

Factors affecting
health,
reproduction and
distribution of
the endangered
Magnolia
macrophylla var.
ashei





University of Florida

Horticulture

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Plant Pathology

Drs. M. Paret & F. Iriarte

Entomology

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Wildlife

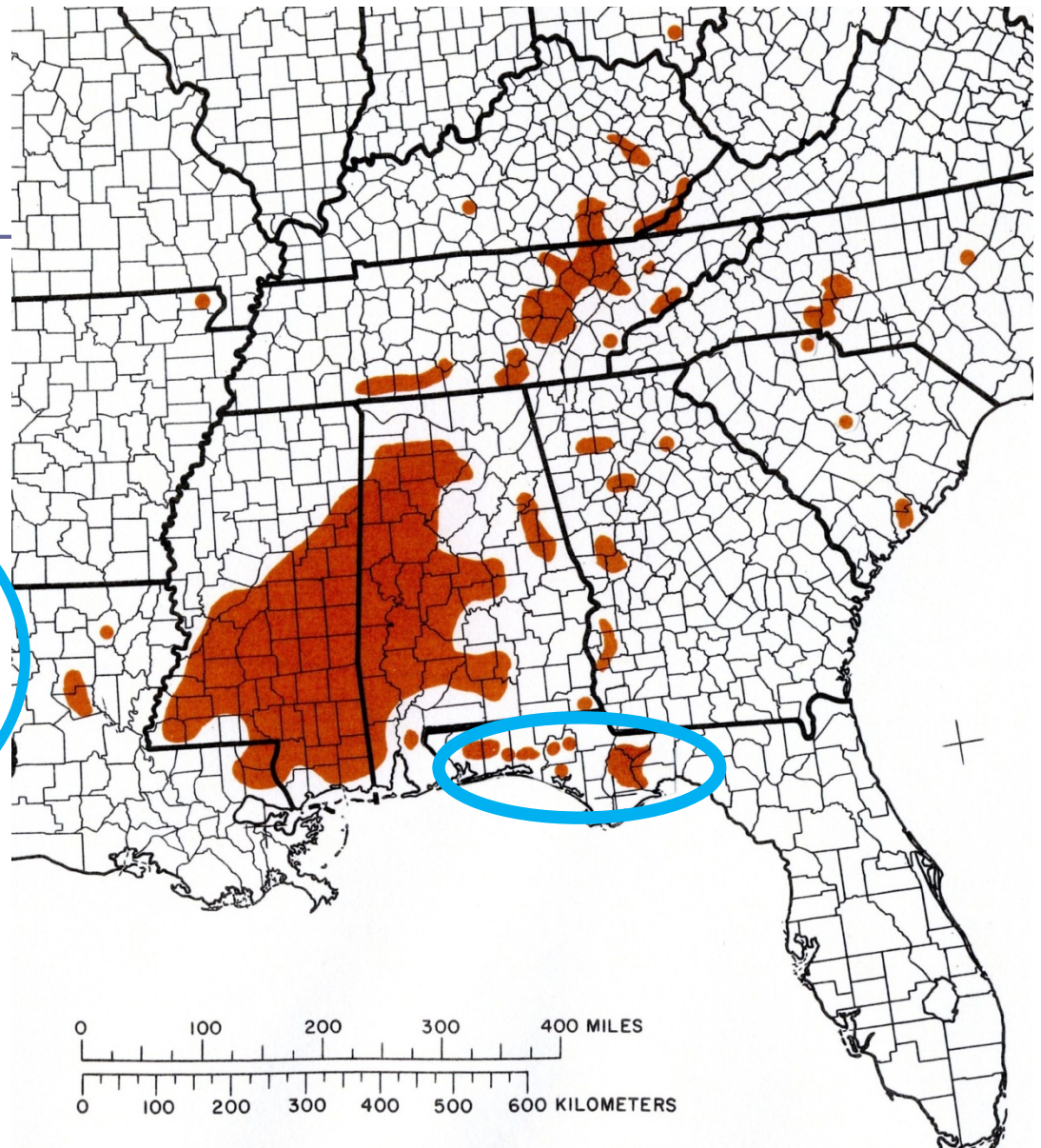
Dr. H. Ober

Thanks to Short-term Employees & Volunteers for help with field work!

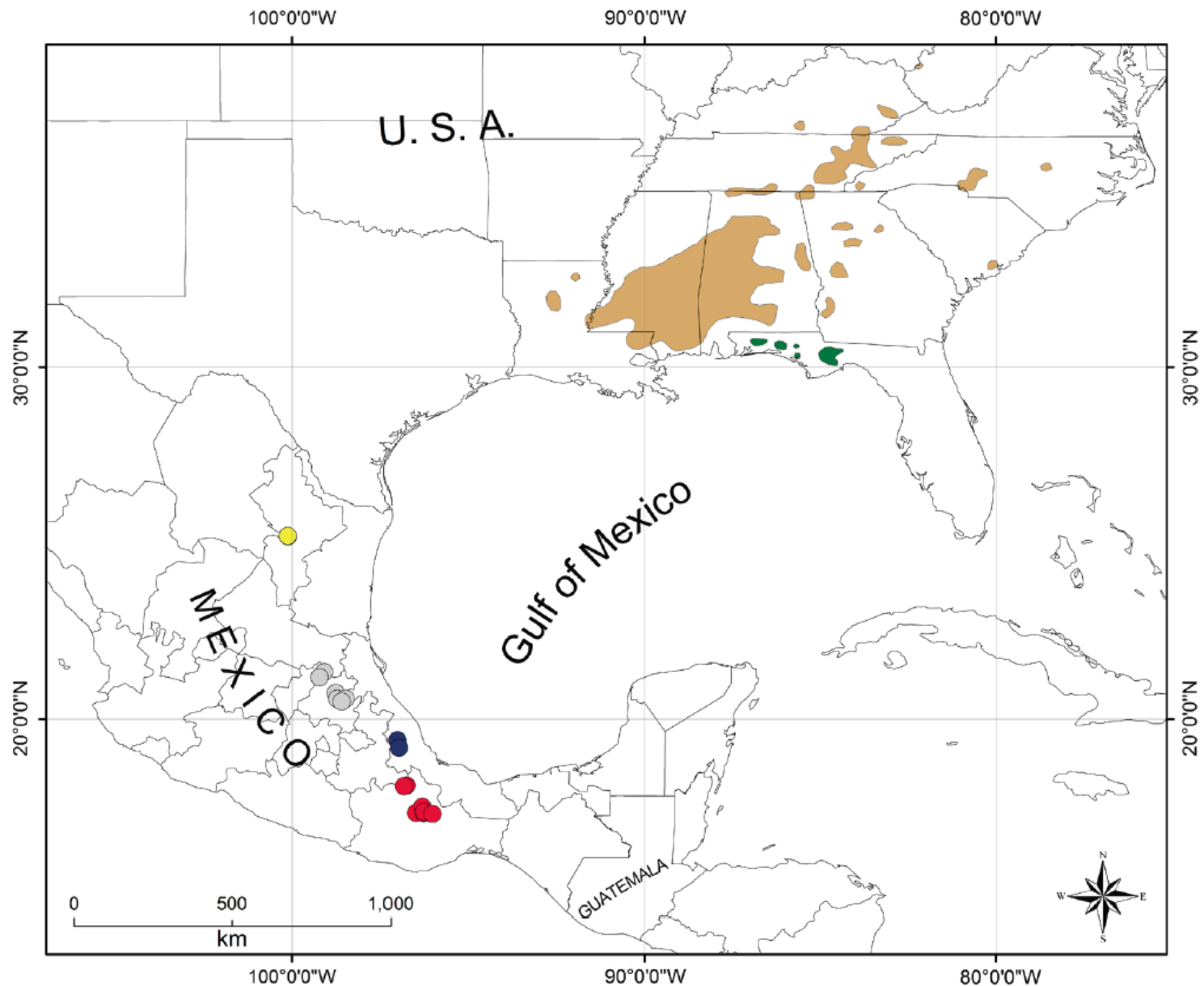
M. macrophylla
distribution in
SE USA

Scattered
disjunct
populations in
Florida are
var. ashei

Var. dealbata is
in México



Courtesy of Richard Figlar



Distribution of Section Macrophylla: Macrophylla = light brown; Ashei = green; Nuevoleonensis = yellow; Rzedowskiana = light grey; Vovidesii = blue; Dealbata = red (Courtesy José Antonio Vázquez-García)

Magnoliaceae: Section Macrophylla includes varieties (syn. Species) *macrophylla*, *ashei* and *dealbata*

<i>M. macrophylla</i>	<i>M. macrophylla</i> var. <i>ashei</i>
Mesic woods of the southeastern USA	Restricted to ravines and slopes in the coastal plain of north Florida, USA
Typically one trunk up to 20 m	One to several stems up to 12 m
Fruits 5-10 cm	Fruits 2.5-5 cm
Co-dominant in forest canopy	Understory plant
Flowers at 15 years	Flowers as early as 3-5 years
	Generally all plant parts are smaller in size

Magnoliaceae: Section Macrophylla

M. macrophylla



M. macrophylla var. ashei



Macrophylla

Leaves 25-100 cm



Courtesy of Richard Figlar

Ashei

Leaves 25-60 cm



Magnolia macrophylla var. *ashei*

■ Status:

- Florida: Endangered
- USA: Management Concern
- NatureServe: G2 (imperiled due to rarity)
- Red List: Vulnerable (IUCN 3.1)

■ Threats:

- Limited range/habitat
- Habitat loss due to human disturbance and erosion
- Reports of low seedling recruitment

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- Few or inefficient pollinators
- Excessive fruit/seed damage from insect pests
- Inadequate seed dispersal mechanisms
- Excessive plant injury from white-tailed deer (*Odocoileus virginianus*) followed by opportunistic pathogens

Torrey State Park

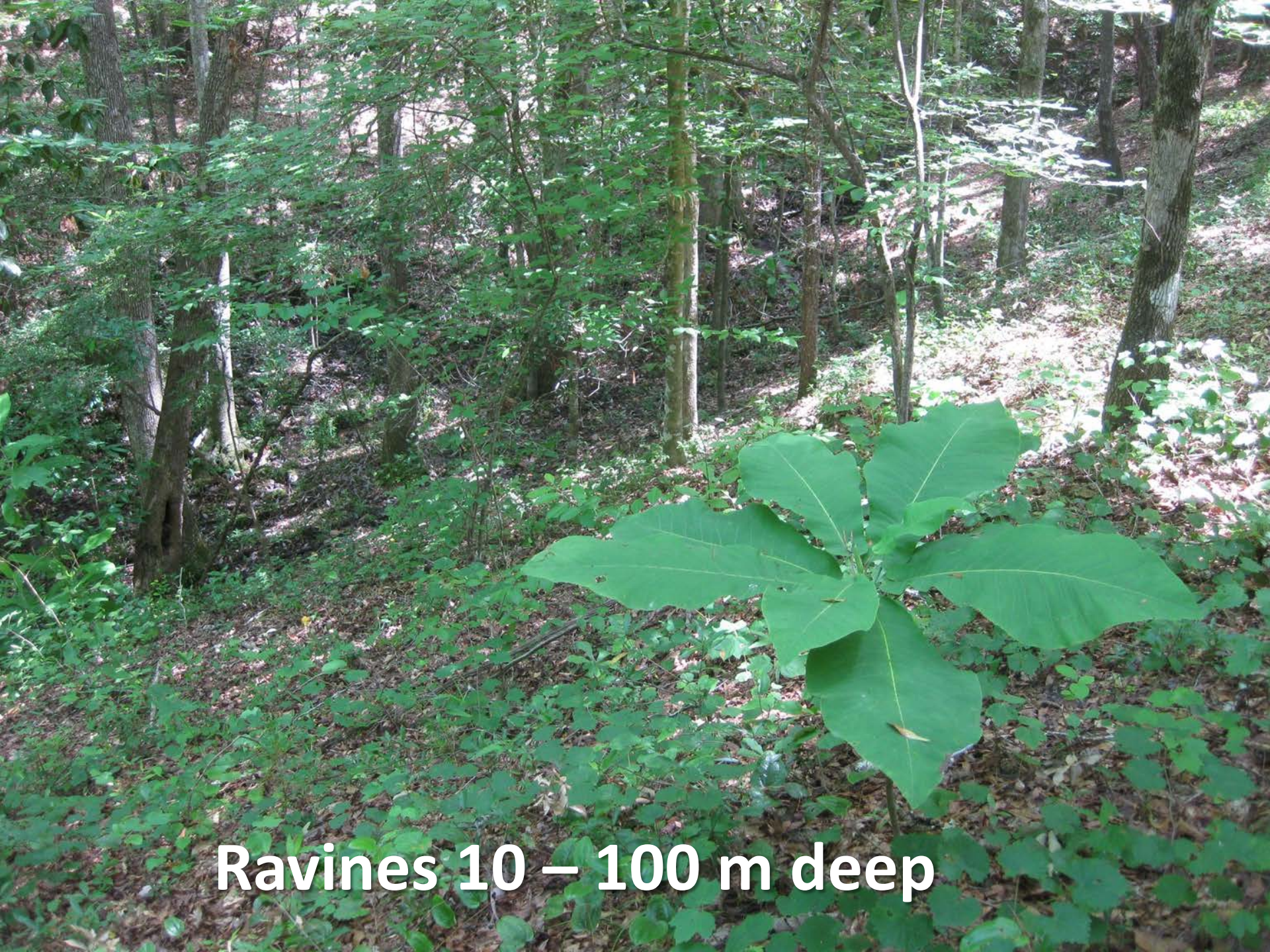
Apalachicola
River

Ravine →

Google

Pine
plantings
on higher
elevations
outline
ravines



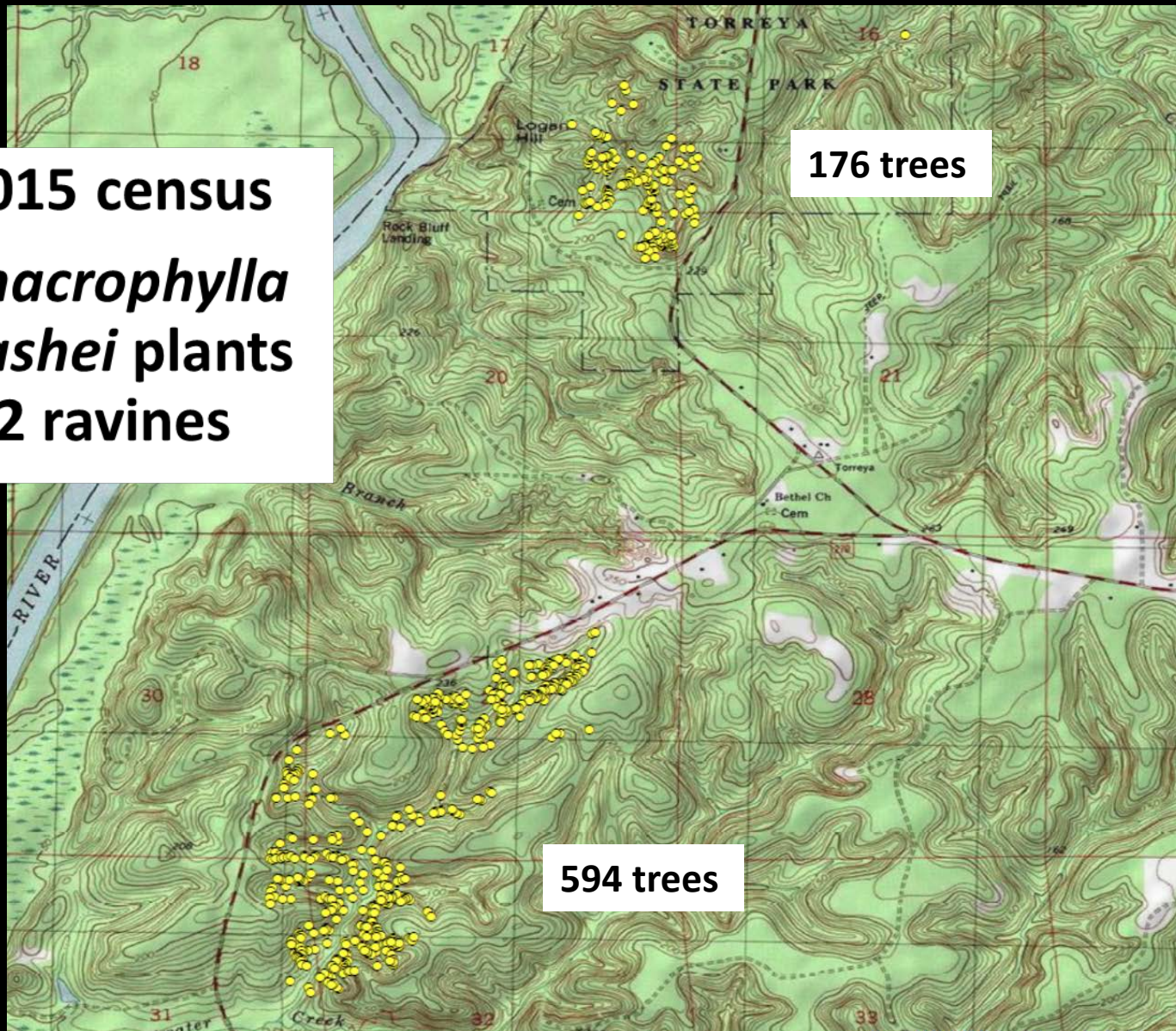


Ravines 10 – 100 m deep



Sites of Research: Two Ravines

● = 2015 census
M. macrophylla
var. ashei plants
in 2 ravines





Late
Female

Male

April



July-
August

Reproductive Studies



- Flower phenology
 - Time-lapse camera
- Census of flowering trees, flowers and fruits
- Pollinator ID
 - False tepal traps
- Effects of seed predation
 - Screen exclusion cages

Reproductive Studies: Census of flowering and fruiting



- 112 trees with flower buds were identified at two sites
 - Number of stems
 - Height
 - Stem diameter
 - Number of flowers



A topographic map of Torreya State Park showing tree sampling locations. The map features brown contour lines indicating elevation, with labels such as 16, 17, 18, 20, 21, 28, 30, 31, and 32. A river is shown on the left, and a creek is labeled at the bottom. Key locations marked include 'Logan Hill', 'Rock Bluff Landing', 'Torreya', and 'Bethel Ch Cem'. Sampling points are represented by white circles (subsample of trees with flower buds) and yellow circles (trees not used). The points are clustered in three main areas: a central cluster near Logan Hill, a cluster near the creek in the lower left, and a small cluster near the center-right. A legend box is overlaid on the left side of the map.

○ = Subsample of
trees with
flower buds

● = Trees not used

Reproductive Studies:

Census of flowering and fruiting



Trees with Flower Buds (n=112)

Number of stems per tree	3.68
Height (m)	4.50
Basal stem diameter (cm)	5.06

Reproductive Studies:

Census of flowering and fruiting

Trees with Flower Buds (n=112)

Total number of flowers	605
Flowers per tree	5.42
Trees that produced fruit (number (%))	66 (50%)
Total fruits	214
Fruits per tree	3.24
Fruits per flower	0.35

Reproductive Studies: False tepal traps



- White Coroplast™, 2 mm x 3 cm x 15 cm
- Painted with tangle-trap sticky coating
- One trap consisted of three wired to stem below
 - Floral shoot
 - Vegetative shoot
- Insects lured to false tepal will be trapped

A photograph of a young plant with several large, bright green, ovate leaves. The leaves are arranged in a whorl-like pattern around a central stem. Three white, rectangular tags are attached to the stem, pointing outwards. The plant is growing in a forest setting with a ground covered in brown, fallen leaves and some small green weeds. A tree trunk is visible in the background.

**Vegetative
bud/shoot**

Reproductive Studies: False tepal traps



- 112 false tepal traps placed on 21 trees over 6 weeks
 - 56 on floral shoots
 - 56 on vegetative shoots
- Each trap left on shoot for one week then collected and stored
 - Tepal traps replaced each week until flowering ceased
- 1 April – 10 May 2016
- Insect counting and identification on-going

COLLECTED 4/6 — 4/12/16 #2

T1F1

T2V3

T2F3

2V3

2F3

T1F2

T3V1

T3F1

3V1

3F1

1220 T1F3

1V1

1F1

3V2

3F2

T2F1

2V1

2F1

3V3

3F3

COLLECTION #4

4/19 → 4/26/16

CBR

TIF1



TIV1



T3

F2



TIF2



TIV2



T3V2

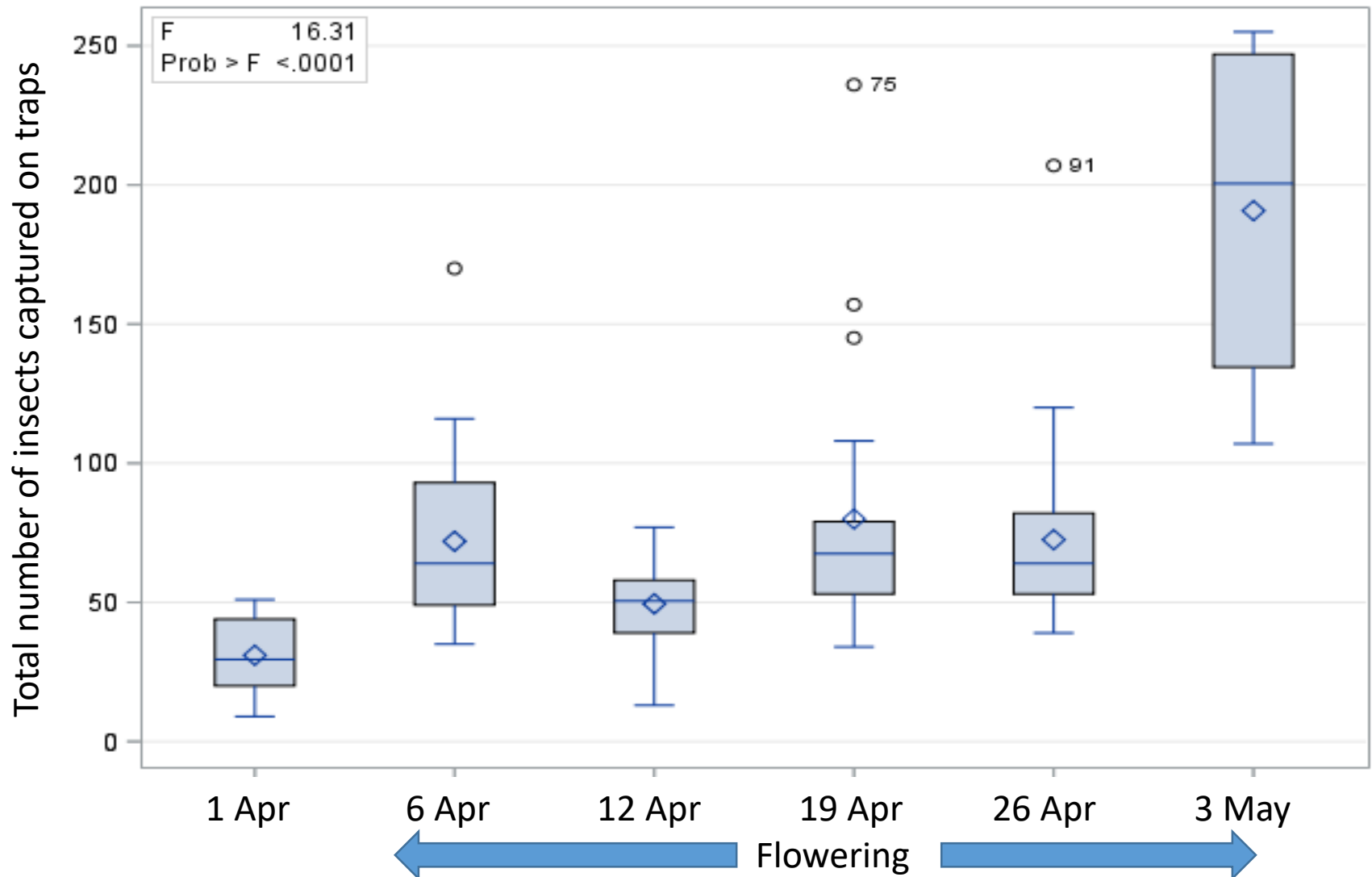


Reproductive Studies:

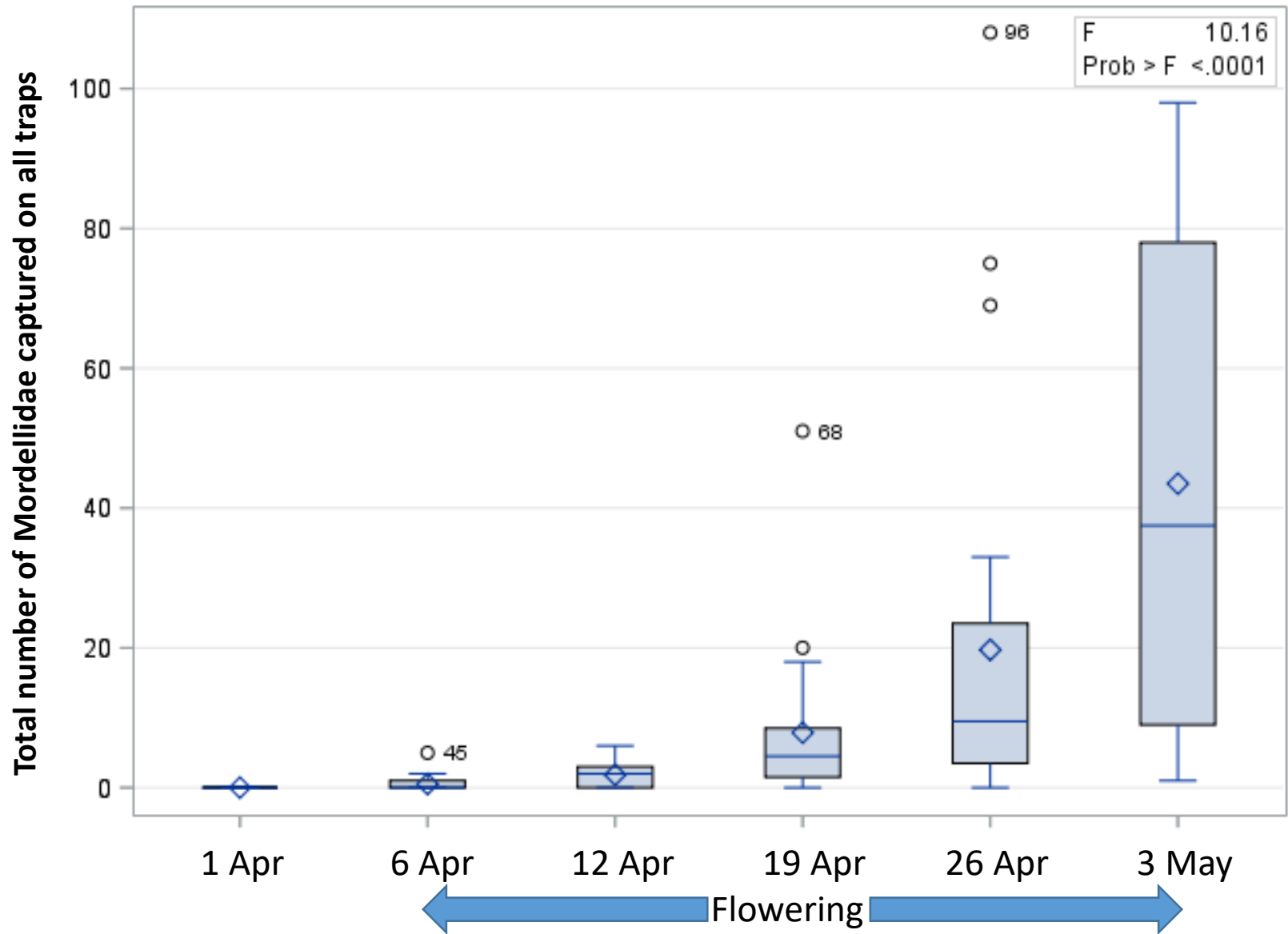
False tepal trap results (Nov. 2016)

Insects Captured	Traps on Floral Shoots (#)	Traps on Vegetative Shoots (#)
Total insects	4266	3243
Tumbling flower beetles (<i>Mordella melauna</i>)*	763	121
Bees	4	1
Cerambycids, scarabs and Lampyridae	13	3

Distribution of Capture



Distribution of Mordellidae (Tumbling Flower Beetle)



Reproductive Studies: Effects of seed predation



- Leaf-footed bug, *Leptoglossus fulvicornis* (Coreidae)
- Native
- Often observed feeding on developing and mature fruits and seeds
- Enhances fruit abortion and believed to damage seed viability
- An exclusion cage was developed to prevent or reduce insect access





Reproductive Studies: Effects of seed predation



- Leaf-footed bug, *Leptoglossus fulvicornis* (Coreidae)
- 31 exclusion cages were installed over fruits about 1 month after fruit development was observed
- August: 31 Caged fruits were harvested along with 30 uncaged fruits paired on the same trees



Reproductive Studies:

Insect exclusion cage (Nov. 2016)

	Caged fruits	Uncaged fruits
Total number of seeds	950	661
Number of seeds per fruit	30.2	22.7
Seeds per fruit (g)	4.93	3.14
<i>Germination studies begin January 2017</i>		



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