

Hydrilla in Ohio's Lakes

Outline

- **Identification**
- **Spread in SE Ohio**
- **Control options**
- **Future Work**

Identification

Leaves

- 4-8 whorls
- Leaf margins are saw-toothed
- Leaf midrib has sharp teeth on underside

Turions

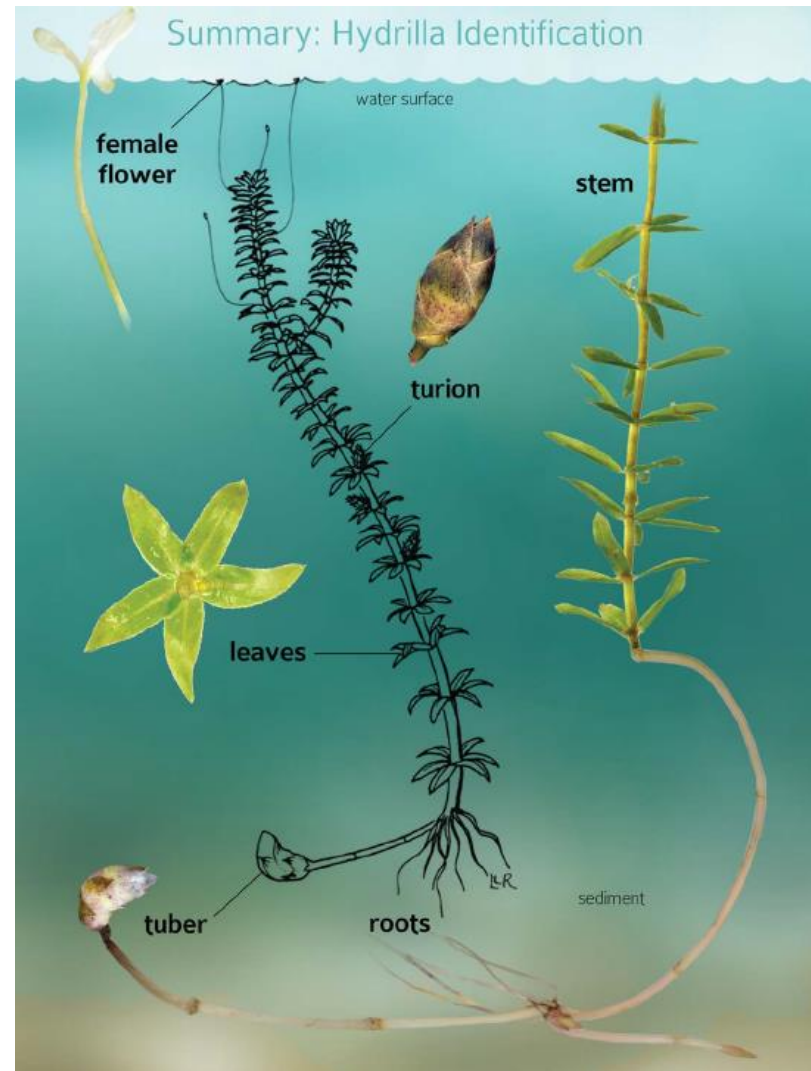
- Cylindrical, dark green, ¼" in diameter
- Break off and create new plants in spring

Flowers

- Female (3 petals whitish in color)
- Male (tiny greenish in color)

Tubers

- Potato shaped
- Yellowish brown in color



Hydrilla Integrated Management. 2014. UF/IFAS University of Florida

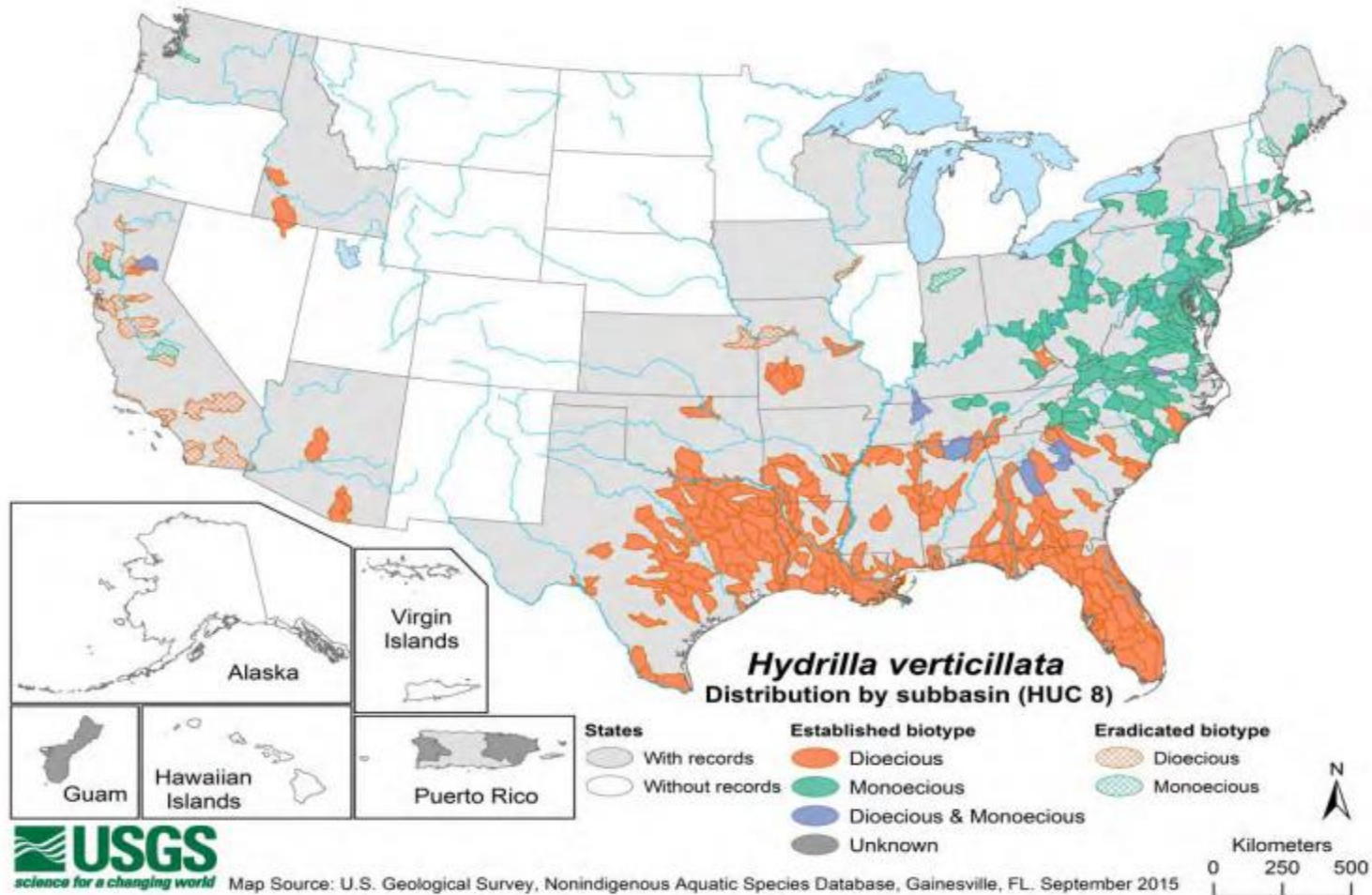
Identification

Monoecious vs Dioecious

- Reproductive organs on same plant
 - Less robust
 - Short time period to sprout, grow, and set tubers
 - Shorter time to maximize control efforts
 - Mainly northern
- Reproductive organs on different plants
 - More robust
 - Longer time period to sprout, grow, and set tubers
 - Mainly southern

Identification

Monoecious vs Dioecious



Identification – similar species





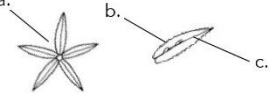

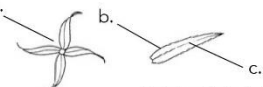

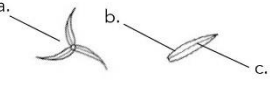
INVASIVE		NATIVE
 <p>Michael J. Grodowitz, U.S. Army Engineer Research and Development Center</p>	 <p>Christian Fischer, www.commonswiki.com</p>	 <p>Paul Skawinski, Aquatic Plants of the Upper Midwest</p>
 <p>HYDRILLA <i>Hydrilla verticillata</i> INVASIVE</p> <ul style="list-style-type: none"> a. whorls of more than 3 leaves b. leaves often have visibly toothed edge c. leaf vein often has small visible spines 	 <p>BRAZILIAN ELODEA <i>Egeria densa</i> INVASIVE</p> <ul style="list-style-type: none"> a. whorls of more than 3 leaves b. leaves do not have visibly toothed edge c. leaf vein is smooth underneath  <p>Illustrations: Center for Aquatic and Invasive Plants, University of Florida</p>	 <p>AMERICAN ELODEA <i>Elodea canadensis</i> NATIVE</p> <ul style="list-style-type: none"> a. whorls of exactly 3 leaves b. leaves do not have visibly toothed edge c. leaf vein is smooth underneath 

Image from
<https://crcwma.org/>

Identification

How is Hydrilla spread?



Fragmentation

Turions

Waterfowl and boats

Roots

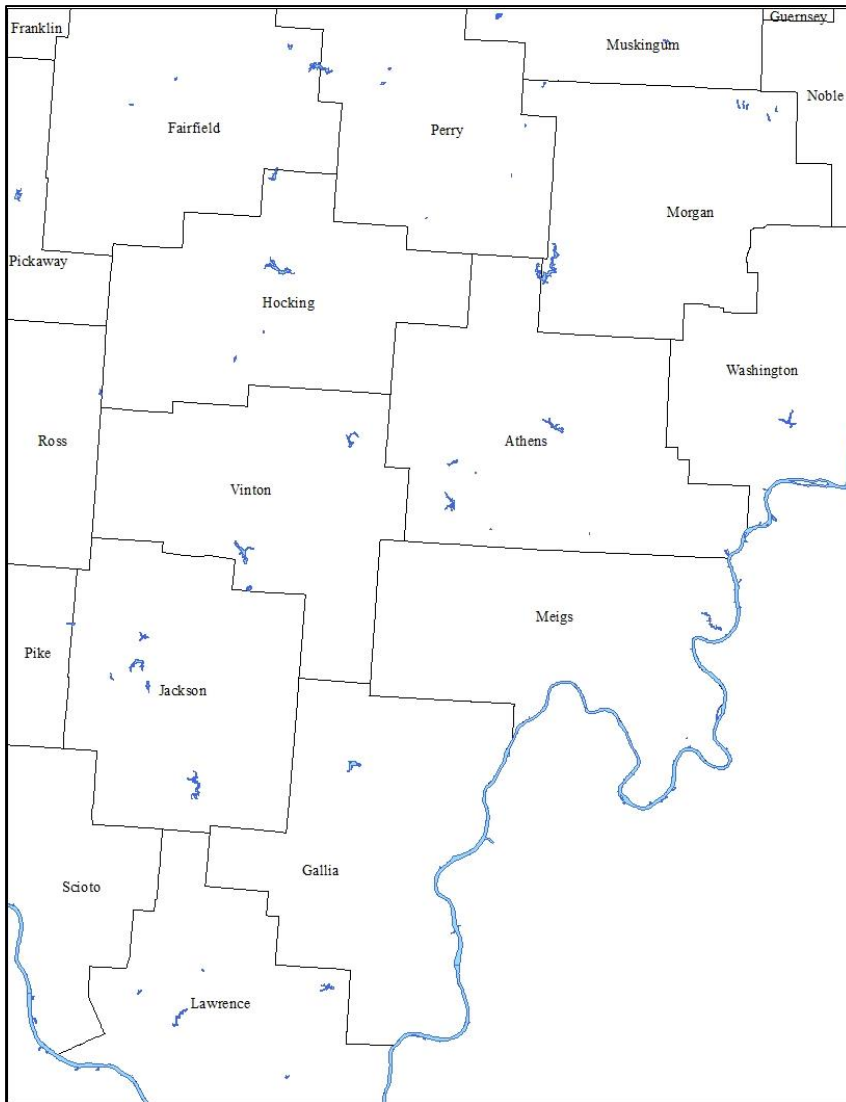
Tubers

Monoecious –seeds

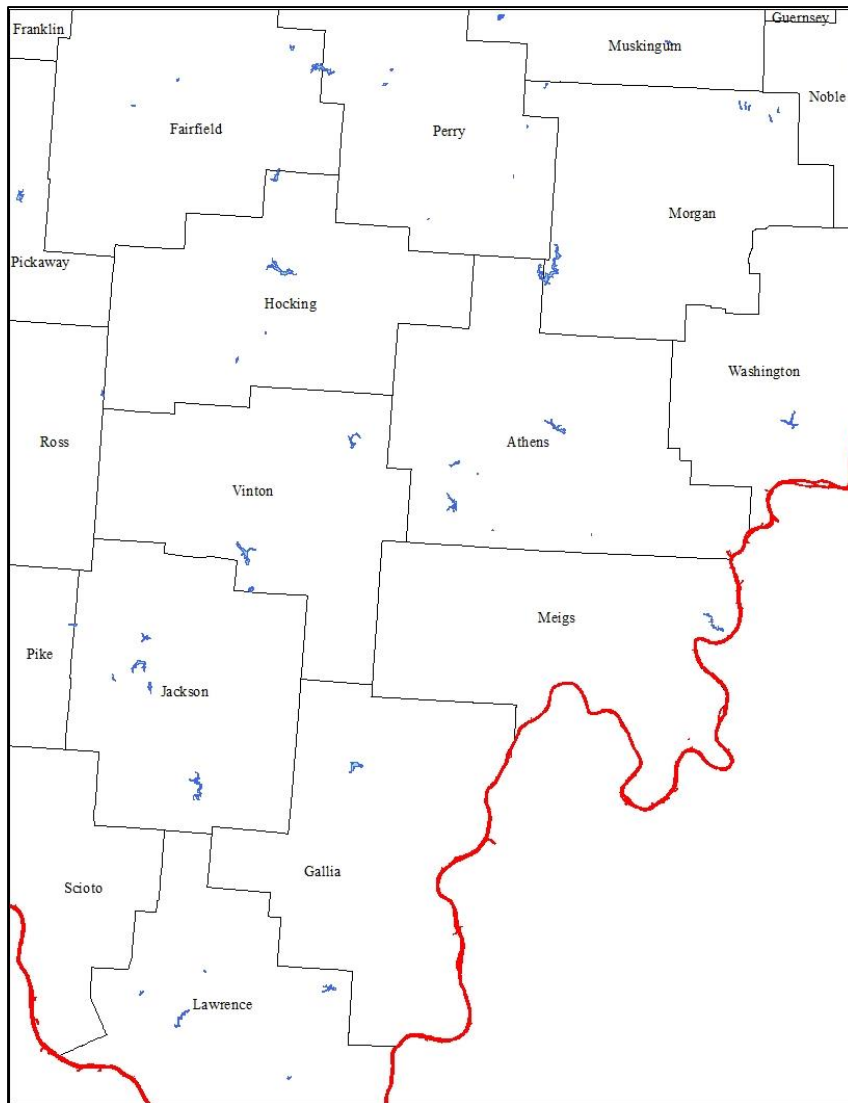
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Spread in SE Ohio



Spread in SE Ohio

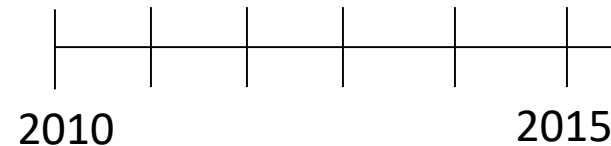
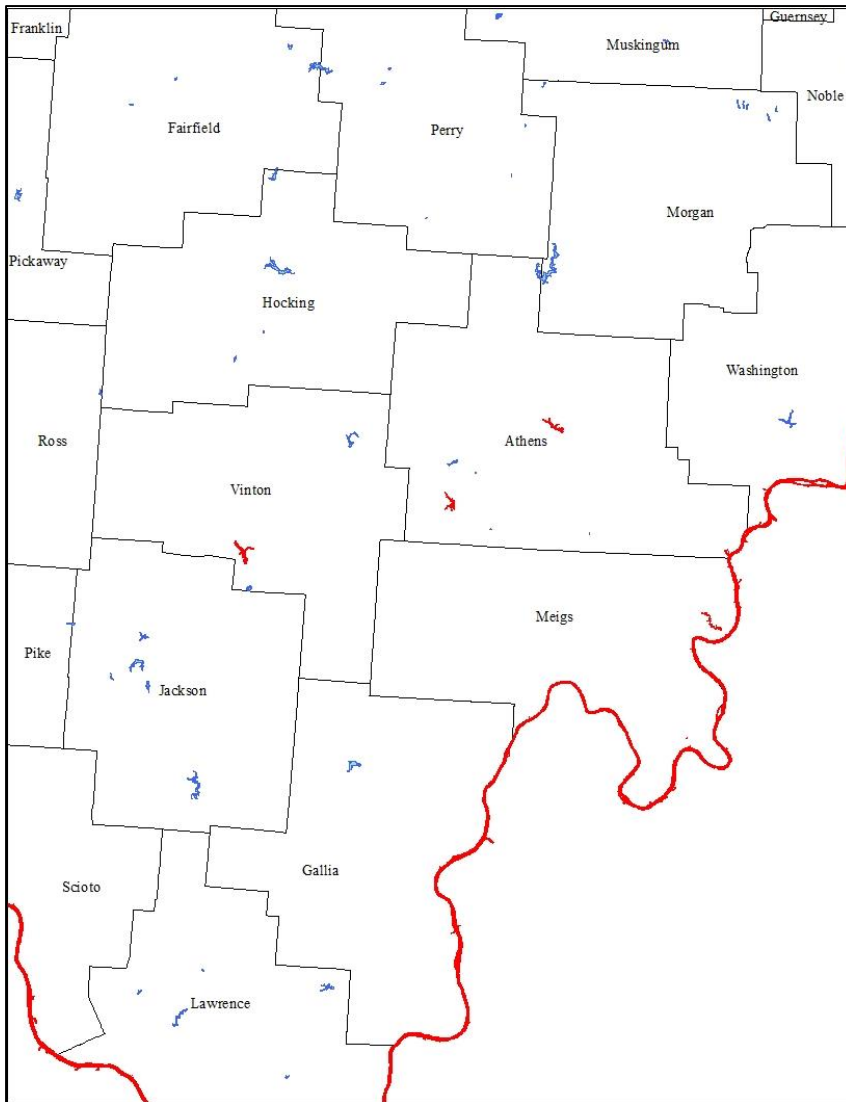


2010

2010
Ohio River

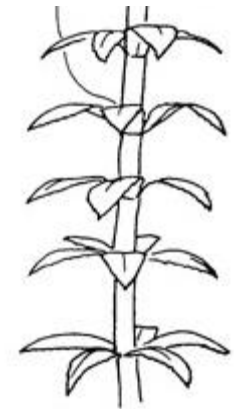


Spread in SE Ohio

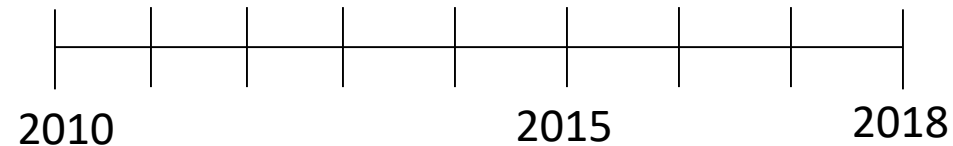
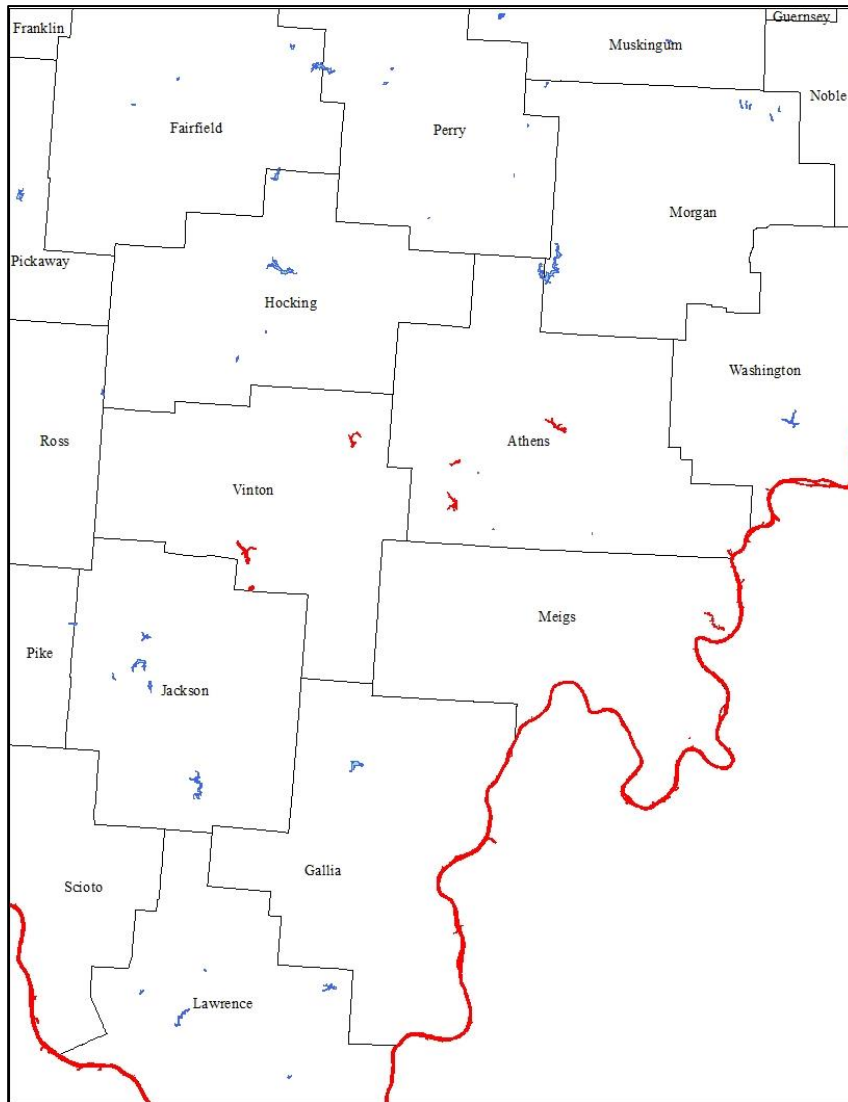


2010
Ohio River

2015
Lake Snowden
Dow Lake
Lake Rupert
Forked Run



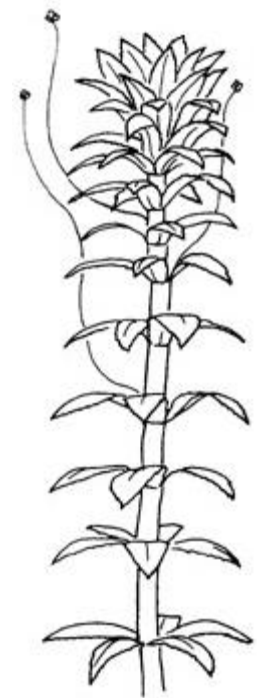
Spread in SE Ohio



2010
Ohio River

2015
Lake Snowden
Dow Lake
Lake Rupert
Forked Run

2018
Lake Hope
Fox Lake
Lake Alma



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Control options

- **Biological vs chemical vs physical**



Control options - Biological

- **Biological control options**
 - Herbivorous fish
 - Grass carp (triploid)
 - Herbivorous insects
 - Hydrilla stem weevil, tuber weevil, leaf-mining flies, tip mining midge, and leafcutter moth
 - Pathogenic fungus
 - Mt fungus (*Mycoleptodiscus terrestris*)

Control options - Biological

Triploid Grass Carp

Advantages

- Removes preferentially
- Inexpensive
- Not labor intensive

Disadvantages

- Not selective
- Tubers not killed
- Hydrilla fragmentation

Control options - Biological

Herbivorous Insects

Advantages

- Inexpensive
- Not labor intensive
- Selective
- Hydrilla removed in lab tests

Disadvantages

- Tubers usually not killed
- Hydrilla fragmentation

Control options - Biological

Common Name	Type	Native Range	Introduced	Established	Host Specific	Damages
Hydrilla stem weevil	Classical	Australia	1991	Maybe	Yes	Stems Leaves
Hydrilla tuber weevil	Classical	India Pakistan	1987	No	Yes	Tubers Stems Leaves
Hydrilla leafcutter moth	Non-classical	Asia Africa Australia	Unknown	Yes	No	Leaves Stems
Hydrilla tip mining midge	Non-classical	Unknown	Unknown	Yes	Yes	Growing stem tips
Asian Hydrilla leaf-mining fly	Classical	Asia	1987	Yes	Yes	Leaves
Australia Hydrilla leaf-mining fly	Classical	Australia	1989	No	Yes	Leaves
Mt fungus	Non-classical	US	N/A	N/A	Yes	Stems Leaves
Grass Carp	Classical	Russia China	1970	Yes	No	Leaves Stems

* Table reproduced from Hydrilla Integrated Management. 2014. UF/IFAS University of Florida

Control options - Chemical

Things to consider

- Contact or systemic
- Selectivity for target plant
- Toxicity to animals
- Speed of control
- Duration of control
- Cost



Control options - Chemical

Active ingredient	Examples of trade names	Mode of action	Speed of action
Bispyribac-sodium	Tradewind®	Systemic	Slow
Copper	Komeen®	Contact	Fast
Diquat	Reward® Tribune™	Contact	Fast
Endothall	Aquathol® Hydrothol®	Contact	Fast
Flumioxazin	Clipper™	Contact	Fast
Fluridone	Sonar®	Systemic	Slow
Imazamox	Clearcast®	Systemic	Slow
Penoxsulam	Galleon®	Systemic	Slow

* Table adapted from Hydrilla Integrated Management. 2014. UF/IFAS University of Florida

Control options - Physical

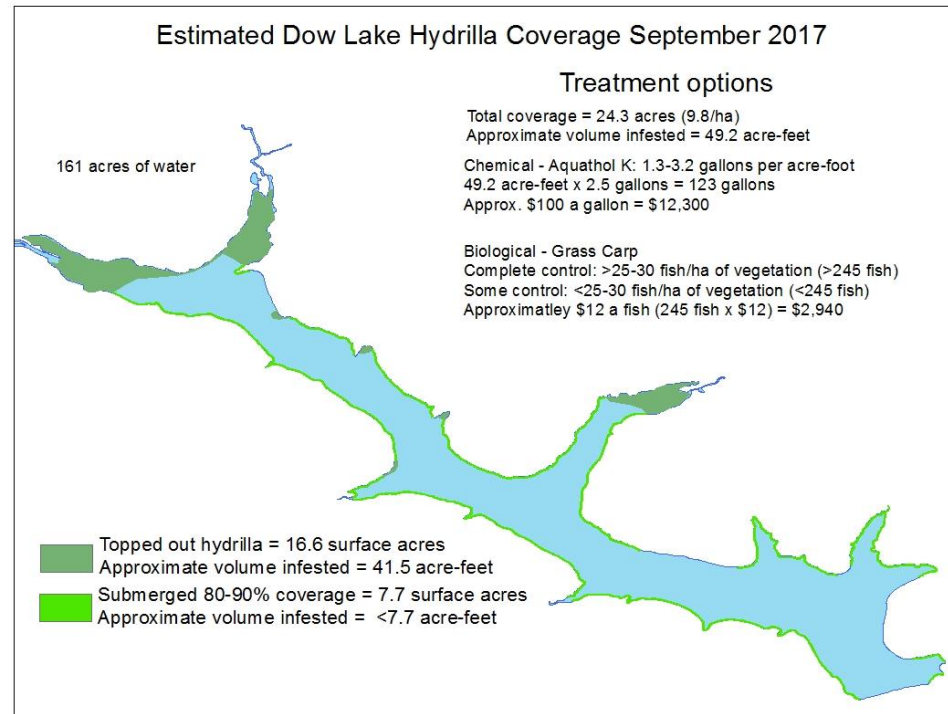
Physical control options

- Hand pulling
- Suction harvesting
- Surface barriers
- Benthic barriers
- Drawdowns
- Dredging
- Chaining

Control options – SE Ohio lakes

Hydrilla treatment process

- Identify
- Survey
- Integrated approach
- Monitor and evaluate



Control options – SE Ohio lakes

Integrated approach

- Cost effective
- Short and long-term benefits



Control options – SE Ohio lakes

Chemical - yearly

- Aquathol K (contact)
- 2.5 g per acre/foot (2.5 ppm)
- Boat ramps/high use areas



Biological

- Triploid Grass Carp
- 25/ha of vegetation



Control options – SE Ohio lakes

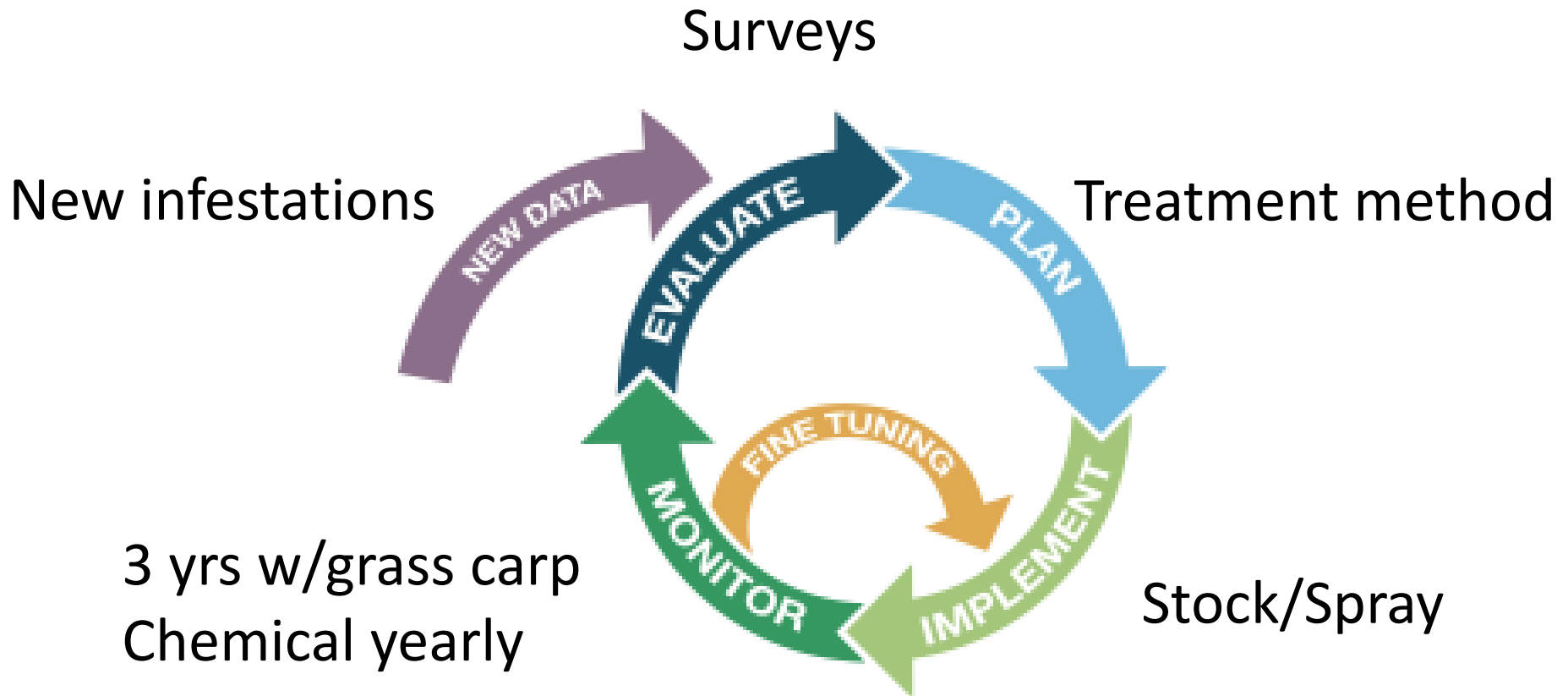
Lake	Treatment	Year identified	Year treated	Lake area (ac)	Estimated coverage (ac)
Lake Snowden	TBD	2015	2019?	143	20*
Dow Lake	Aquathol K Grass Carp	2015	2018	161	24.3
Lake Rupert	Aquathol K Grass Carp	2015	2018	327	63.9
Lake Hope	Aquathol K	2018	2018	120	<1
Lake Alma	Aquathol K	2018	2018	69	<1
Forked Run Lake	Aquathol K Grass Carp	2015	2018	113	18*
Fox Lake	Aquathol K	2018		52	<1

* Under estimated coverage due to hydrilla dying back

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Future work





wildohio.gov

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