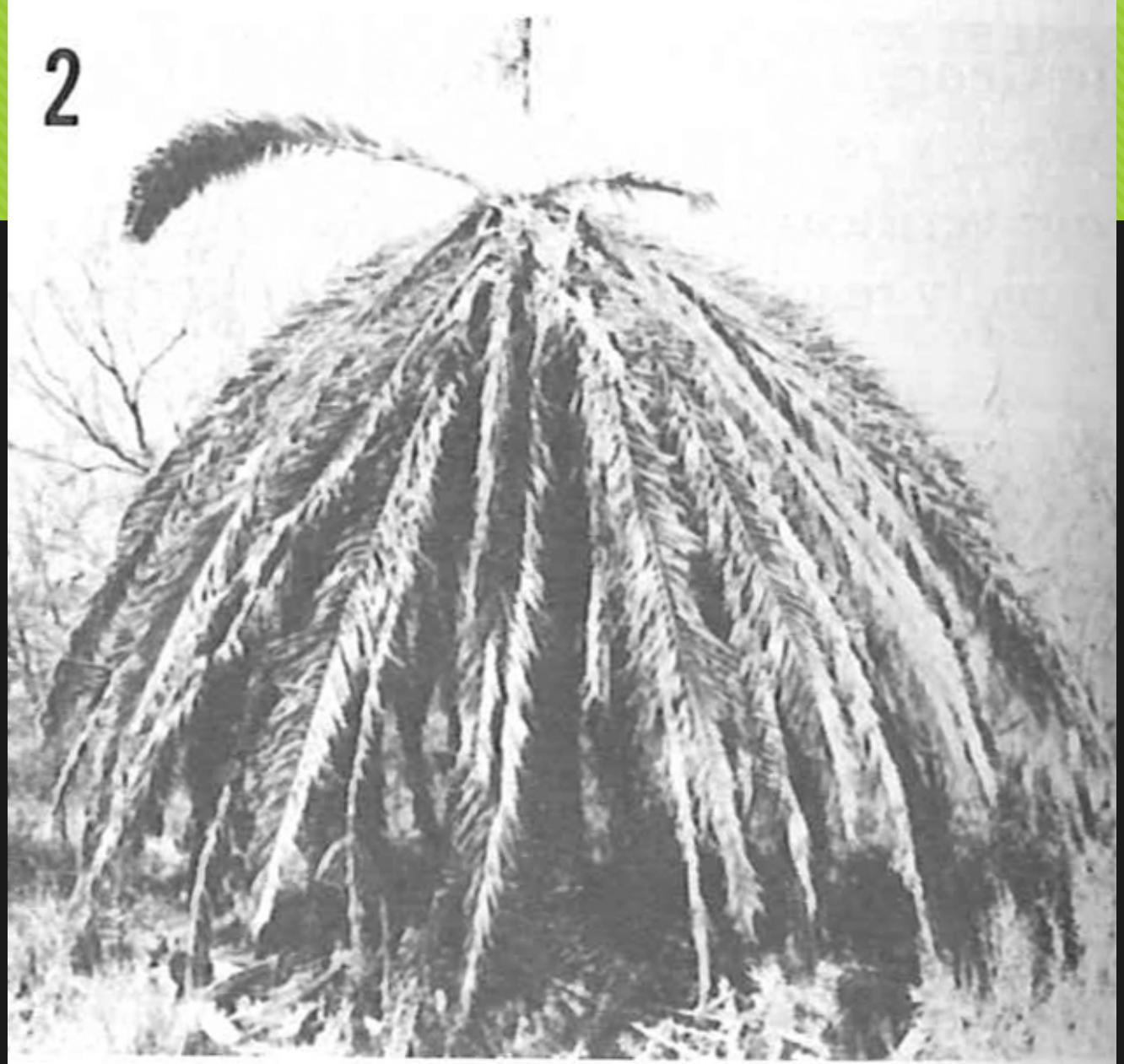
# Disease Progression - Front Entrance

- December 2014 = 5/30 positive
- February 2015 = 7/30 positive
- April 2015 = 9/30 positive
- June 2015 = 10/30 positive
- November 2015 = 14/30 positive
- May 2017 = 16/30 dead from TPPD



# Host Range

- First recorded in *Phoenix* palms
- Shortly after, infected *Sabal palmetto*
- Currently 10 confirmed susceptible hosts
- McCoy et al. 1980



# Host Range

Current Palm Species	No. of Samples
<i>Phoenix canariensis</i>	18
<i>Phoenix dactylifera</i>	16
<i>Phoenix roebelinii</i>	3
<i>Phoenix sylvestris</i>	107
<i>Sabal palmetto</i>	32
<i>Syagrus romanzoffiana</i>	17
<i>Adonidia merrillii</i>	0
<i>Bismarckia nobilis</i>	1
<i>Livistona chinensis</i>	1
<i>Carpentaria acuminata</i>	1



# Host Range

- Have begun sampling other palms to determine if resistant hosts exist
- All palms near disease outbreaks will be tested over time

Species	No. Tested	No. Positive
<i>Cocos nucifera</i>	30	0
<i>Serenoa repens</i>	3	0
<i>Sabal mauritiiformis</i>	4	0

TPPD

LY

*Sabal palmetto*

*Syagrus romanzoffiana*

*Phoenix roebelinii*

*Carpentaria acuminata*

*Bismarckia nobilis*

*Adonidia merrillii*

*Phoenix canariensis*

*Phoenix dactylifera*

*Phoenix sylvestris*

*Livistona chinensis*

*Cocos nucifera*

*Aiphanes lindeniana*

*Allagoptera arenaria*

*Arenga engleri* *Borassus flabellifer*

*Caryota mitis* *Caryota rumphiana*

*Chelyocarpus chuco*

*Copernicia alba* *Corypha taliera*

*Cryosophila warsecewiczii*

*Cyphophoenix nucele*

*Dictyosperma album*

*Dypsis cabadae* *Dypsis decaryi*

*Gaussia attenuata*

*Howea belmoreana*

*Howea forsteriana*

*Hyophorbe verschaffeltii*

*Latania lontaroides*

*Livistona rotundifolia*

*Nannorrhops ritchiana*

*Phoenix reclinata*

*Phoenix rupicola*

*Pritchardia affinis*

*Pritchardia pacifica*

*Pritchardia remota*

*Pritchardia thurstonii*

*Ravenea hildebrandtii*

*Syagrus schizophylla*

*Trachycarpus fortunei*

*Veitchia arecina*

# Symptoms

- In *Sabal palmetto*
  - Fruit drop/inflorescence necrosis
  - Lower leaves begin to exhibit a bright brown/bronze coloration
  - Discoloration progresses into younger leaves
  - Spear leaf collapse → bushy top appearance
  - Younger leaves will remain green for variable amount of time
  - “Nest” stage









# Symptoms

- In *Phoenix* palms, the symptoms between LY and TPPD are the same





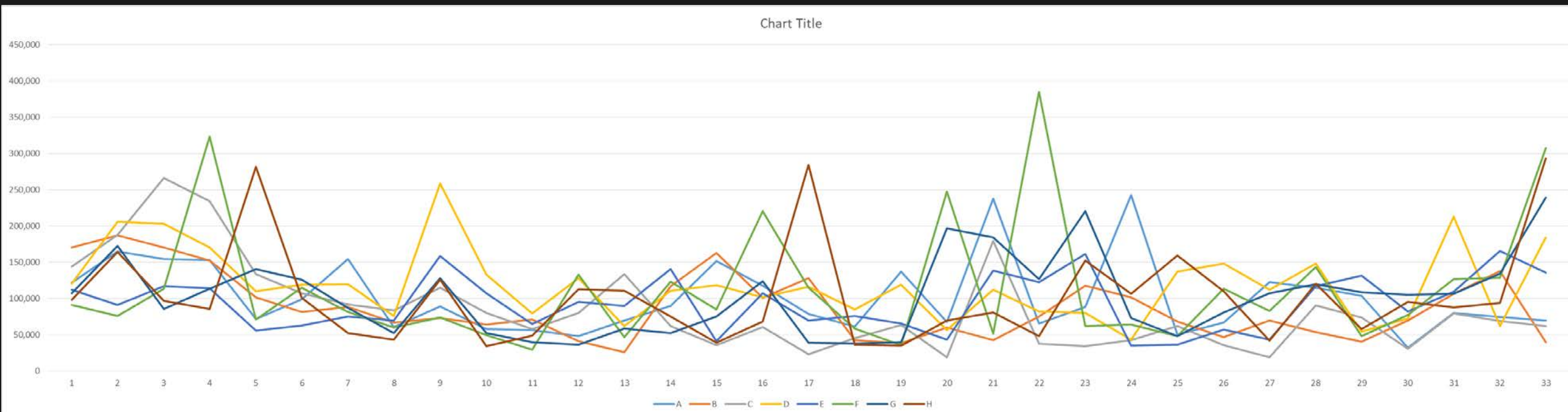
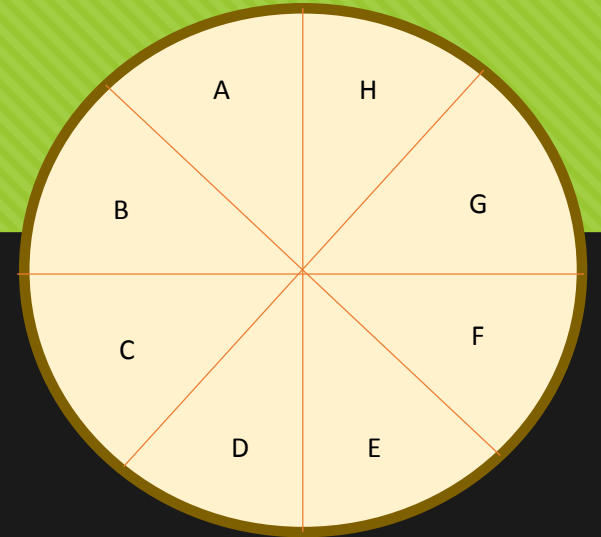
# Tissue Sampling

- Have begun mapping the phytoplasma in infected palms

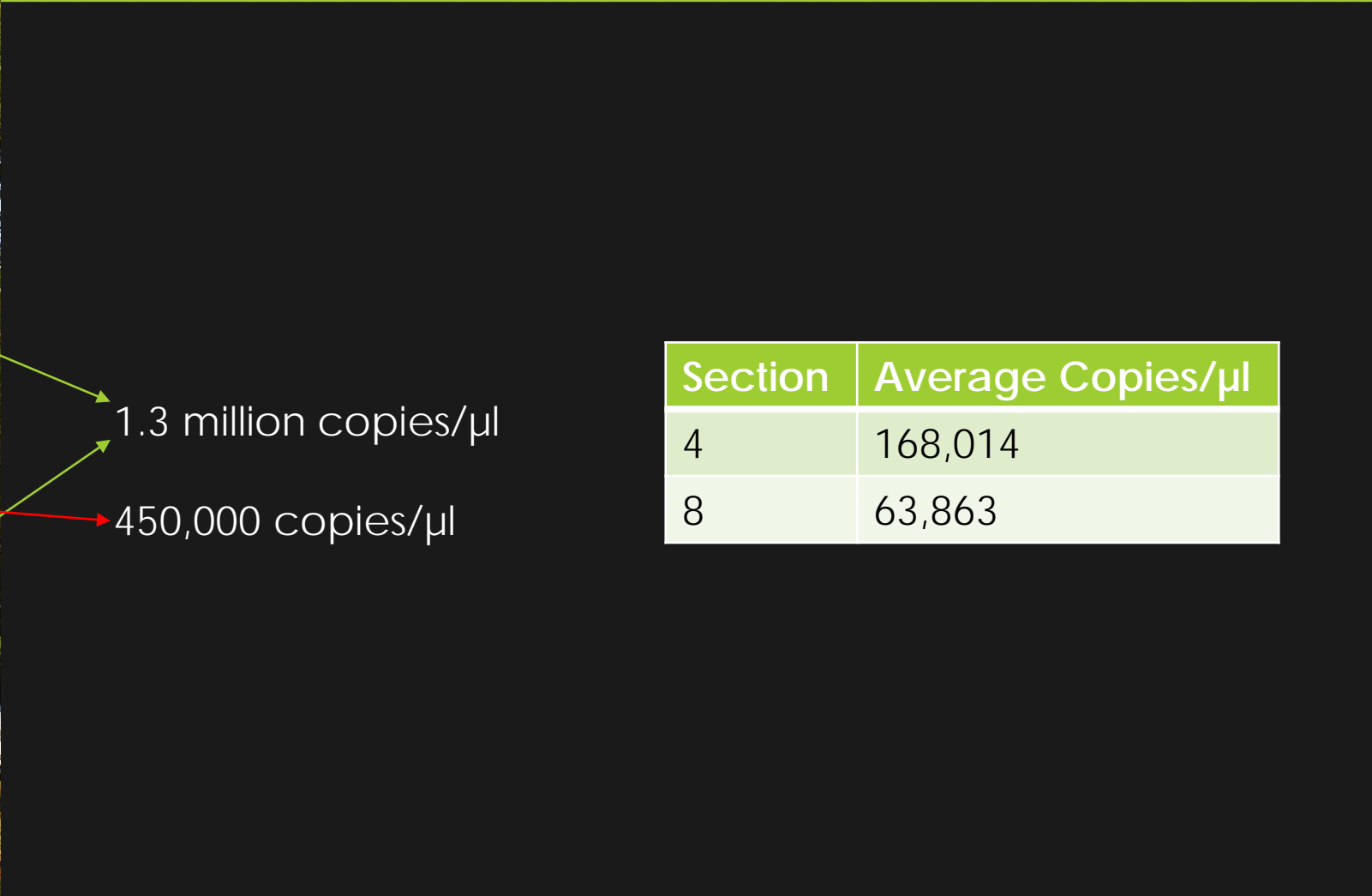
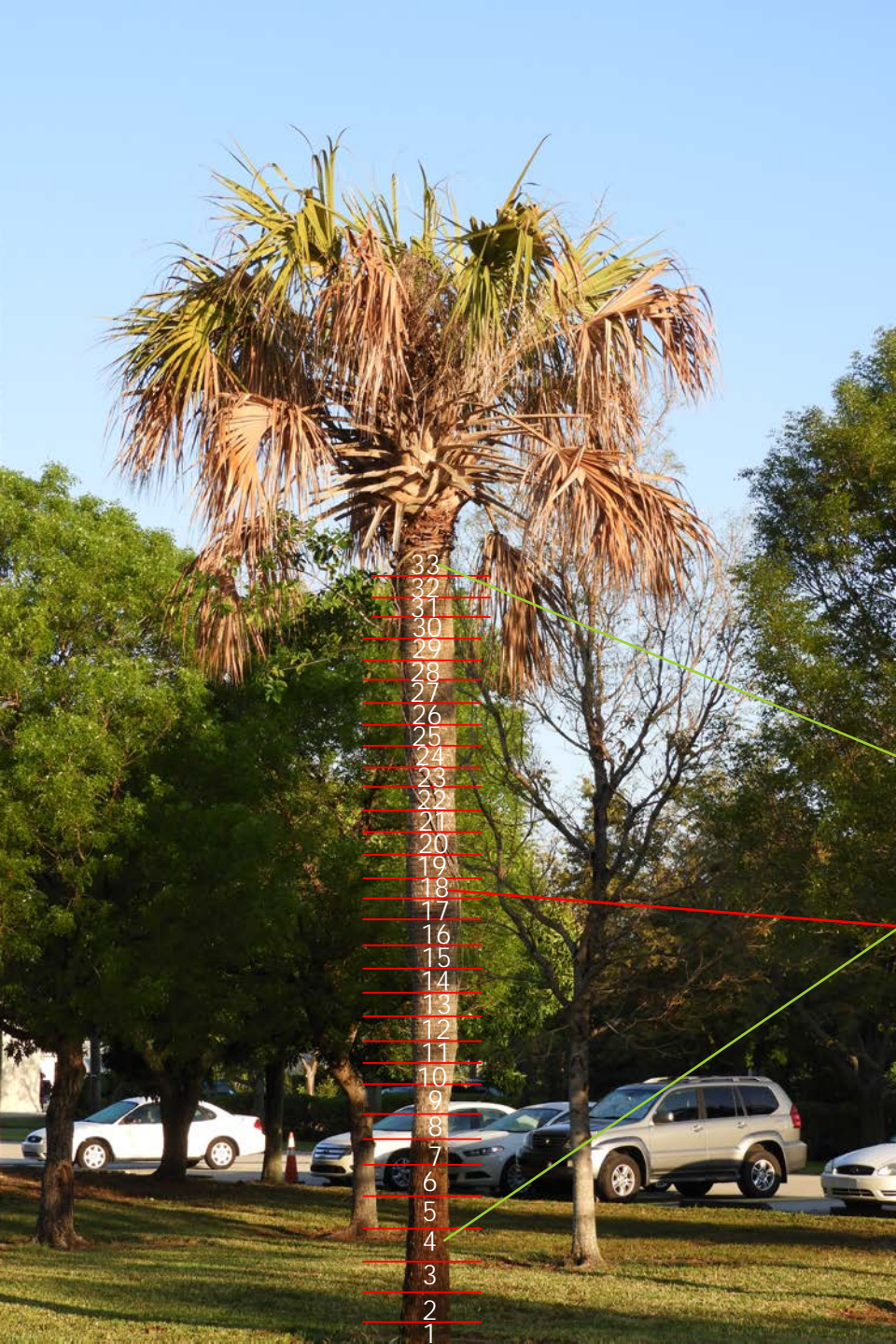




# Tissue Sampling







1.3 million copies/ $\mu$ l

450,000 copies/ $\mu$ l

Section	Average Copies/ $\mu$ l
4	168,014
8	63,863

# Thank you!

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