Can we control Southern Cattail (*Typha domingensis*)
in a Midwest Wetland System?
*A Cryptic Invasion*

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Southern Cattail in WI

August, 2011 the late Dr. Galen Smith Emeritus Professor UW-Whitewater found Southern Cattail as he drove through Middleton. Smith authored *Typha*, Flora of North America.
Known Distribution
Closest population 150 miles south at a cooling plant in Illinois

International Union for Conservation of Nature
Typha domingensis Morphological Field Traits

Cinnamon colored spike, lime green leaves

Spotted mucilage coloration extends across inner leaf sheaf
2012- Dr. Smith reports finding at Wisconsin Wetlands Association Conference

1. We get Early Detection Grant AIS funding from WDNR
2. We meet Dr. Pamela Geddes Northeastern IL University at WWA-studying cattail genetics with microsatellite primers
3. We find multiple stands of Southern cattail and begin control efforts
Southern Cattail Locations

- Stormwater swales
- Outlets of stormwater culverts
- Areas of construction – 2003, 2005, 2008- did it arrive with construction equipment?
- Mixed within “Wisconsin” cattails- narrow leaved, broad leaved and hybrid
- Upstream of large wetland system and Lake Mendota

LAG TIME- 3 + years prior to detection
2012-2017 Control Efforts

Identify cinnamon spikes/light green leaves
Cut spike - bag and landfill

Apply 2.5% AquaNeat with 1% Liberate (Surfactant)
Esser Pond Results
Firefighters Park Results

Yearly control;
While a few isolated stands are gone

Formidable southern cattail areas expand

2015- used seed from WI cattails and bur reed to over seed areas

No discernable impact
Barriers to effective control:

- 2-8 year time lag - seed bank
- "leap frog" colonization
- Identification by orange spikes - pollen already released - leaf morphology too time consuming
- Labor intensive removal of cattail spikes
- Southern cattail surviving WI winter
- Possible hybrid zone
Increasing Confusion:

• Are we controlling Southern cattail or a hybrid swarm?
• How much of the stand should we control?
2017- Samples from nine locations sent to Dr. Pamela Geddes, Northeastern Illinois University

• Dr. Geddes is testing microsatellite primers on our samples in comparison with known microsatellite primers of
  • *T. angustifolia* (4)
  • *T. minima* (2)
Samples:

By Morphology- 56% were *T. domingensis* or a hybrid

• Sent samples from 8 areas of Southern Cattail control work and one from a pond with no known S. cattail

• Each sample was identified by morphology as S. cattail or a suspected hybrid of S cattail and “Wisconsin cattail” (*T. glauca, T. angustifolia, T. latifolia*)

• 11 were RED- showed up in 2017
Preliminary Results:

By Morphology- 56% were *T. domingensis* or a suspect hybrid

<table>
<thead>
<tr>
<th></th>
<th># of individuals</th>
<th>%</th>
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<tbody>
<tr>
<td>A (angustifolia)</td>
<td>14</td>
<td>33%</td>
</tr>
<tr>
<td>L (latifolia)</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>G (glauca)</td>
<td>6</td>
<td>14%</td>
</tr>
<tr>
<td>New peaks (N)</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>G+N</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>G+A</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>L+A</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>L+G</td>
<td>5</td>
<td>12%</td>
</tr>
<tr>
<td>L+N</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>D (domingensis) +G</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>D+G+A</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>43</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>No results</strong></td>
<td><strong>2</strong></td>
<td></td>
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</tbody>
</table>
Locations of N and D vs WI

Southern Cattail by Morphology
The Plot Thickens, It’s a Mess!!

Over ½ the plants sent to Dr. Pamela Geddes showed all or part of the morphological traits of *T. domingensis* taught to us by Dr. Galen Smith- *Typha* expert

Only 2 plants showed *T. domingensis* peaks that matched Florida samples- none were “pure”

10 plants had new peaks that are not consistent with *T. domingensis* from Florida or ANY OTHER SAMPLES of *Typha latifolia, T. angustifolia or T. glauca* – **New peaks are in areas of suspected *T. domingensis***
Cattails inscrutable:

• ~20% of our samples had morphology of Wisconsin cattails-73% of samples were A, L, G or mix.
• Did the original cattail introduction-maybe off construction equipment-already contain hybrids? Of what??
• What species is N- New Peaks??
• Do we have the ability to identify Southern cattail by molecular analysis?
What is our target plant?

○ How do we control a species if we cannot recognize it in the field?
○ How do we measure success?
○ How do we control a “Cryptic Invasion”
Need more primers!

“In short, I believe this highlights the need to try multiple primers in multiple species, yet not many primers are published, which hinders the progress of molecular work. Developing our own primers is really costly and time-consuming, so we rely on primers that have already been published. Unfortunately for our case with *T. domingensis*, they do not seem to do a good job at separating *T. domingensis* from the Midwestern species. “

Dr. Pamela Geddes, Northeastern Illinois University
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More ?? Than Answers!

Is it Southern Cattail?

Can we justify herbiciding acres of cattail within our possible range?
What We Might Do Differently; In Hindsight

- GPS locations of potential cattail invader (remove seed heads)

- Send samples for genetic testing of suspected invader and a potential hybrid zone

**If samples positive for invader:**

- Spray all cattail within known location and also spray radius of “hybrid” zone **before** plant flowers

- Re test samples in genetic lab after several years of control
Can we estimate a hybrid zone?

What would be a reasonable zone of control?
Cattails On the Move

Flood in Middleton- rainfall of 11.63” in 24 hours on August 20-21, 2018

$3 Million in Flood Damage in Middleton

All Suspected Southern Cattail Areas Flood Spreading Cattails to Unknown Locations
Thank you to our partners and collaborators:

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Dr. Don Waller, UW Madison

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Penni Kline, Retired from City of Middleton
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Mike Healy, Adaptive Restoration & Crew
Oak Hill Corrections Crew
Tracy Hames, Wisconsin Wetlands Association

In Memory of Dr. Galen Smith- whose bright smile and enthusiasm for all things botanical lives on