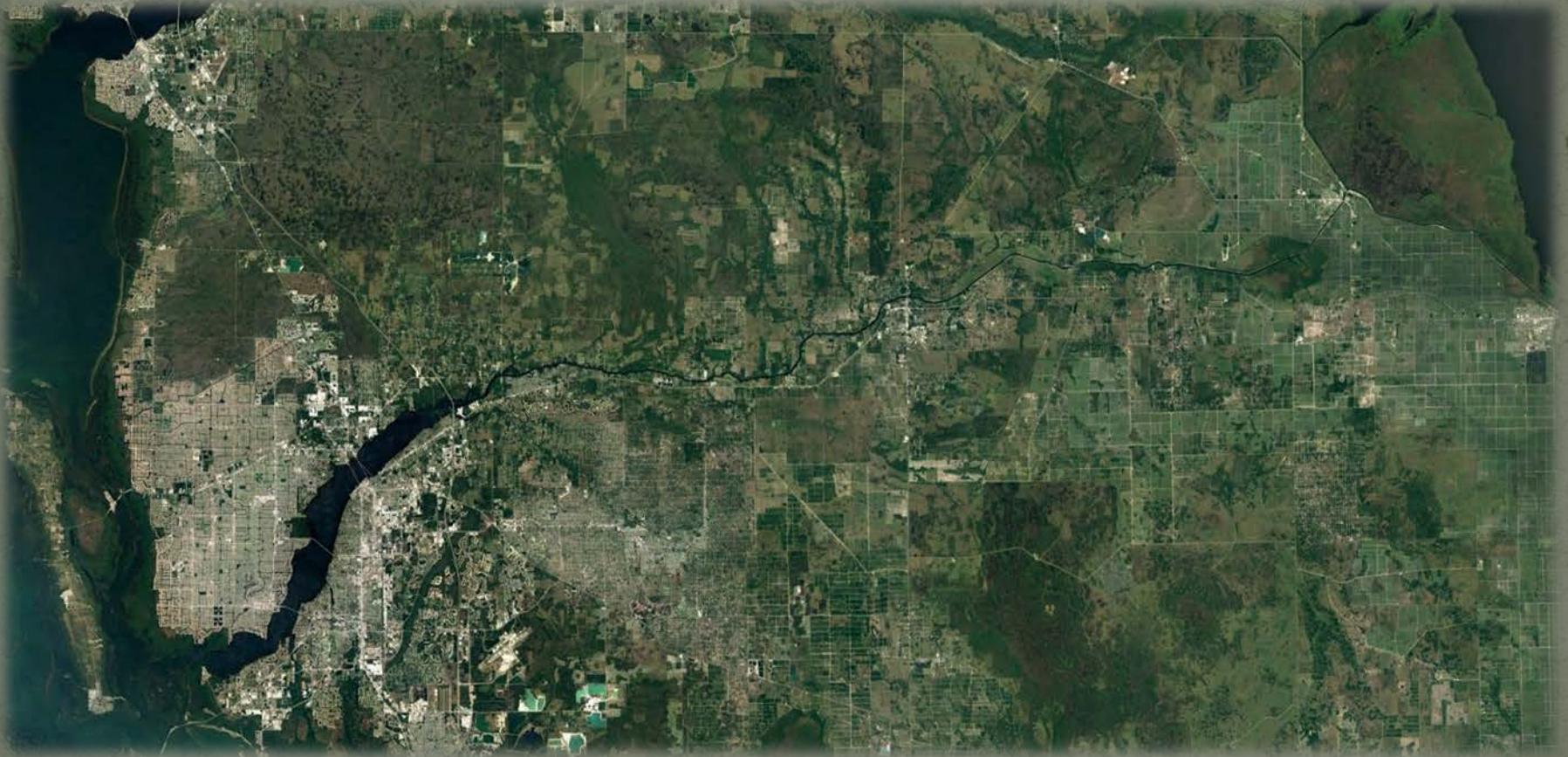
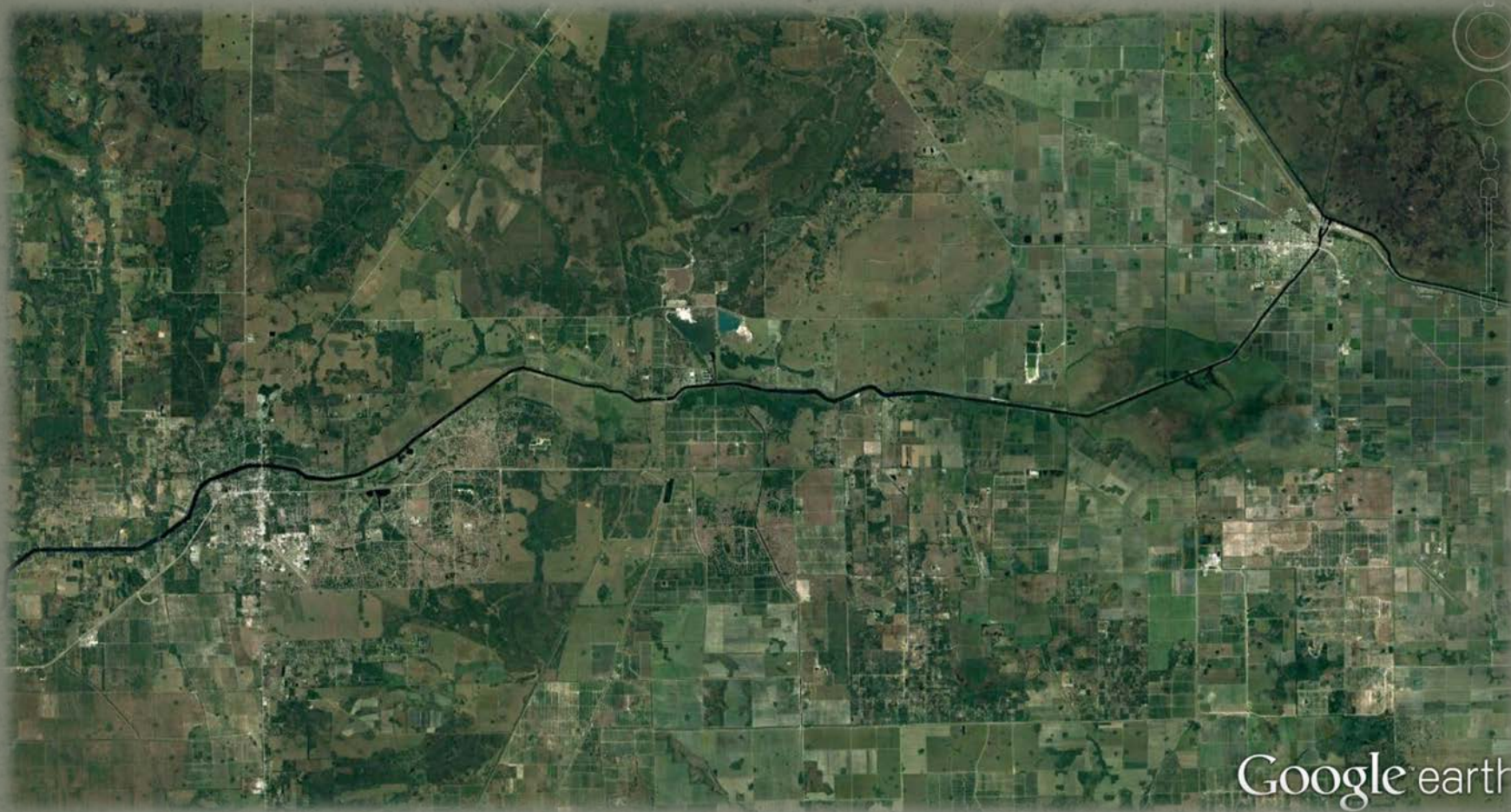


Aquatic Plant Management

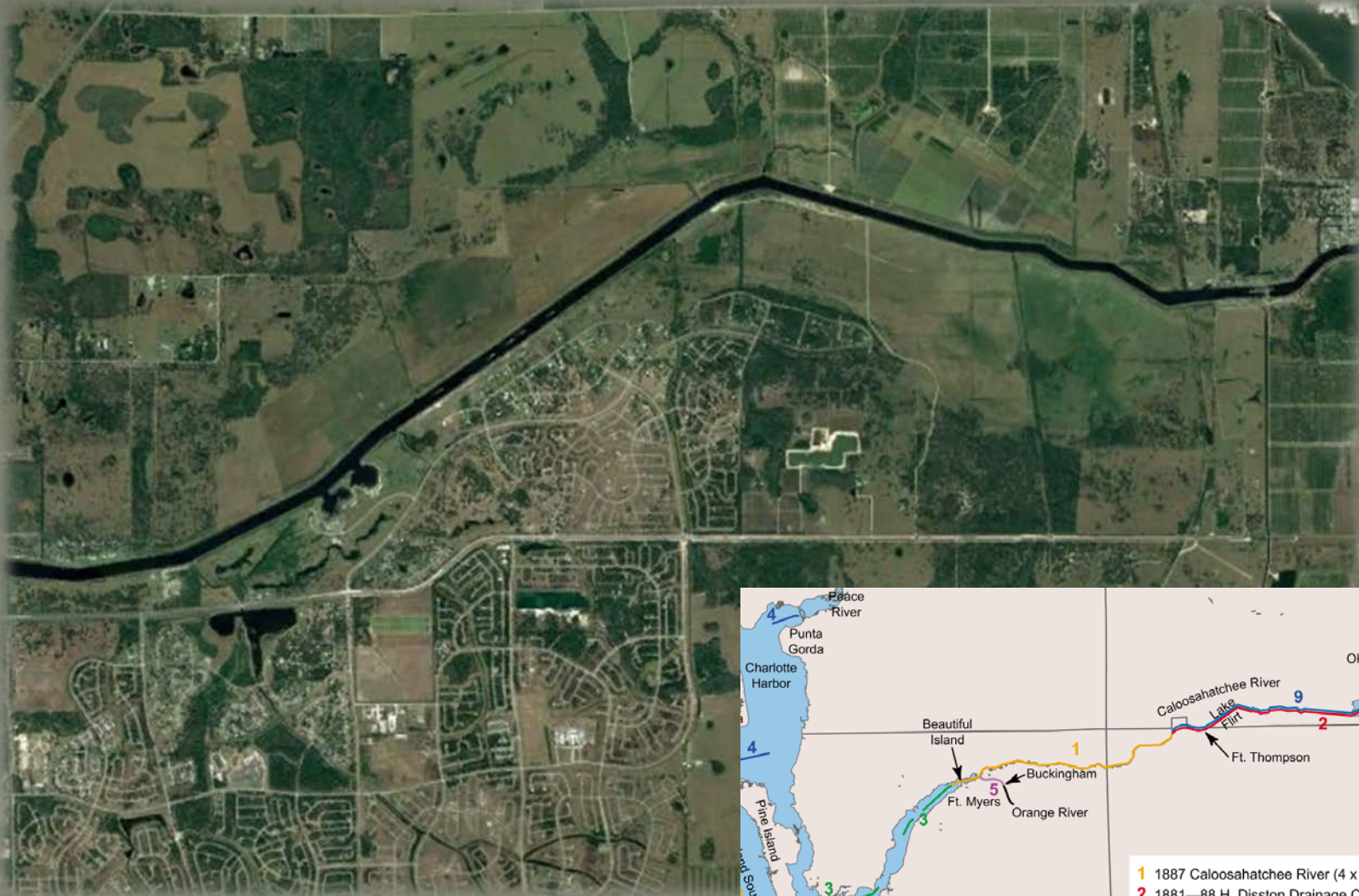


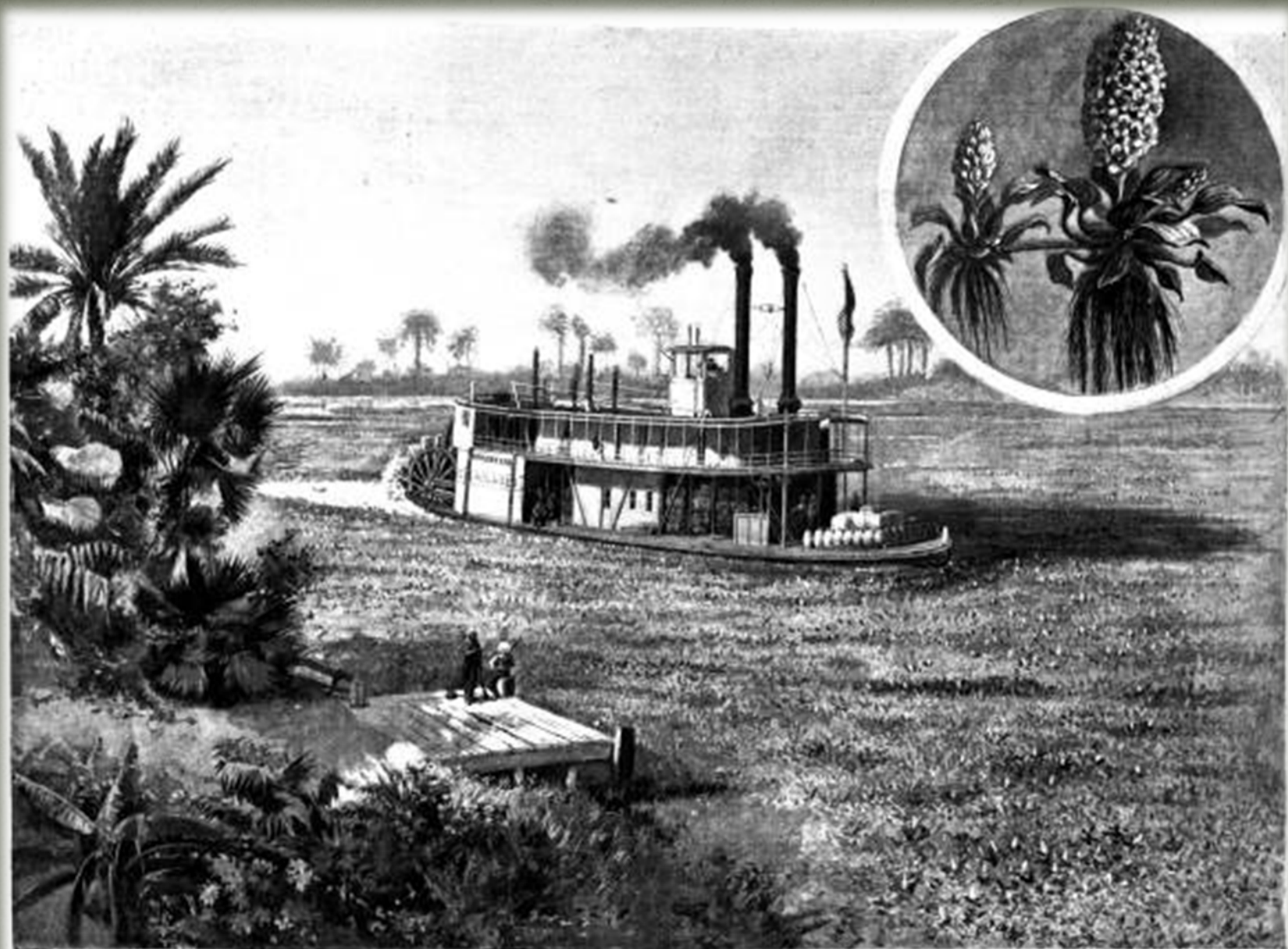
Caloosahatchee River (C- 43 Canal)





Google earth





WATER-HYACINTHS IN THE ST. JOHNS RIVER, FLORIDA.



Water Hyacinth, Florida.

3117.

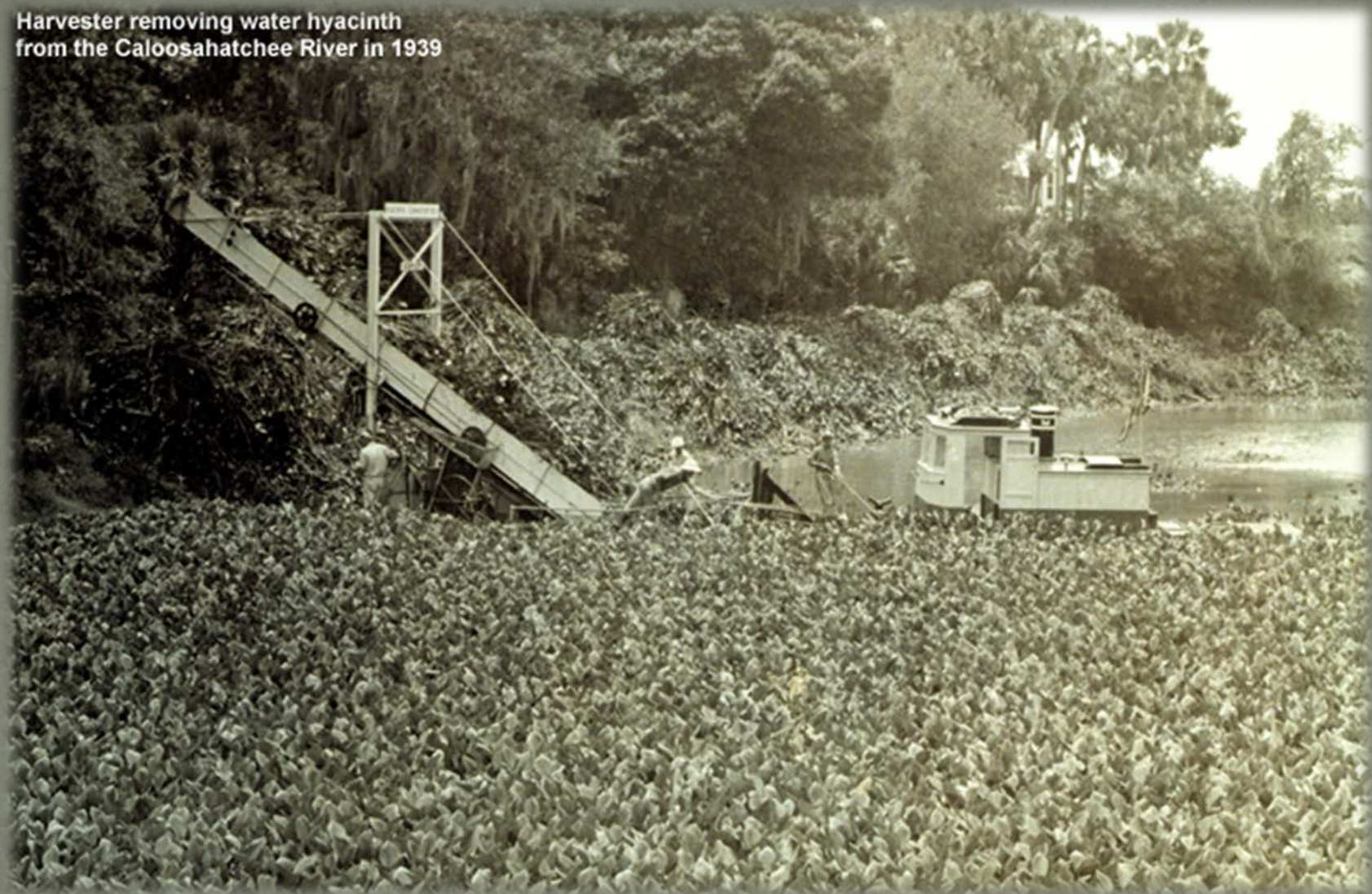
The Hippo Bill of 1910 “Lake Cow Bacon”



THE ATAVIST
AMERICAN HIPPOPOTAMUS

JON MOOALLEM

Harvester removing water hyacinth
from the Caloosahatchee River in 1939



The
Face
of
AMERICA

December 17, 1991 / Vol. 100, No. 50

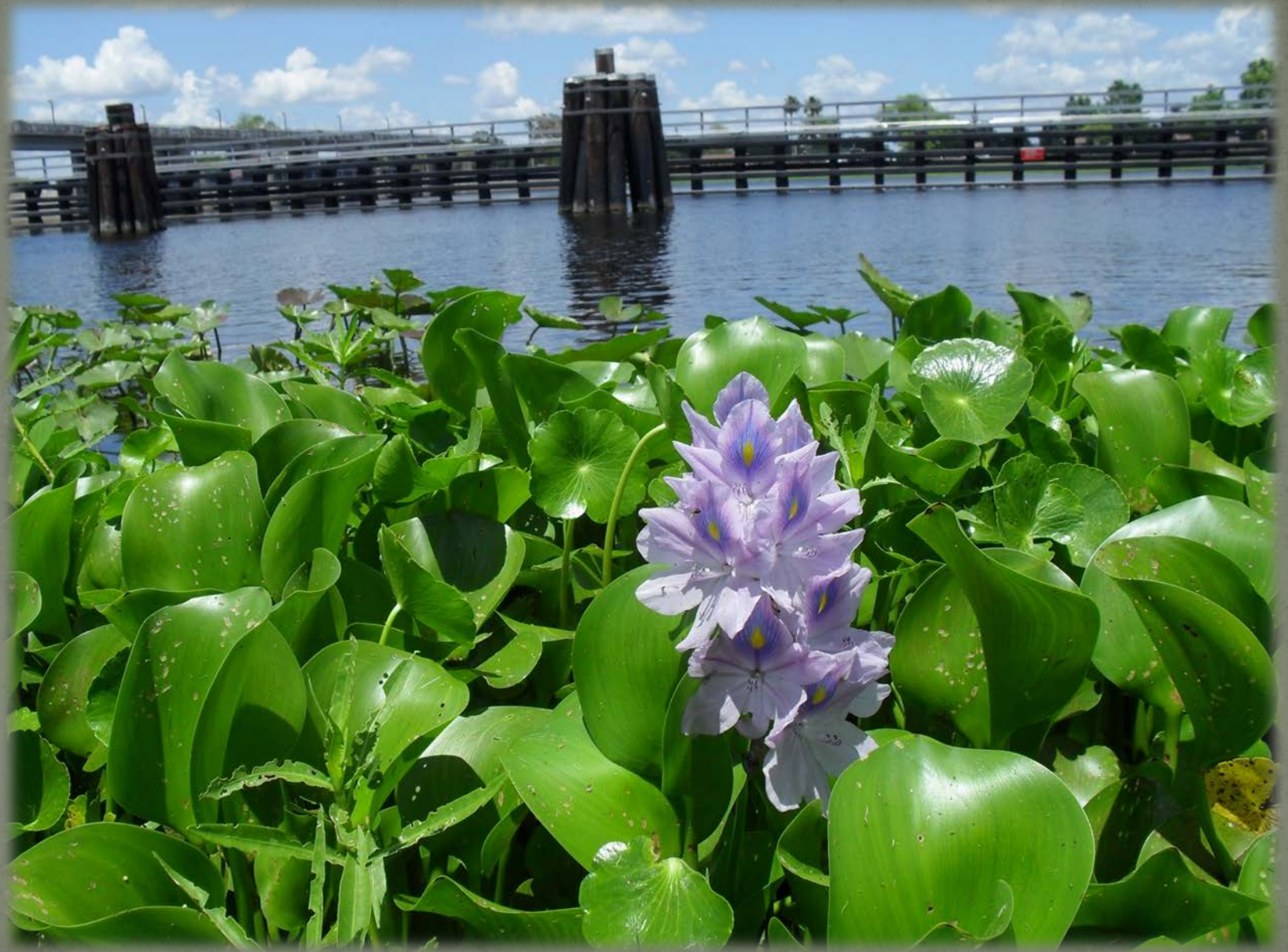
Watery Jungle

Trapped like bugs in a giant web, these craft wait for an offshore wind to free them. Their green prison is a floating island of water hyacinths sent downriver by a rainy spell. Besides being a headache to boatmen, the proliferating plants destroy fish spawning grounds, cause flooding and form noisome breeding spots for mosquitoes. Brought from South America for exhibit at the

New Orleans Cotton Exposition, the water hyacinth, with its orange-ender blossom, soon won many admirers. Among them, legend has it, a Florida woman who put the plant in her pond. As it rapidly multiplied, she turned the surplus into the nearby St. Johns River. Within ten years the hyacinths had covered a water area more than half







Water Hyacinth
Eichhornia
crassipes



Frog's-bit
Limnobium
spongia



Frog's-bit

Limnobium spongia



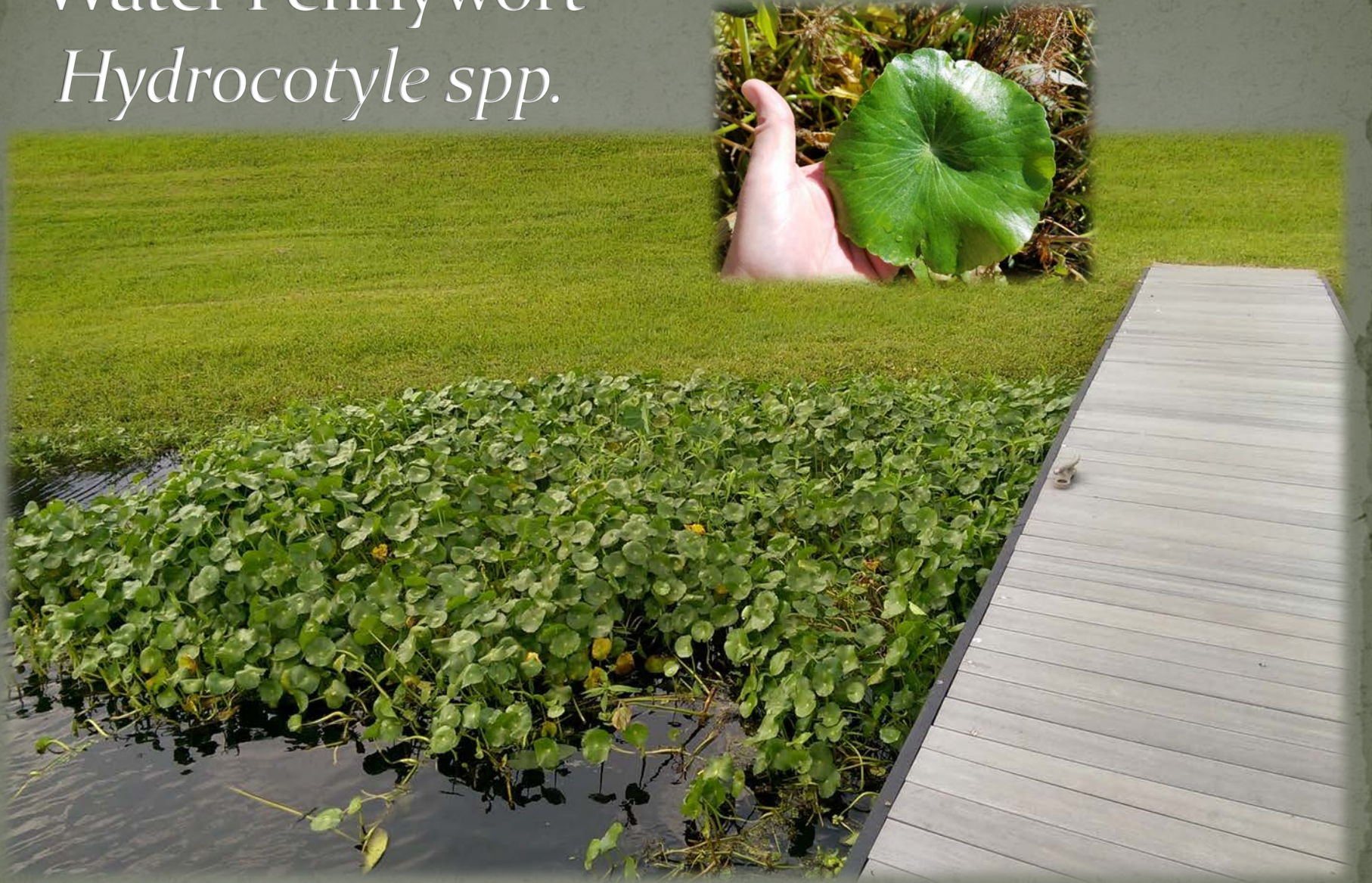


What plant species?



Water Pennywort

Hydrocotyle spp.



Water Lettuce *Pistia stratiotes*

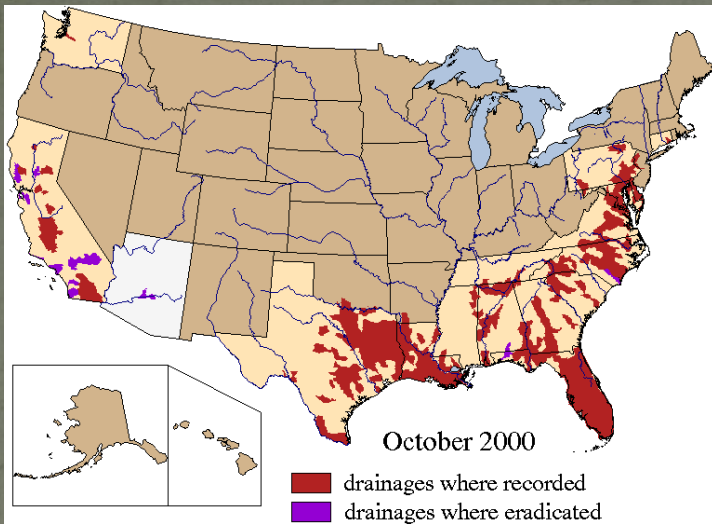






Hydrilla verticillata





Hydrilla verticillata



Hygrophila polysperma



East Indian hygrophila
Hygrophila polysperma
Photo by Ann Murray
Copyright 1999 Univ. Florida





Hygrophila



Red Ludwigia



Red Ludwigia – *Ludwigia repens*



red ludwigia
Ludwigia repens
Photo by Ann Murray
© 2001 University of Florida

Muskgrass – *Chara* species



Southern naiad

Najas guadalupensis

Najas guadalupensis
1996 Kerry Dressler



Limnophila

Limnophila sessiliflora



limnophila
Limnophila sessiliflora
Photo by Jeff Schardt
© 2009 FWC Invasive Plant Management Section



Parrot feather

Myriophyllum aquaticum



Tape grass

Vallisneria americana

















Roundleaf toothcup

Rotala rotundifolia



Roundleaf toothcup
Rotala rotundifolia
Photo by Colette Jacono
© 2012 University of Florida



Roundleaf toothcup
Rotala rotundifolia
Photo by Colette Jacono
© 2012 University of Florida

Bacopa species

Smooth water hyssop
Bacopa monnieri



Lemon bacopa
Bacopa caroliniana



Water lilies
Spatterdock, cow lily
Nuphar advena



American lotus - *Nelumbo lutea*



American lotus
Nelumbo lutea
Photo by Ann Murray
© 2001 University of Florida

LOOK INSIDE THE FLOWERS ... to separate the introduced floating-hearts from the Florida natives ...

1. Flowers densely covered with hair on the inner surface; flowers 2.5 - 3.7 cm wide *Nymphoides indica* (2)
1. Flowers without hair (excepting a few radiating from center); flowers 0.75 - 2.4 cm wide .. (3)
2. Petals bearing a ruffled crest (like a rooster's comb) down the center *Nymphoides cristata* (3)
2. Petals without a median, ruffled crest
3. Leaf undersurface rough, veins prominent; leaves to 15 cm long; plants larger, sturdy *Nymphoides aquatica*
3. Leaf undersurface smooth; leaves to only 7 cm long; plants smaller, delicate *Nymphoides cordata*

<i>Nymphoides indica</i> Water snowflake INTRODUCED	<i>Nymphoides cristata</i> Crested floating-heart INTRODUCED	<i>Nymphoides aquatica</i> Big floating-heart NATIVE	<i>Nymphoides cordata</i> Little floating-heart NATIVE
			
			

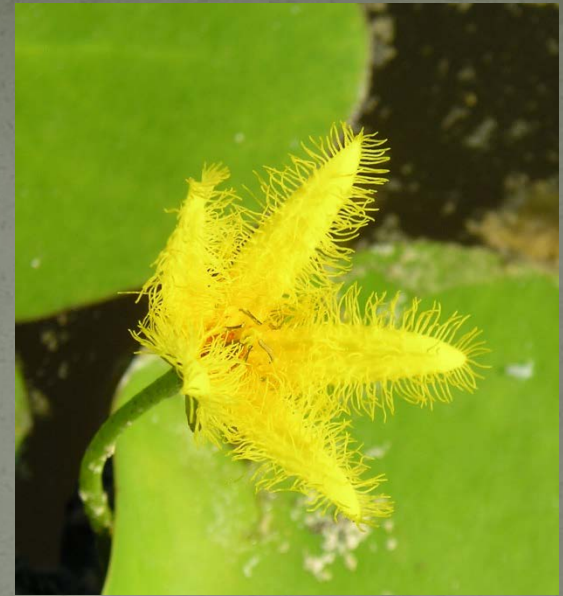
Nymphoides indica is known from limited, scattered introductions in Florida. First recorded at the Braden River, Manatee Co. in 1983, it has since appeared at a natural wetland in Osceola Co. and a Lee Co. pond.

Abundant populations of *Nymphoides cristata* are increasing in distribution. Early introductions included a Lee Co. cypress swamp in 1997. South Florida canal systems and a central Florida lake (Orange Co.) have since been invaded.

Nymphoides aquatica ranges naturally through much of Florida, and the South, where it flowers from spring through fall. Although the petal margins are ruffled, its inner surface is unadorned.

Drought conditions kept *Nymphoides cordata* hard to find this spring in its Panhandle range. Florida is the southern extent of its native easterly distribution, which stretches north to Maine.

Nymphoides grayana ?



Banana lily

Nymphoides aquatica



Crested floating heart

Nymphoides cristata



Crested floating heart
Nymphoides cristata
Photo by Colette Jacono
U.S. Geological Survey



Crested floating heart
Nymphoides cristata
Photo by Larry McCord, Santee Cooper
Eutaw Creek, SC (2009)

Yellow floating heart
Nymphoides peltata



Water snowflake
Nymphoides indica



Giant salvinia

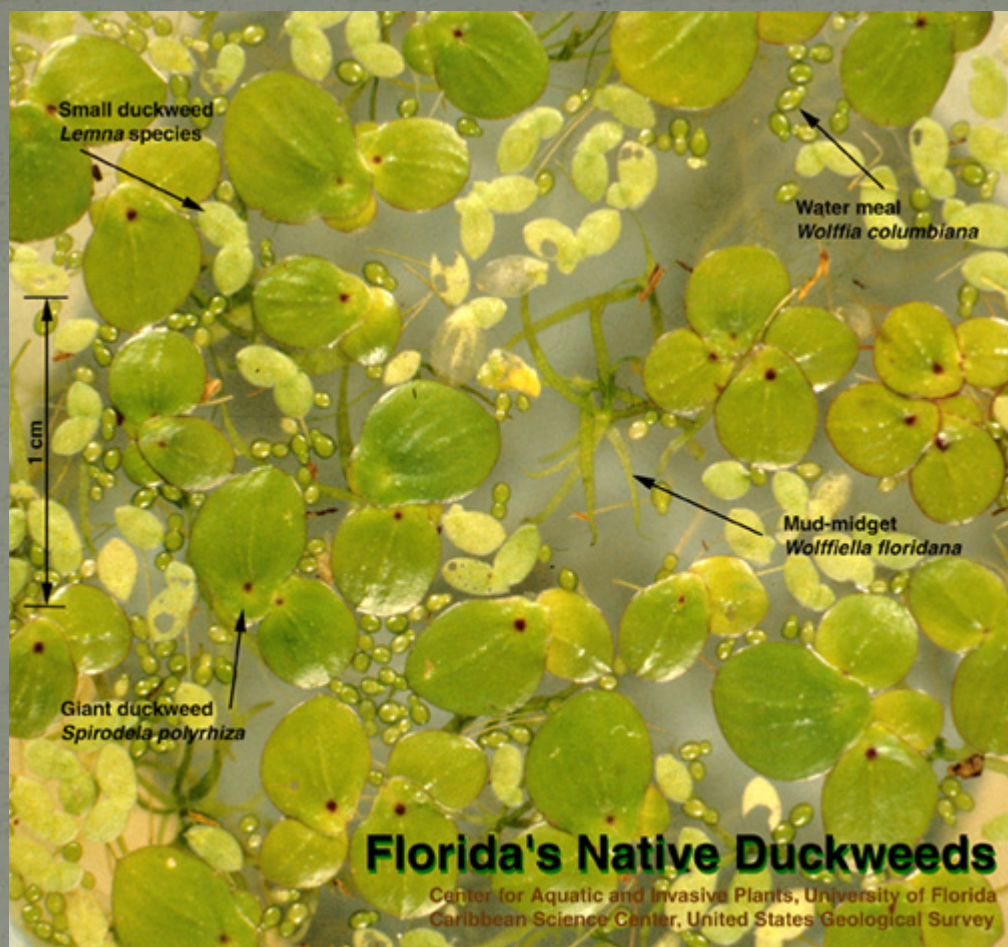
Salvinia molesta



Giant salvinia
Salvinia molesta
Photo by Vic Ramey
© 2000 University of Florida

Water fern
Salvinia minima





Small Duckweed

Lemna species









Aquatic plant management plan

- Identify the problem plant species and composition percentage
- Assess waterbody use
- Measure water conditions
- Incorporate these factors with decision making process; time of year, species, history of site, size of waterbody, exits to the system, permit requirements?
- Determine and formulate best educated method of control



Hyacinth Management

File Pending Reports Data Help

Hyacinth Inspector Reports

Today\Yesterday

Start Date: 9/ 5/2016

End Date: 9/18/2016

Search

Date	Name	Address
9/16/2016 4:01 PM	Vetter Rich	66 Crescent Lake Dr North Fort Myers, FL 33917
9/16/2016 9:50 AM	Maederer Glenn	5842 Inverness Cir North Fort Myers, FL 33917
9/16/2016 9:04 AM	Hager	308 NW 13th St Cape Coral, FL 33914
9/14/2016 1:10 PM	Talbott	10210 Sandy Hollow Ln Bonita Springs, FL 33913
9/13/2016 2:15 PM	Holcomb	7351 Nalle Grade Rd North Fort Myers, FL 33917
9/13/2016 10:18 AM	O'meara Stephen & Dary	12491 Eagle Rd Cape Coral, FL 33914
9/12/2016 8:43 AM	Jackson	610 Astarias Cir Fort Myers, FL 33912
9/12/2016 7:34 AM	Barbour	225 NE 5th Terrace Cape Coral, FL 33914
9/9/2016 9:42 AM	Grahl Daniel	12030 Honeysuckle Rd Fort Myers, FL 33912
9/9/2016		
9/7/2016		

Hyacinth Reports

Choose Report:

- ☐ Request Calls
- ☐ Edit Requests Call
- ☐ Daily Totals Report
- ☐ Years Totals Report
- ☐ Request Map
- ☐ Inspector Stats
- ☐ Graphs
- ☐ Biological by WaterID
- ☒ Mobile Map
- ☐ GC 6 Month Report
- ☐ Inspections
- ☐ Inspections-Indicator
- ☐ Treatments
- ☐ Treatment-Detail
- ☐ Treatments-WaterID
- ☐ Operations Summary
- ☐ GC Stocking-Year
- ☐ GC Stocking-All
- ☐ Plant Species-Year
- ☐ Treatment Percentage

Today\Yesterday

Start Date: 9/ 6/2016

All

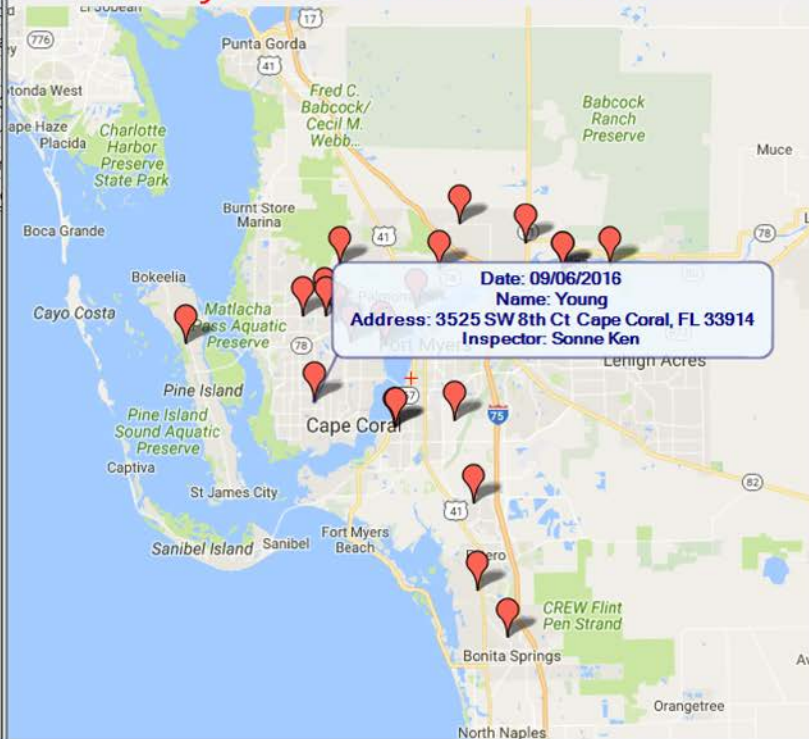
End Date: 9/18/2016

Close

View Report

Mobile Map

Hyacinth Service Calls

Mosquito Rec
9/6/2016 to

Look up

Address

Search

Zone:

Latitude:

Longitude:

Map Options

Map Type

Google Street View

Call

Clear

☐ Show call

Landing

Show

☐ Show site

within 5

Save

Site #: 920100 Acres: 2.954 Vehicle #: 61 Date: 09/18/2016 01:00 

Slender Pond Weed
Slender Spikerush
Southern Naiad
Spatterdock
Spike Rush
Stonewort
Tapegrass
Torpedograss

Species	Coverage (%)
Alligatorweed	33.33
Para Grass	33.33
Torpedograss	33.33

Reset

Clear

Map it

History

Inspection Type: Chemical

Inspection Information:

Outside Weed Firm?

Yes

No

GC Seen?

Yes

No

Water Temp (C°):

29.1

Turbidity:

11

Barrier Condition:

▼

DO2 (ppm):

7.6

Coverage (%):

20

Assistant:

▼

Saturation (%):

98.2

Wind Direction:

SE

▼

Door knocker Left:

Yes

No

Salinity (ppt):

0.03

Wind Speed:

2

Notes:

Recommended Action

Chemical

Mechanical

Biological

No Action

Close

Save

Choose Transaction Type

Call Inspections

Pending Chemical

No Call Inspections

Pending Mechanical

Pending Post Inspections

Pending Biological

Choose Vehicle

61 - Chevrolet

Select Service Call

	Select	TreatmentDate	Type	WaterID	WaterName	AcresTreated	Assistant	TreatmentNotes
	☒	09/05/2016	Chemical	919027	Rutenberg Park	0.04	Ford Jeremy	

Chemical Tank Mix

Vehicle:

333 - Alumatech

Tank:

1

Search

Initial Tank Mix

Chemical:

Amount:

Units:

Add

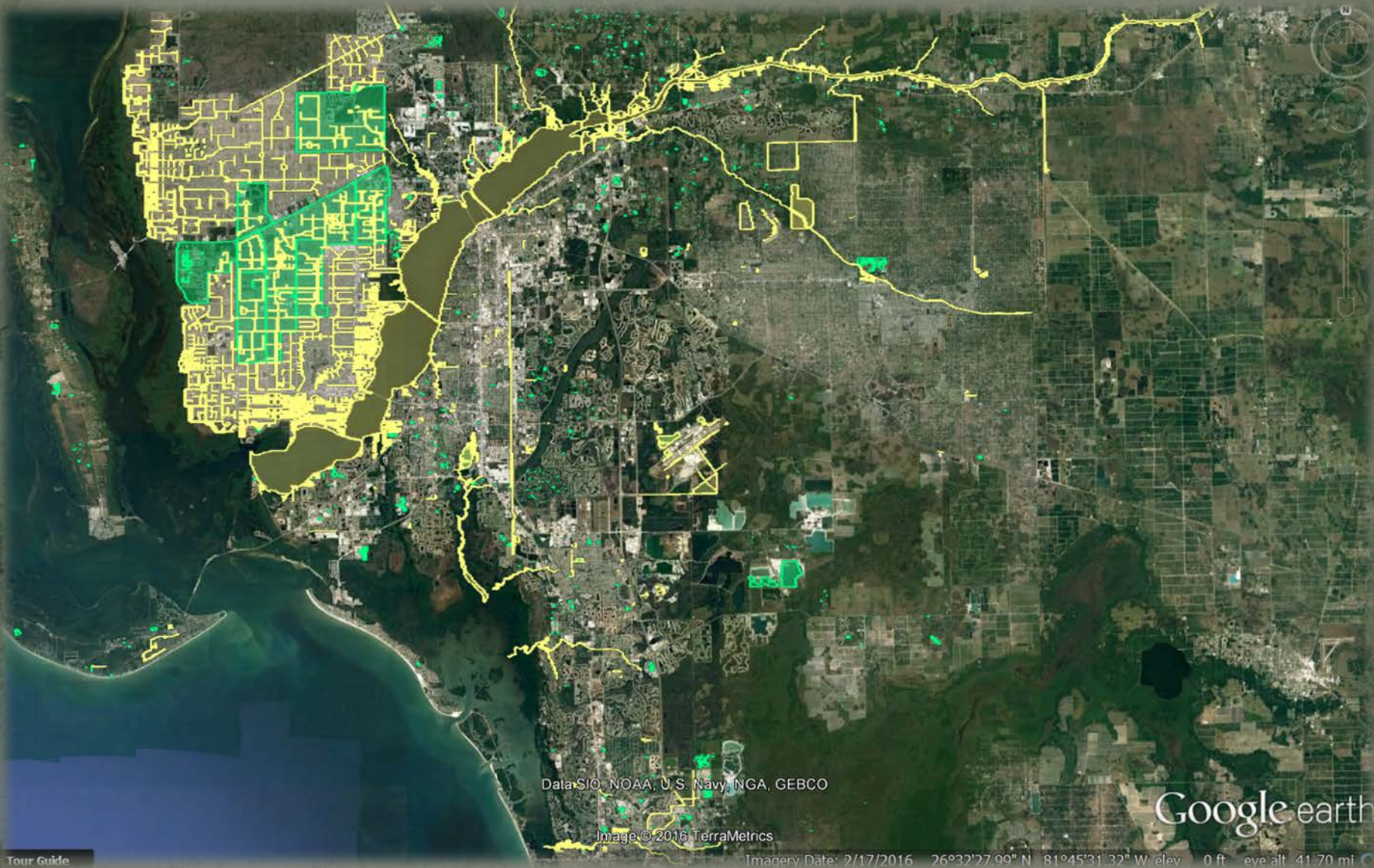
Chemical	Amount	Unit
Aquaneat	1	Gal
Stingray (quart bottle)	13	Oz
Lovert	1	Gal

Close

Save

Close

Ok



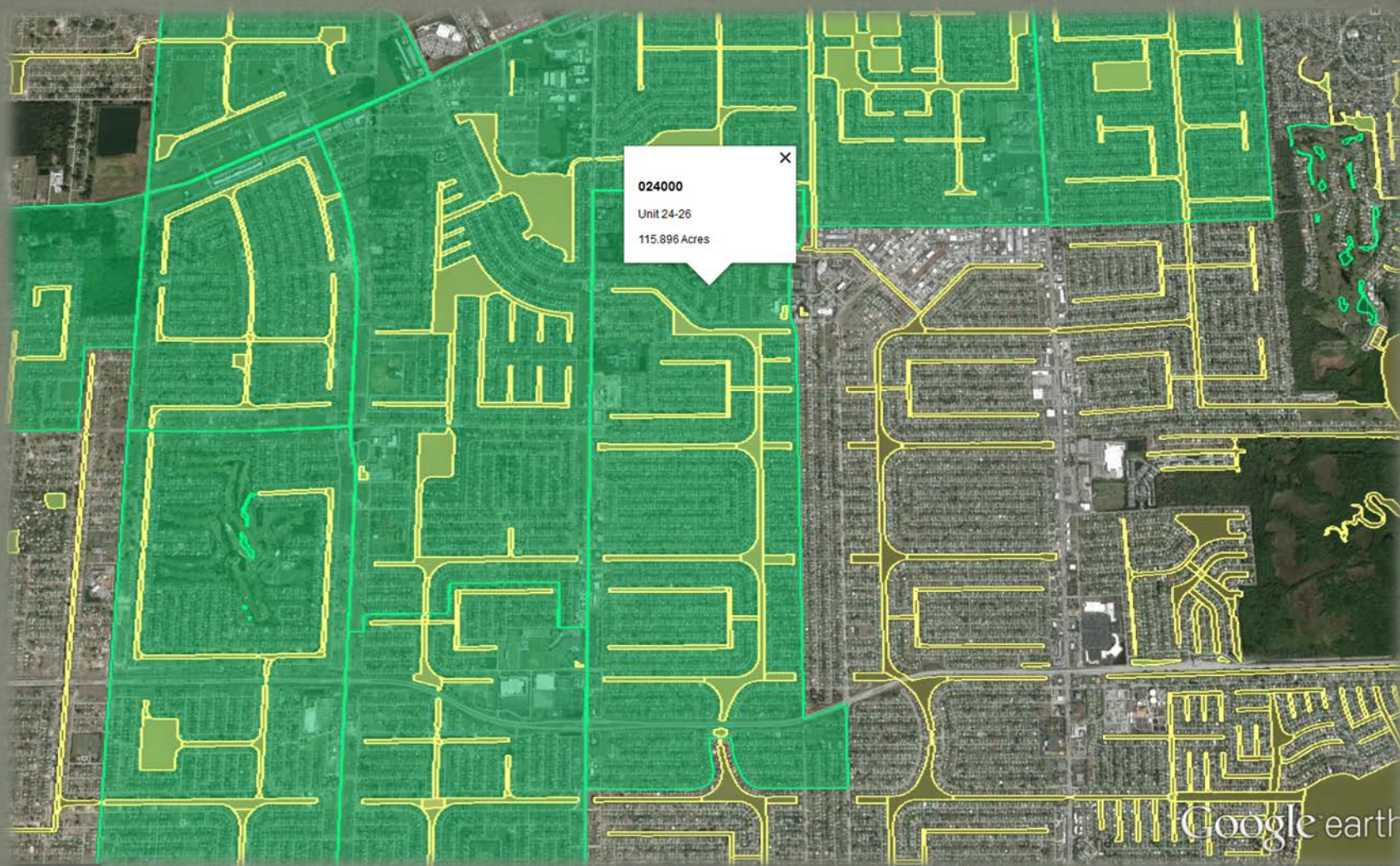
Data: SIO, NOAA, U.S. Navy, NGA, GEBCO

Image © 2016 TerraMetrics

Google earth

Imagery Date: 2/17/2016 26°32'27.99" N 81°45'31.32" W elev 0 ft eye alt 41.70 mi

Tour Guide

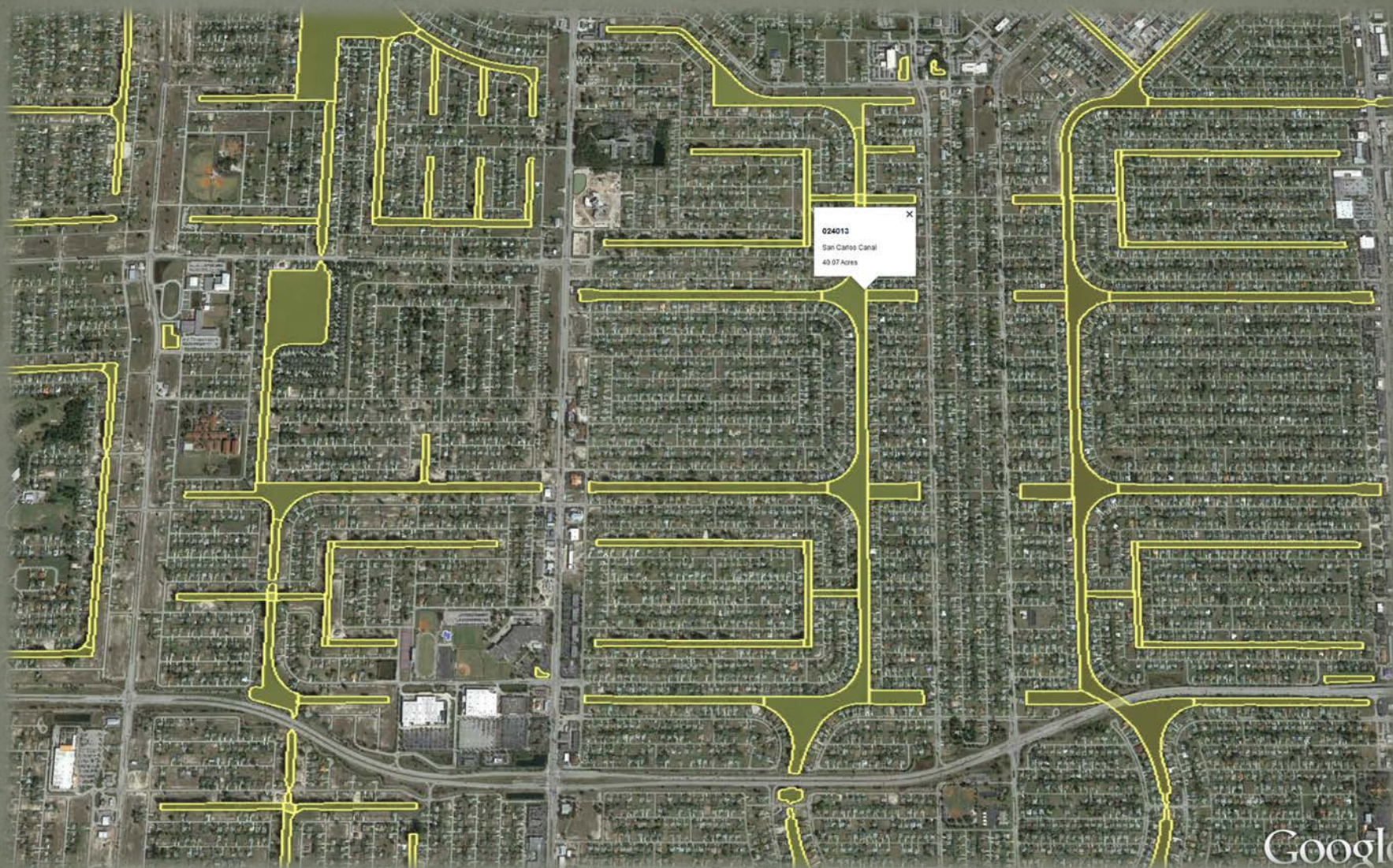


024000

Unit 24-26

115.896 Acres

Google earth



024013
San Carlos Canal
40.07 Acres

Google



1985



1995



2005



2015

Stingray

2.5 gallon and 1 quart size containers

Chemical Name: **Carfentrazone**

Details for STINGRAY AQUATIC HERBICIDE

EPA Registration Number: **279-3279**

Company Name: **FMC CORP.**
Division Name: **AGRICULTURAL PRODUCTS GROUP**
Address: **1735 MARKET ST., RM 1971**
City, State Zip: **PHILADELPHIA, PA 19103**

Current State (Date): **Active - Conditionally Registered**
(SEPTEMBER 30, 2004)



Stingray (Carfentrazone) – *Selective contact herbicide, emulsifiable in water, applied as a foliar spray or subsurface application, affects floating and emerged plants*

- **PPE – Required by label:** Long sleeved shirt/pants, waterproof goggles & shoes/socks.
 - Always use chemical splash eyewear and gloves when mixing.
- **Environmental/Physical/Chemical Hazards**
 - Very toxic to certain species of algae and moderately toxic to fish. Treatment can result in oxygen depletion or loss due to decomposition of plants. (Fish Kill)
- **May be mixed with most aquatic herbicides.**
- **Tank Mixtures** – water, chemical, surfactant, drift retardant, dyes
- **Emulsifiable Concentrates** - are liquids that when mixed with water creates a stable mixture that requires little or no agitation after properly mixing, milky white concentration
- **Application Equipment** – hand-held/high-volume spray equipment



Stingray (Carfentrazone) – Specific Application Rates

WEED CONTROL INFORMATION

Apply this product in accordance with the following table:

WEED SPECIES	Pounds Active per Surface Acre	Stingray (fl. oz.) per Acre	Stingray (ml) per 1,000 sq. ft.
Water-lettuce (Pistia stratiotes)	0.05 - 0.2	3.4 - 13.5	2 - 9
Water-hyacinth (Eichhornia crassipes)	0.1 - 0.2	6.7 - 13.5	5 - 9
Salvinia (Salvinia minima, Salvinia molesta)	0.05 - 0.2	3.4 - 13.5	2 - 9
Duckweed (Lemna spp.)	0.2	6.7 - 13.5	5 - 9
Mosquito fern (Azolla caroliniana)	0.2	13.5	9
Water spinach (Ipomoea aquatica)	0.2	13.5	9
Watermeals (Wolffia spp.)	0.2	13.5	9
Alligatorweed (Alternanthera philoxeroides) (Suppression)	0.2	6.7 - 13.5	5 - 9
Water primrose (Ludwigia octovalvis) (Suppression)	0.2	13.5	9

- **Surface** -Maximum application rate of **13.5 fluid ounces per acre** must not be exceeded in any single application. (Rate 0.1%)
- Tank mixes vary dependent on flow. Conventional 1 acre per 100 gallons, Invert 1 acre per 50 gallons.
- **Subsurface** – using boat-mounted system or polymer with rapid sinking. Concentration may not exceed 200 ppb.

Water Depth (feet)	Gallons of F8426 per Surface Acre
1	0.286
2	0.574
3	0.858
4	1.15
5	1.43
6	1.72
7	2.01
8	2.29
9	2.58
10	2.86
15	4.30
20	5.74

Stingray (Carfentrazone) – Other Information

- Breaks down in soil **microbially and through hydrolysis** with 3-5 day half-life reported
- **Non-refillable Containers 5 Gallons or Less – Triple Rinse and Disposal**
- **Do not apply to the water within 1/4 mile upstream of potable water intake**
- **14 Day Irrigation Restriction** on application of > 20% of water
- **Very low toxicity to animals, enzyme inhibitor (photosynthesis)**
- **No restrictions on treated water for recreation or domestic use**
- **May show signs of plant death within hours to a few weeks**
- **Product requires the addition of spray adjuvant**
- **Treat up to 50% of water body at one time**
- **Minimum of 14 days prior to re-treatment**

Water Use Restrictions Following Applications with Stingray Aquatic Herbicide		
Water Use	20 % of the surface acre treated	20- 50 % of the surface acre treated (spot treatment)
Drinking	0 day	1 day
Fishing and swimming	0 day	0 day
Livestock** consumption	0 day	1 day
Spray tank applications* and Irrigation to Commercial Turf Farms and Residential Turf and Ornamentals	0 day	14 days
Spray tank applications* and Irrigation to Food Crops	0 day	14 days

	Chemical	Type	Application	Tidal	Potable Water Restrictions	Irrigation Restrictions	Additional PPE	Application Foliar Rate	Target Plants
Aquaneat	Glyphosate	Systemic	Foliar	✓	1/2 mile	None	Standard	0.75-1.5%	Cattail Penny Torpedo Phragmites
Clipper	Flumioxazin	Contact	Foliar/Subsurface	X	None	12 Hours in less than 3 ft of water	Standard	6-12 ounces	Lettuce Algae Spatterdock Bryozoa Hyacinth Cabamba
Stingray	Carfentrazone	Contact	Foliar/Subsurface	✓	1/4 mile	14 days on more than 20% of waterbody	Standard	13.5 ounces or less	Cristata Salvinia Spatterdock Lettuce Torpedo Alligatorweed
Clearcast	Imazamox	Systemic	Foliar/Subsurface	✓	1/4 mile	24 hour on non-moving water	> 14 mil gloves	0.25-5%	Cattail Hyacinth Spatterdock Alligatorweed
Tribune	Diquat	Contact	Foliar/Subsurface	✓	1-3 days	1- 5 days	> 0.5% headgear, apron, face shield, > 14 mil gloves	0.5-2%	Lettuce Hyacinth Duckweed Naiad Salvinia Hydrilla
Sonar	Fluridone	Systemic	Subsurface	X	1/4 mile	30 days	Standard	30-90ppb	Duckweed Salvinia Azolla Lettuce Cristata Hydrilla
Alligare	Triclopyr	Systemic	Foliar/Subsurface	X	1/2 mile	120 days	Standard	0.5 - 2 gal	Rotala Alligatorweed Hyacinth
Polaris	Imazapyr	Systemic	Foliar	✓	1/2 mile	120 days	> 14 mil gloves	1-6 pints	Alligatorweed Torpedo Parrot Cristata
Hydrothol	Endothall	Contact	Foliar/Subsurface	X	< 0.1 ppm	None	Coveralls, headgear, apron, respirator	1-5 ppm	Hygrophila Cristata Tape Hydrilla Pondweed
Aquathol	Endothall	Contact	Foliar/Subsurface	X	< 0.1 ppm	None	Respirator	1-5 ppm	Hygrophila Cristata Tape Hydrilla Pondweed
Tradewind	Bispyribac	Systemic	Foliar/Subsurface	X	None	Keep below 30ppb	> 14 mil gloves	1 to 2 oz 20-45 ppb	Lettuce Alligatorweed Duckweed Hydrilla
Komeen	Chelated Copper	Contact	Foliar/Subsurface	X	None	None	> 14 mil gloves	0.5-1.0 ppm	Hydrilla Naiad Chara Pondweed























Towboat in
Faka Union Canal

10/22/2014 10:46





Triploid Grass Carp

Ctenopharyngodon idella

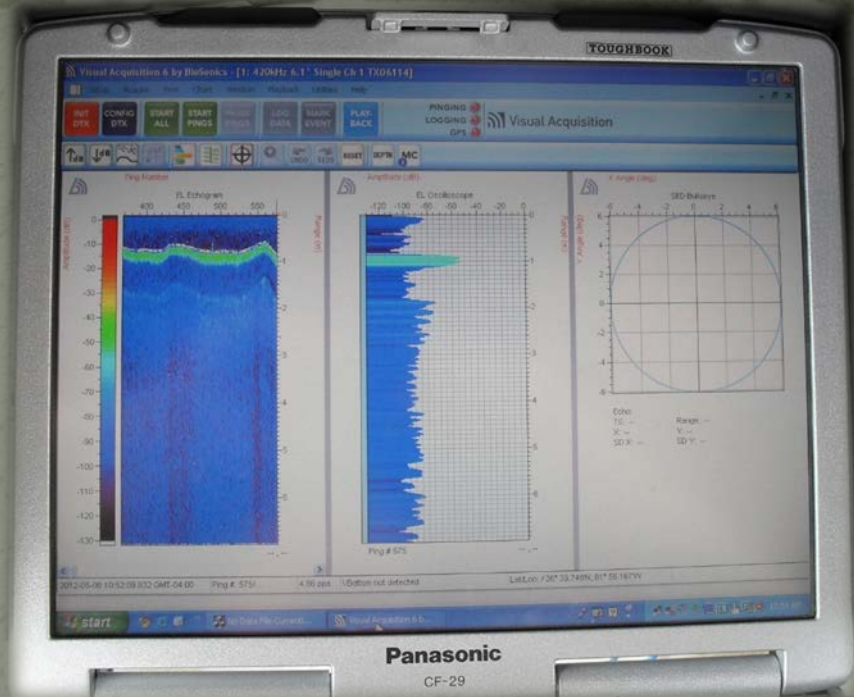
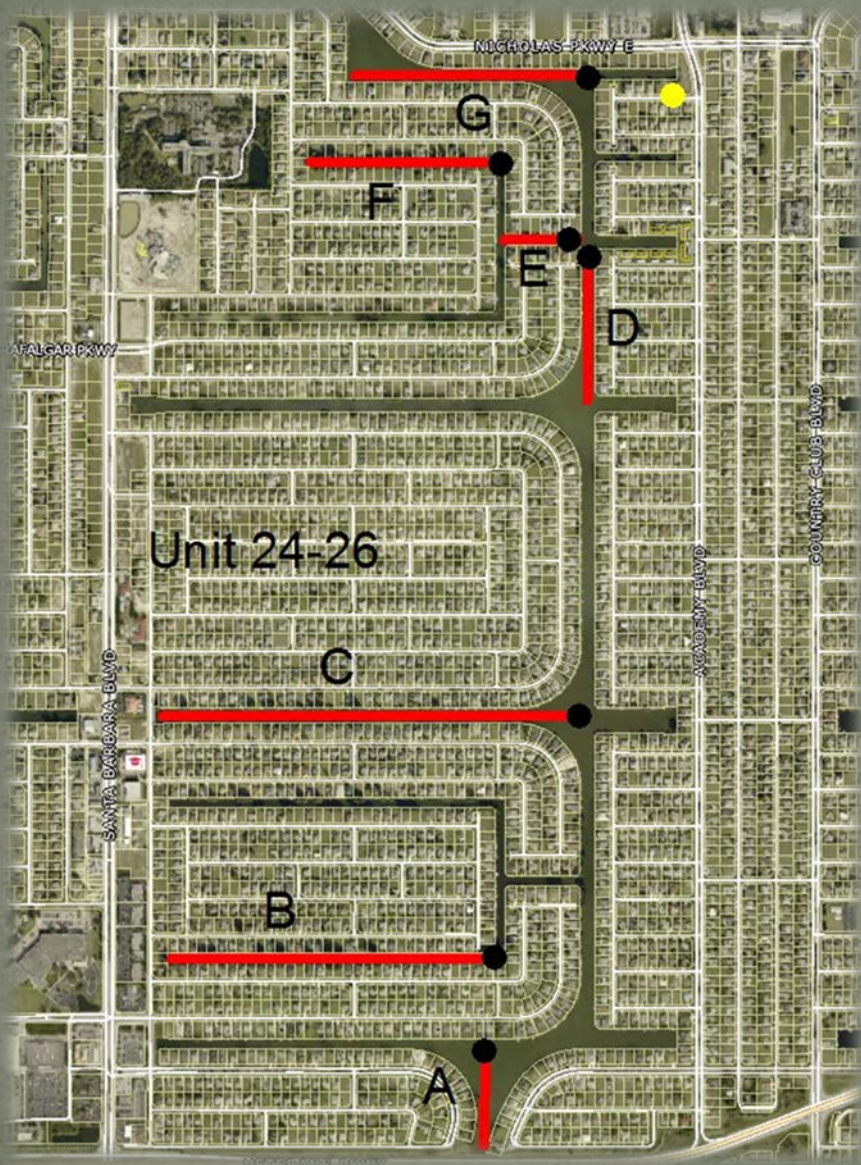


Grass Carp Regulations in Florida

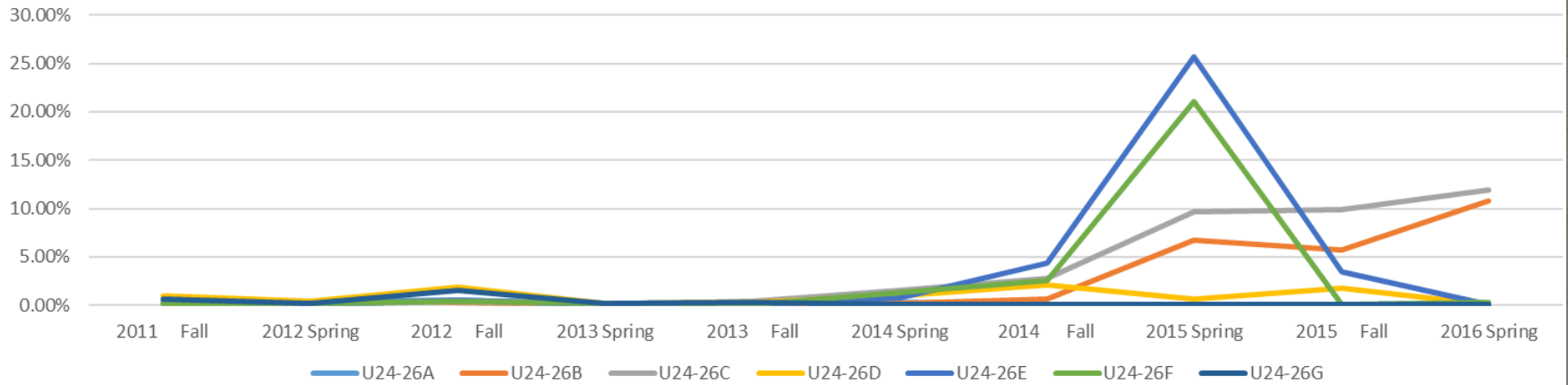
- Florida Fish and Wildlife Conservation Commission is lead agency. Rule 68A-23.088
- Restricted species. Only triploids allowed for management
- Must have a permit to possess, stock or transport
- Physical barriers required when lake is not contained
- Multiple private owners requires multiple consent
- Homeowners Assoc. officer can sign permit application for a private lake
- Public multi-use lakes, permitted mitigation or water quality treatment sites may require additional agency review and consent

Grass Carp Barriers

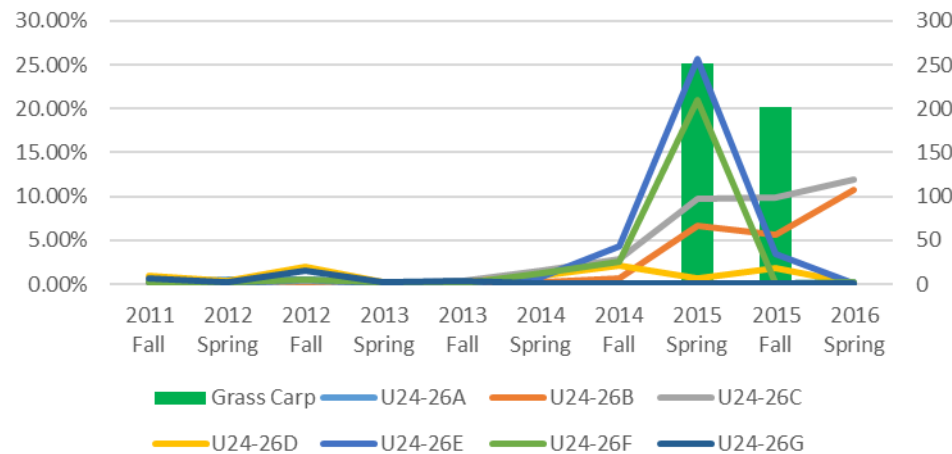




Units 24-26



Units 24-26



Public Outreach And Service



Questions?

