

NON-TRADITIONAL PATHWAYS: RETHINKING HOW INVASIVE SPECIES MOVE AROUND THE WORLD

**Dr. Trevor R. Smith – Director,
FDACS Division of Plant Industry
State Plant Regulatory Official**

**Invasion Science Research Symposium
May 7, 2024**



**DIVISION
of
PLANT INDUSTRY**

THE LAST 5 YEARS BY THE NUMBERS

2019

12 State and 15 US/Hemisphere Records = 27

2020

11 State and 14 US/Hemisphere Records = 25

2021

20 State and 12 US/Hemisphere Records = 32

2022

17 State and 14 US/Hemisphere Records = 31

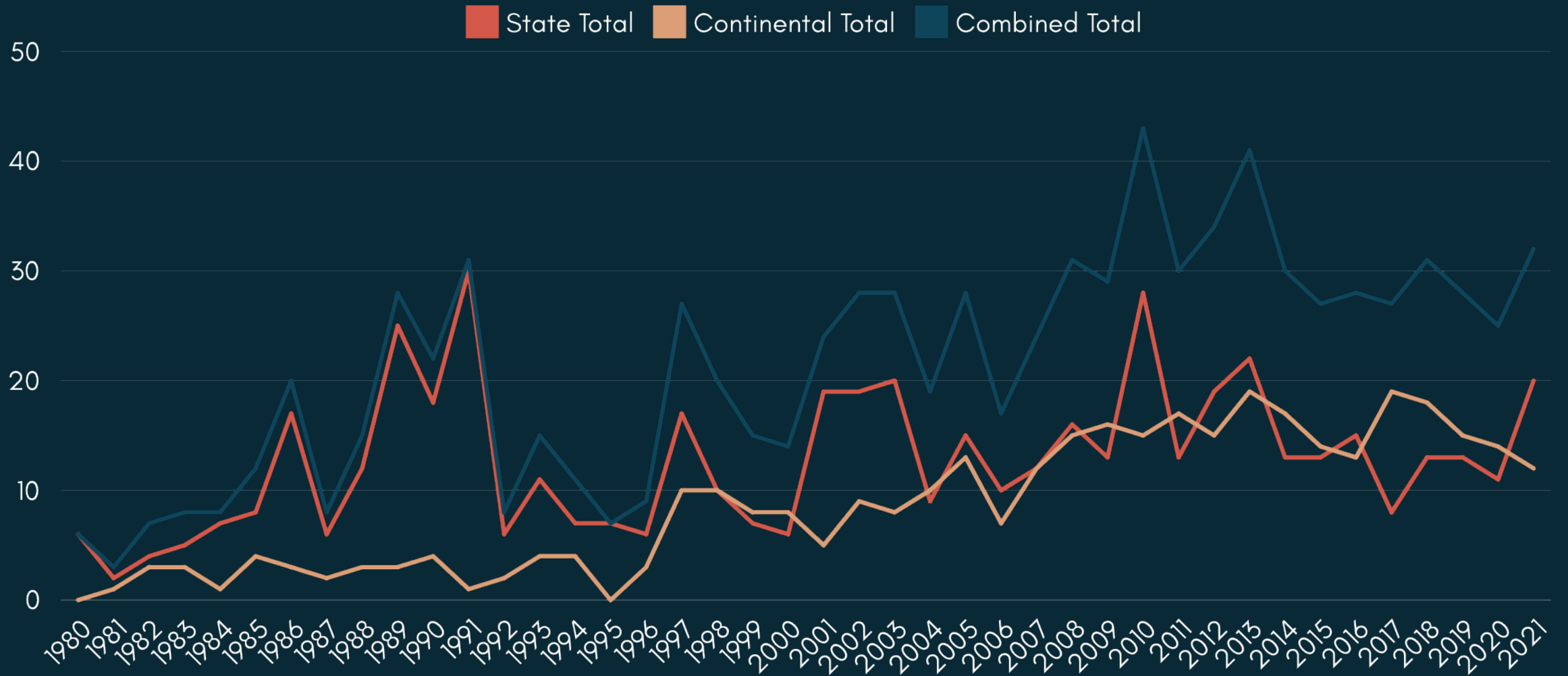
2023

12 State and 17 US/Hemisphere Records = 29

AVERAGE
2.5
NEW EXOTIC
ARTHROPODS
AND PATHOGENS
PER MONTH



FLORIDA: NEW ESTABLISHED EXOTIC ARTHROPODS, 1980 - 2021



ONE YEAR: FLORIDA (JAN 2021 – DEC 2021)

Scientific Name	Order
<i>Ectomerus triquetrus</i>	Acari: eriophyoid mite
<i>Leucoptera coffeella</i>	Lepidoptera: coffee leafminer
<i>Pychoderes vanduzeei</i> (Reitter)	Hemiptera: plant bug
<i>Iccius cylindricus</i>	Coleoptera: darkling beetle
<i>Entomobrya unifasciata</i>	Collembola: a springtail
<i>Rynadoa cardini</i> (Barber & Bruner)	Hemiptera: plant bug
<i>Teratophyloides pilosulus</i> (Carvalho)	Hemiptera: plant bug
<i>Trichosiphonaphis polygonifoliae</i>	Hemiptera: aphid
<i>Longidorus americanus</i>	Dorylamida: needle nematode
<i>Badnavirus Sweet potato pakakuy virus</i>	Pakakuy virus
<i>Emaravirus Camellia japonica associated emaravirus 2</i>	Emaravirus
<i>Mastrevirus Sweet potato symptomless virus 1</i>	Virus
<i>Physopella artocarp</i>	Rust
<i>Prospodium tabebuiae</i>	Rust
<i>Hemileia vasatrix</i>	Rust

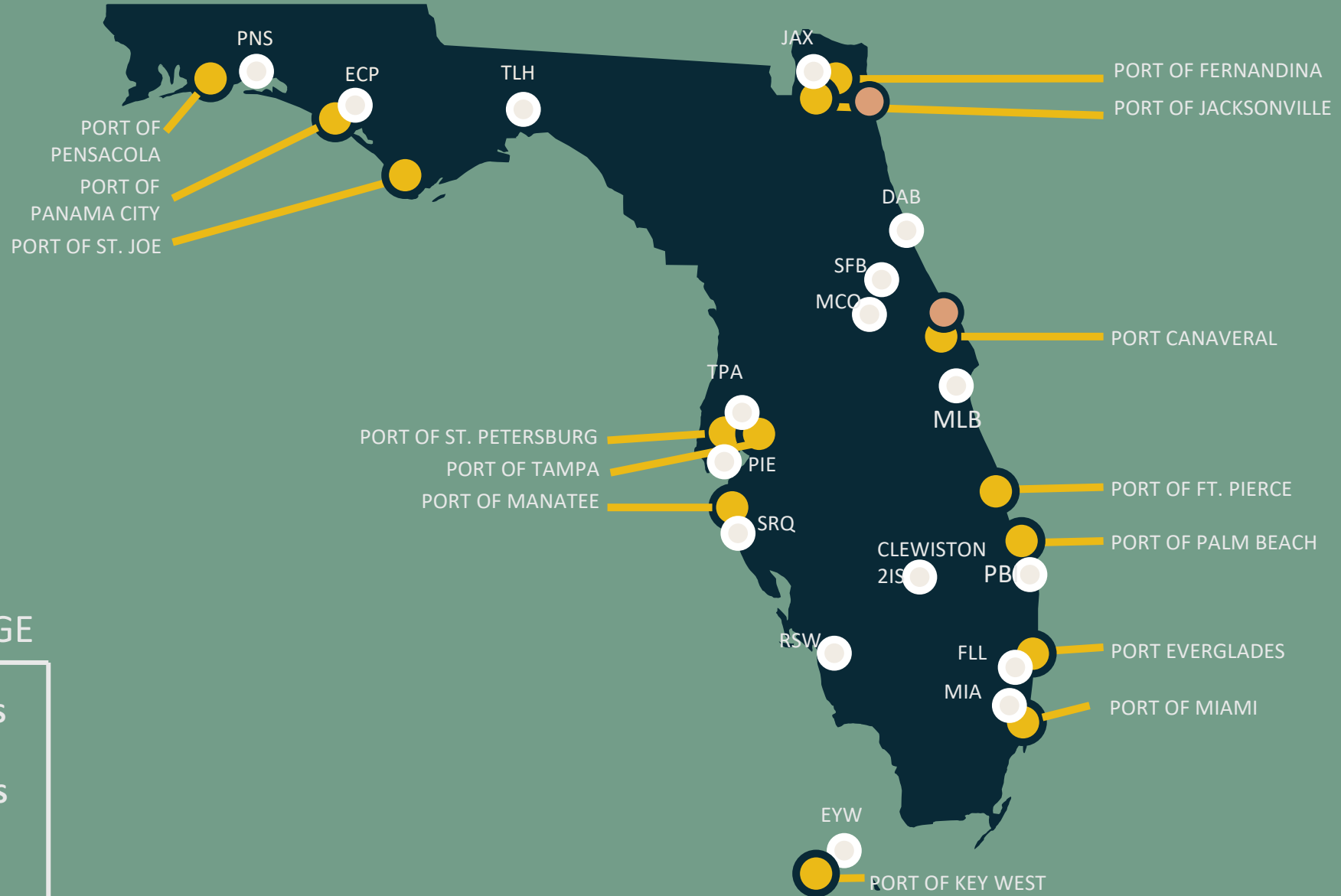
FLORIDA...

THE REGULATORY CHALLENGE

- 29 international ports of entry
- 90% cut flower shipments, and a third of all plant material entering the U.S. comes through Florida
- Climate gradient of temperate, subtropical and tropical with diverse host plants
- Over 200 million tons of perishable cargo enter Florida annually
- Over 130 million visitors each year

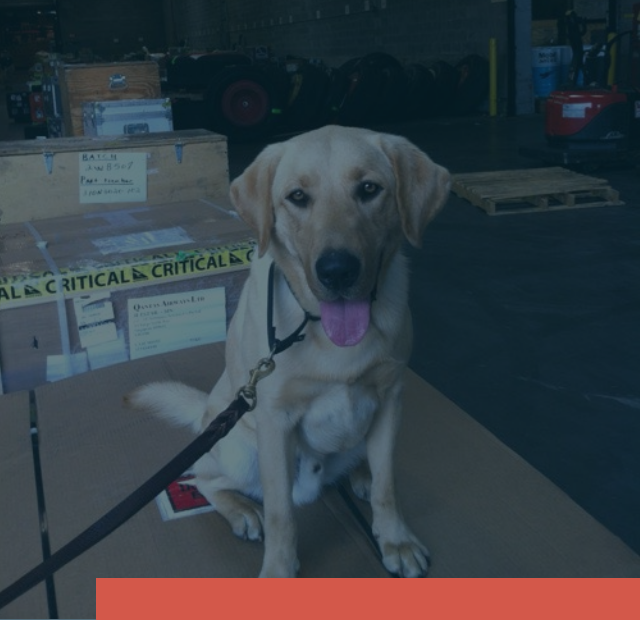


FLORIDA IS A HIGH-RISK, SENTINEL STATE



FLORIDA UNDER SIEGE

-  12 MARITIME PORTS
-  17 MAJOR AIRPORTS
-  2 SPACE PORTS



REGULATED PATHWAYS



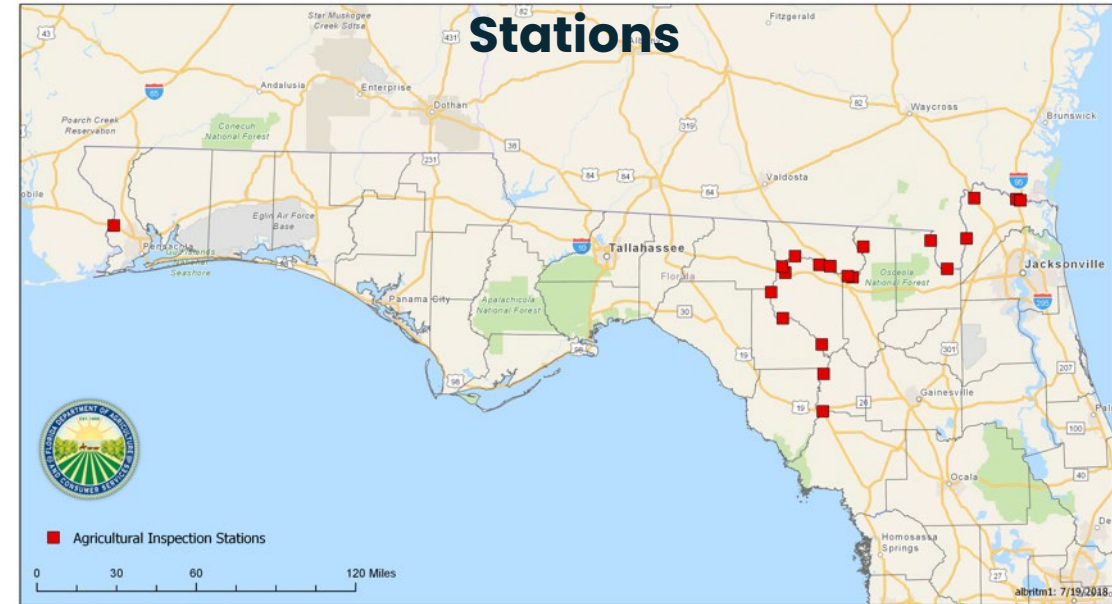
REGULATED PATHWAYS VEHICLES & TRUCKS

Interdiction Stations

Most common interception origins:

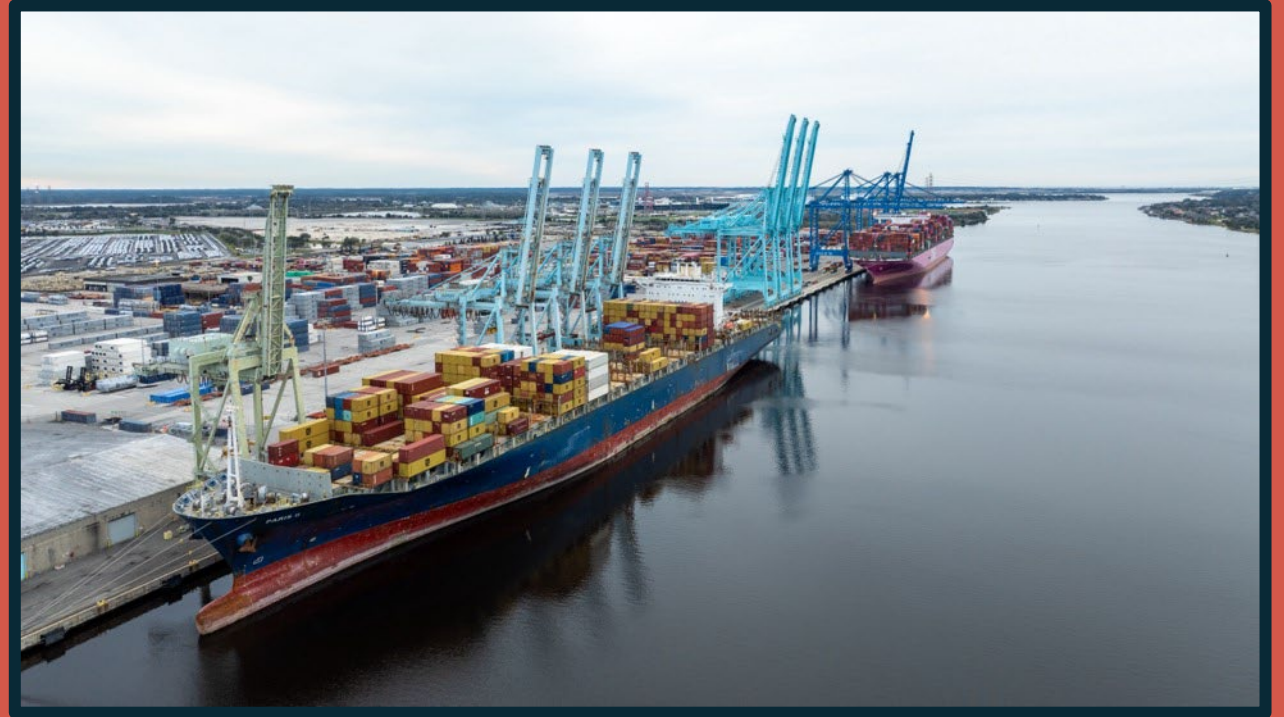
- California
- Mexico
- Central America
- South America
- Asia

Florida Agricultural Inspection Stations



REGULATED PATHWAYS

AIR & MARITIME CARGO



REGULATED PATHWAYS

PASSENGER TRAVEL

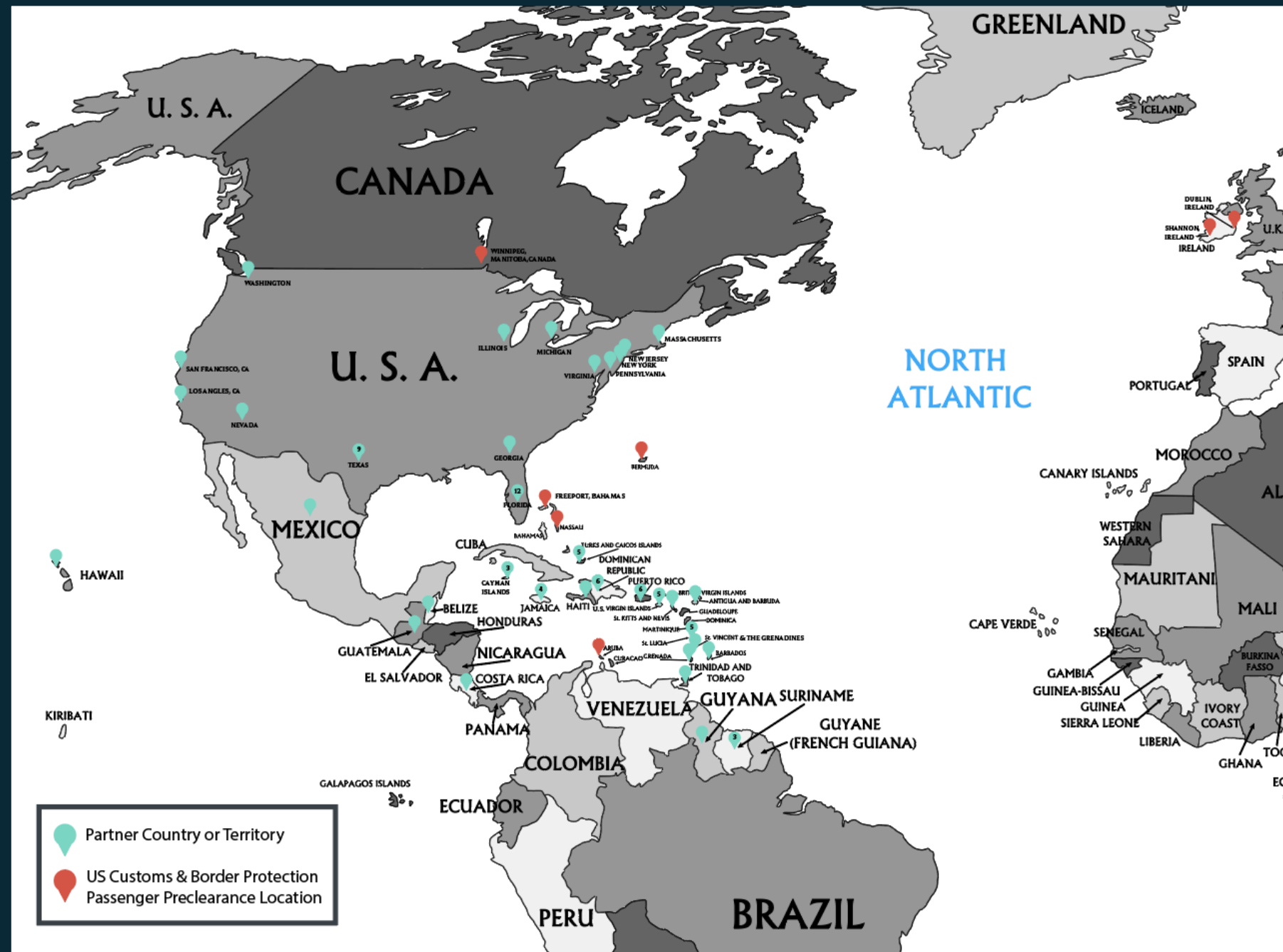


REGULATED PATHWAYS

DON'T PACK A PEST PROGRAM

- Program initiated in 2010
- Key Initiative in keeping Florida safe from agricultural pests
- Partnered with USDA, CBP, and other U.S. cities with major ports.

WHEN YOU TRAVEL . . .
DECLARE AGRICULTURAL ITEMS
& DON'T PACK A PEST



REGULATED PATHWAYS

E-COMMERCE/MAIL



REGULATED PATHWAYS

E-COMMERCE/MAIL

- Canine teams locate and inspect incoming packages to ensure they meet state guidelines and are free from pests and diseases.
- Operate in parcel shipping facilities and pest eradication programs.
- Trained to detect plant material.



DIVISION OF PLANT INDUSTRY

1-888-397-1517

CHEWIE

BREED - BLACK LABRADOR
D.O.B. - APRIL 6, 2021
WEIGHT - 70 LBS.
LIKES - TREATS, PLAYING
AND BEING THE CENTER
OF ATTENTION
HANDLER - KARIANNE RIVERA

— II —

AFTER COMPLETING A RIGOROUS TRAINING COURSE, CHEWIE JOINED The Florida Department of Agriculture and Consumer Services ON AUGUST 25th, 2022

DETECTION SPECIALTIES:
CHEWIE IS TRAINED TO FIND AGRICULTURAL MATERIALS IN BOXES, PALLETS AND TRUCKS AT COMMERCIAL SHIPPING FACILITIES THROUGHOUT THE STATE. HE EVEN WALKS ON A MOVING CONVEYOR BELT TO INSPECT PACKAGES.

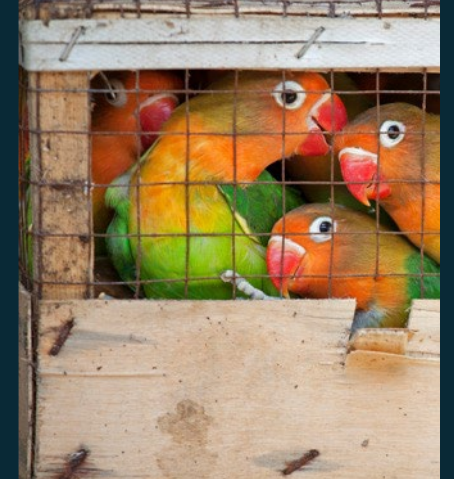




TRADITIONAL PATHWAYS

TRADITIONAL PATHWAYS

- Plant Material
- Commodities
- Pet Trade
- Lumber





NON-TRADITIONAL PATHWAYS

NON-TRADITIONAL PATHWAYS

BAMBOO STAKES



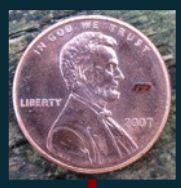
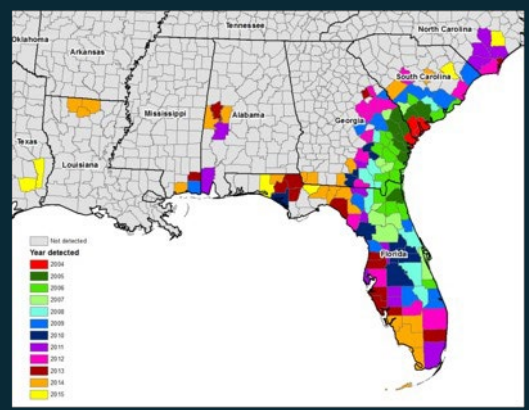
Bamboo stakes in plants



NON-TRADITIONAL PATHWAYS

SOLID WOOD PACKING & DUNNAGE

- Asian Longhorn Beetle
- Emerald Ash Borer
- Red Bay Ambrosia Beetle



NON-TRADITIONAL PATHWAYS

PET TRADE PARAPHERNALIA



ADAM H PUTNAM
COMMISSIONER

Florida Department of Agriculture and Consumer Services

Division of Plant Industry

ENTOMOLOGY SPECIMEN REPORT

Section 570.32 (1), F.S.

1911 SW 34th St./P.O. Box 147100, Gainesville, FL 32614-7100/(352) 395-4678/Fax (352) 395-4614

Sample Information

Sample Number **E2016-306-2**

Date Received **2/2/2016**

Priority: **URGENT**

Purpose: **Import Inspection**

Via State/Country **China**

Arthropod Determination

Determined By: **Skelley, Paul** Determination Date: **02-Feb-16**

Arthropod Order: **COLEOPTERA**

Disposition: **1 - Pinned**

Arthropod Family: **BOSTRICHIDAE**

Life Stage: **1 - ADULT**

Arthropod Genus: *Coccographis*

Determiners Comments:

REGULATORY SIGNIFICANT. Oriental wood borer related to powder post beetles, not a known pest, genus does not occur in the Western Hemisphere.

Arthropod Species: *nigrorubra*

Arthropod Subspecies:

Arthropod Descriptor: **Lesne**

Arthropod Common Name:

Confirmed by:

Confirmed Date:

Host Information **Not Verified**

Plant Family: **Theaceae**

Plant Part: **Stem & Gall**

Plant Genus: **Camellia**

Severity: **Slight**

Plant Species: **sinensis (L.) KUNTZE**

Collection Method: **Hand Catch**

Plants Involved/Affected: **5/1**

Acres Involved/Affected: **/**

Plant Common Name: **TEA**

Non Plant Host Common Name:

Botany Notes: **Labeled as tea twigs.**

Non Plant Host Order:

Non Plant Host Species:

Non Plant Host Family:

Non Plant Host Subspecies:

Non Plant Host Genus:

Non Plant Host Descriptor:

INTERCEPTION REPORT

ISSUED:
1 March 2016

Florida Department of Agriculture and Consumer Services
Division of Plant Industry

Pet wooden chew toys for rabbits and rodents

Paul Skelley, Paul.Skelley@FreshFromFlorida.com, Taxonomic Entomologist, Florida Department of Agriculture & Consumer Services, Division of Plant Industry

Recently a DPI inspector found wood borer pupae in Chinese stick bundles sold for rabbit chew toys in a local pet store. Further investigation by other inspectors around the state have produced 3 genera of Cerambycidae (long horned beetles) and 2 genera of Bostrichidae (powder post beetles) (Figures 2–6). Four of these genera do not occur in the New World. This diversity attests to the risks associated with this avenue of introduction.

Imported wooden products of any kind, especially those that are still covered with bark, may harbor invasive wood boring beetles. In the past, products that have been found infested include potpourri, bamboo stakes, artificial Christmas trees, small household decorations, sculptures, pallets, and shipping containers.

If looking for potential infestations, signs of damage include emergence holes, sawdust or frass in the bag or under the product, soft spots indicating galleries are just under the surface, or structural weakness. Gently peel into the soft spots or follow burrows to see if there are any current occupants. Gently try to break sticks. If a stick easily breaks, there was a weak spot often associated with a burrow or other damage. If a live insect is found, the product need to be treated to kill the insects and prevent the potential spread of the pest.

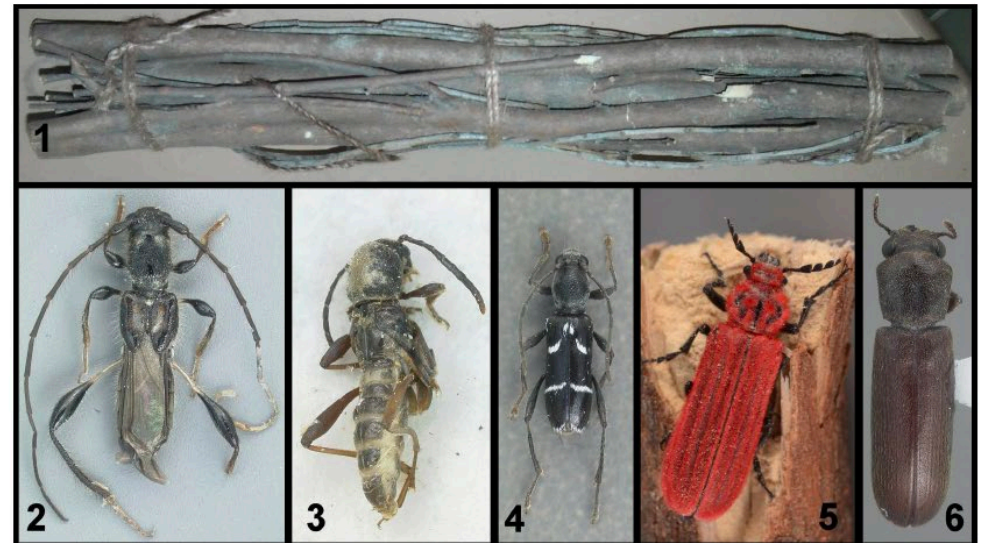


Figure 1. Pet chews (bundle of sticks) for rabbit and other rodents, available in many pet store chains. Figures 2–6. Beetles found in to date (8 February 2016) in Chinese rodent chew sticks. 2) *Glaphyra* sp. (Body Length = 9 mm). 3) *Chlorophorus* sp. (failed pupa-adult transformation, L= 9 mm). 4) *Amamicytus* sp. (L= 4.5 mm). 5) *Coccographis nigrorubra* Lesne (L= 15 mm). Photograph credit: Lyle Buss, UF. 6) *Lyctus* sp. (L= 5 mm).

DIVISION OF PLANT INDUSTRY
(352) 395-4700



POST OFFICE BOX 147100
GAINESVILLE, FLORIDA 32614-7100

1911 S.W. 34TH STREET
GAINESVILLE, FLORIDA 32608

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
COMMISSIONER ADAM H. PUTNAM

Center for Wood Anatomy Research
USDA Forest Service, Forest Products Laboratory
One Gifford Pinchot Dr.
Madison, WI 53726-2398

Sirs,

The Florida Department of Agriculture – DPI and USDA discovered a number of exotic pests being brought into the US with Chinese wooden pet chew toys, mostly small sticks for rodents. We have concerns about the identification of these sticks compared with the labeling. We'd like some level of identification on these product samples that will help us understand 1) if these products are correctly labeled and if they may contain multiple wood types, and 2) what the potential host(s) of these insects may be. Unfortunately, the samples are what they are; sticks. Any assistance is greatly appreciated.

On the following pages, I include a list of the associated samples. A copy of our insect identification report is included with each sample. Please refer to our sample numbers when reporting your findings. THANKS.

Please feel free to contact me should you have any further queries.

Sincerely yours,

Dr. Paul E. Skelley, Biological Administrator III
Florida State Collection of Arthropods
Florida Department of Agriculture - DPI
P.O.Box 147100
Gainesville, FL 32614-7100, USA

Phone: (352) 395-4678
E-mail: Paul.Skelley@freshfromflorida.com

E2016-0335: Mega Munch. Labeled as 'tea'. Would like to know if this might be correct. Sorry about the stick size and beetle damage.

E2016-0539: Lounging Logs. Labeled as 'pine', appears to be couple different types of wood, possibly not pine.

E2016-0693: Mini Munch. Labeled as 'tea', appears to have a couple different stick types.

General Sample: Mega Munch, bundled as sold from pet store in Florida. There may be different wood types.



NON-TRADITIONAL PATHWAYS

MISIDENTIFIED WOOD



United States
Department of
Agriculture

Forest
Service

Forest
Products
Laboratory

One Gifford Pinchot Dr.
Madison, WI 53726-2398

Date: August 19, 2016

Dr. Paul E. Skelley
Florida Department of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, FL 32614-7100

Dear Dr. Paul E. Skelley,

I have identified the specimen(s) you submitted to the Center for Wood Anatomy Research wood identification service. Your specimen(s) was/were received on 4/10/2016 and identification(s) was/were completed on 8/19/2016 the identification(s) is/are as follows:

1. E2016-0335 - Hardwood Not Camellia.
2. E2016-0539 - Not Pine. *Quercus* sp., *Eucalyptus* sp., *Camellia/Loropetalum* sp., *Platycarya* sp., possibly other genera.
3. E2016-0693 - Not Camellia. At least 3 different hardwoods.
4. General sample - *Camellia* sp. and other hardwoods.

Respectfully,

ALEX C. WIEDENHOEFT, PH.D.

E2016-0335: Mega Munch. Labeled as 'tea'. Would like to know if this might be correct. Sorry about the stick size and beetle damage.

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E2016-0693: Mini Munch. Labeled as 'tea', appears to have a couple different stick types.

General Sample: Mega Munch, bundled as sold from pet store in Florida. There may be different wood types.



NON-TRADITIONAL PATHWAYS

TILE & STONE IMPORTS

- More than 20,000 containers of imported tile from the Mediterranean each year.
- Insects, snails, seeds can hitchhike under plastic wrapping or on pallets/crates.



NON-TRADITIONAL PATHWAYS

TILE & STONE IMPORTS

- Spotted Lanternfly (*Lycorma delicatula*)
- Snails
 - Brown garden snail
 - *Xerolenta* sp.
 - *Ceruella* sp.
- Wood borers
 - *Ips typographus*
 - Longhorned beetle
 - Wood boring wasp – *Sirex noctilio*
- Flea beetles
- Weevils
- True bugs
 - Stink bugs
 - Seed feeding lygaeid



NON-TRADITIONAL PATHWAYS

CRAFT STORES



NON-TRADITIONAL PATHWAYS

CRAFT STORES



Boxwood wreath -
blight



Beetle larvae in
pinecone



Chinese tallow in
wreath



NON-TRADITIONAL PATHWAYS


VEHICLES

- Northern giant hornet, suspected of reaching North America in used cars from Korea.
- Yellow-legged hornet, possibly the same pathway. Limited distribution in coastal Georgia and South Carolina.
- *Granodomus lima* (Férussac), native to Puerto Rico, is one of the relatively few snail species recognized as an agricultural/horticultural pest.



NON-TRADITIONAL PATHWAYS

ARTIFICIAL TREE

 <p>Florida Department of Agriculture and Consumer Services Division of Plant Industry ENTOMOLOGY SPECIMEN REPORT</p> <p>Section 570.32 (1), F.S. 1911 SW 34th St./P.O. Box 147100, Gainesville, FL 32614-7100/(352) 395-4678/Fax (352) 395-4614</p> <p>ADAM H PUTNAM COMMISSIONER</p>	
<p>Sample Information</p> <p>Sample Number: E2019-5749-1 Date Received: 10/18/2019</p> <p>Priority: Routine Purpose: Survey Via State/Country:</p>	
<p>Arthropod Determination</p> <p>Arthropod Order: COLEOPTERA Determined By: Schnepf, Kyle Determination Date: 18-Oct-19</p> <p>Arthropod Family: CERAMBYCIDAE Disposition: 2 - Pinned</p> <p>Arthropod Genus: <i>Paranoplium</i> Life Stage: 2 - ADULT M</p> <p>Arthropod Species: <i>gracile</i> Determiners Comments:</p> <p>Arthropod Subspecies:</p> <p>Arthropod Descriptor: (LeConte, 1881) TRIOLGY. Species from California, does not occur in Florida. Branches from tree likely moved in from out of state. Cerambycids typically do not reinfest so specimens likely came into the state as eggs or larvae.</p> <p>Arthropod Common Name:</p> <p>Confirmed by: Confirmed Date:</p>	
<p>Host Information</p> <p>Plant Family:</p> <p>Plant Genus:</p> <p>Plant Species:</p> <p>Plant Common Name:</p> <p>Botany Notes:</p>	<p>Plant Part:</p> <p>Severity:</p> <p>Collection Method: Hand Catch</p> <p>Plants Involved/Affected: /</p> <p>Acres Involved/Affected: /</p> <p>Non Plant Host Common Name: None</p> <p>Non Plant Host Order:</p> <p>Non Plant Host Family:</p> <p>Non Plant Host Genus:</p> <p>Non Plant Host Species:</p>
<p>Collector/Sender Information</p> <p>Collection Date: OCT 1 2019</p> <p>Ed Blumenthal</p> <p>Sent Date: OCT 15 2019</p> <p>Ed Blumenthal</p>	<p>Specimen Location Information</p> <p>Nursery Number:</p> <p>Business/Individual Address:</p> <p>Walt Disney World, Swan Hotel</p> <p>1200 Epcot Resorts Blvd Lake Buena Vista, FL 32830 Orange USA</p> <p>Section - Township - Range:</p> <p>Latitude: 0 Longitude: 0</p>
<p>Collector/Sender Comments:</p> <p>Specimens found after treatment of plastic tree with real branches. Artificial tree. EB</p>	
<p>Send Report To:</p> <p>E Blumenthal (eblumenthal@masseyservices.com), S Halbert</p>	



NON-TRADITIONAL PATHWAYS

RUSTIC FURNITURE

- In 2016, the Minnesota Department of Agriculture (MDA) discovered rustic log furniture manufactured in China and sold in Minnesota was infested with the velvet longhorned beetle (VLB).
- Preferred hosts of VLB are reported to be apple (*Malus*) and mulberry (*Morus*).
- Over 30 larvae of varying sizes were recovered from 5 walnut logs (*Juglans*).
- Resulted in a national recall in all states.



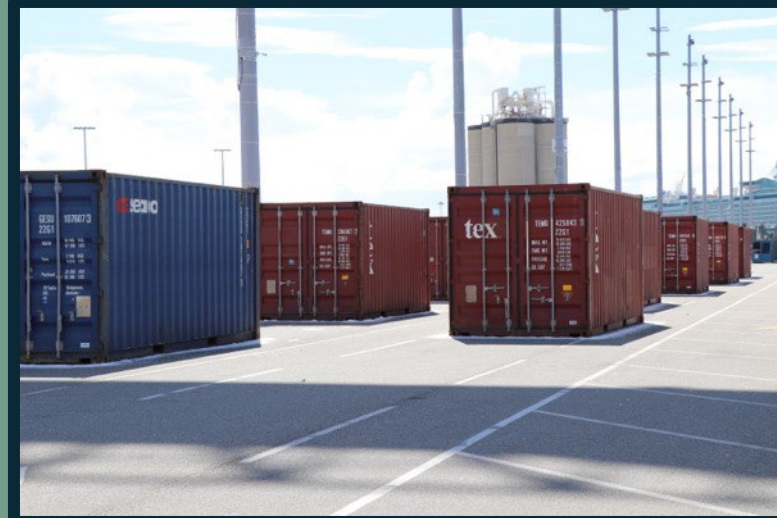
NON-TRADITIONAL PATHWAYS

SHIPPING CONTAINERS



Photo by A. Beaumont USDA-APHIS-PPQ

Wheat seed on underside of container. Also infested with four species of beetle.



Salt barriers around snail-infested containers.



NON-TRADITIONAL PATHWAYS

MISCELLANEOUS



- Religious Ceremonies
 - Santeria ritual as practiced by some individuals promoted use of snail juice to cure various medical ailments.
- Health Treatments
 - Ecuador immigrant promoted use of snail mucin for facial treatments.
 - Snail use documented in Wales in 1600–1700s. Skin of dead puppies, oils made of swallows, and juice of snails for various ailments.



NON-TRADITIONAL PATHWAYS

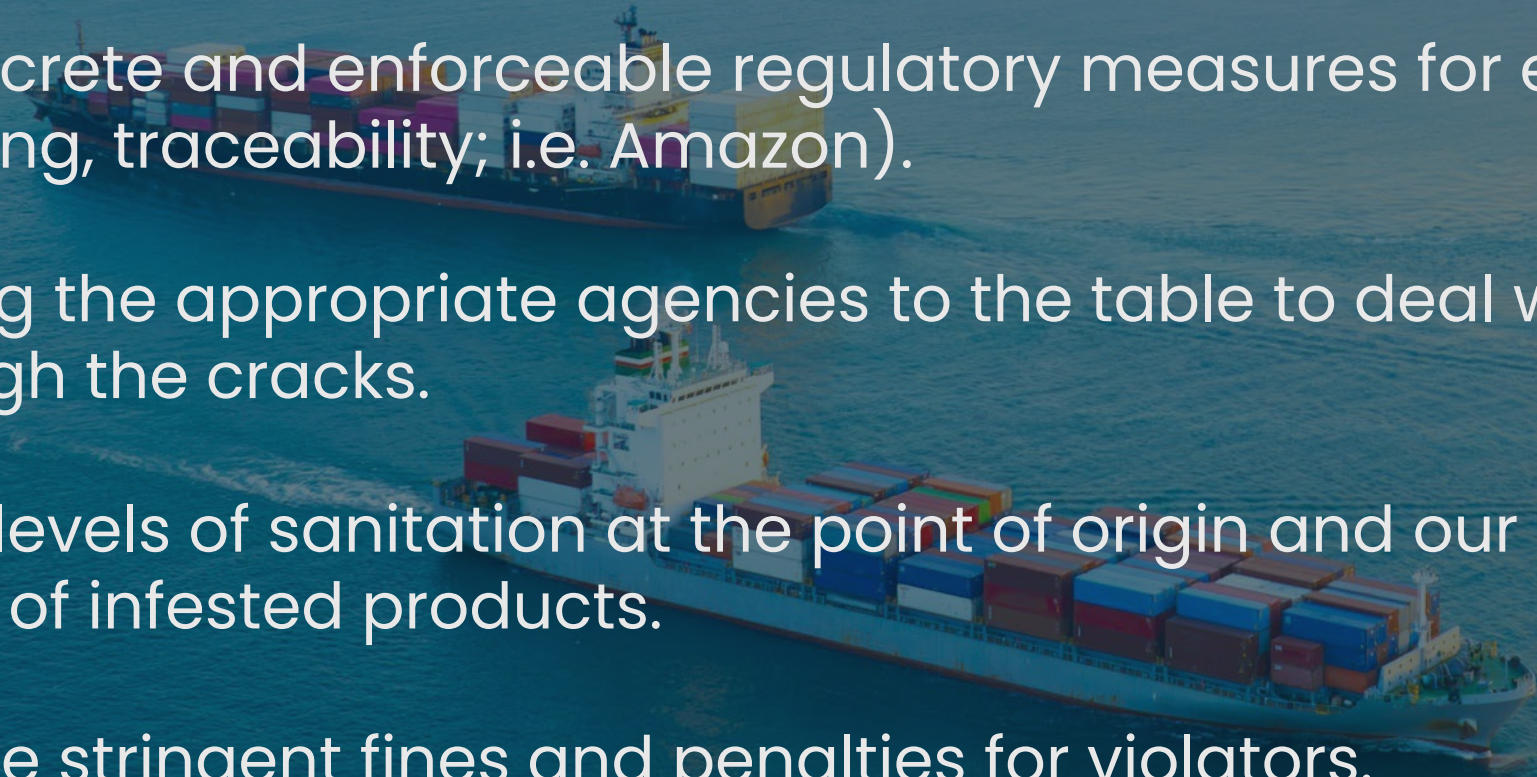
CHINESE SEEDS

Non-solicited seeds from China were reported in 2020. Millions of seed packets sent to hundreds of thousands of Americans in brushing scam.

- DPI Helpline call volume – 5,746
- Number of reports recorded – 2,397



CHALLENGES TO BE ADDRESSED

- Breakout of old paradigms (i.e. Ports, Plants, Produce, etc.).
 - Develop concrete and enforceable regulatory measures for e-commerce (Transshipping, traceability; i.e. Amazon).
 - Start bringing the appropriate agencies to the table to deal with pathways falling through the cracks.
 - Inadequate levels of sanitation at the point of origin and our continued acceptance of infested products.
 - Must be more stringent fines and penalties for violators.
- 
- An aerial photograph of two large container ships sailing on the ocean. The ships are heavily loaded with colorful shipping containers. The water is a deep blue, and the ships are moving from the top left towards the bottom right of the frame.

THANK YOU!

OVER 100 YEARS
OF RESPONDING
TO INVASIVE SPECIES



DIVISION
of
PLANT INDUSTRY