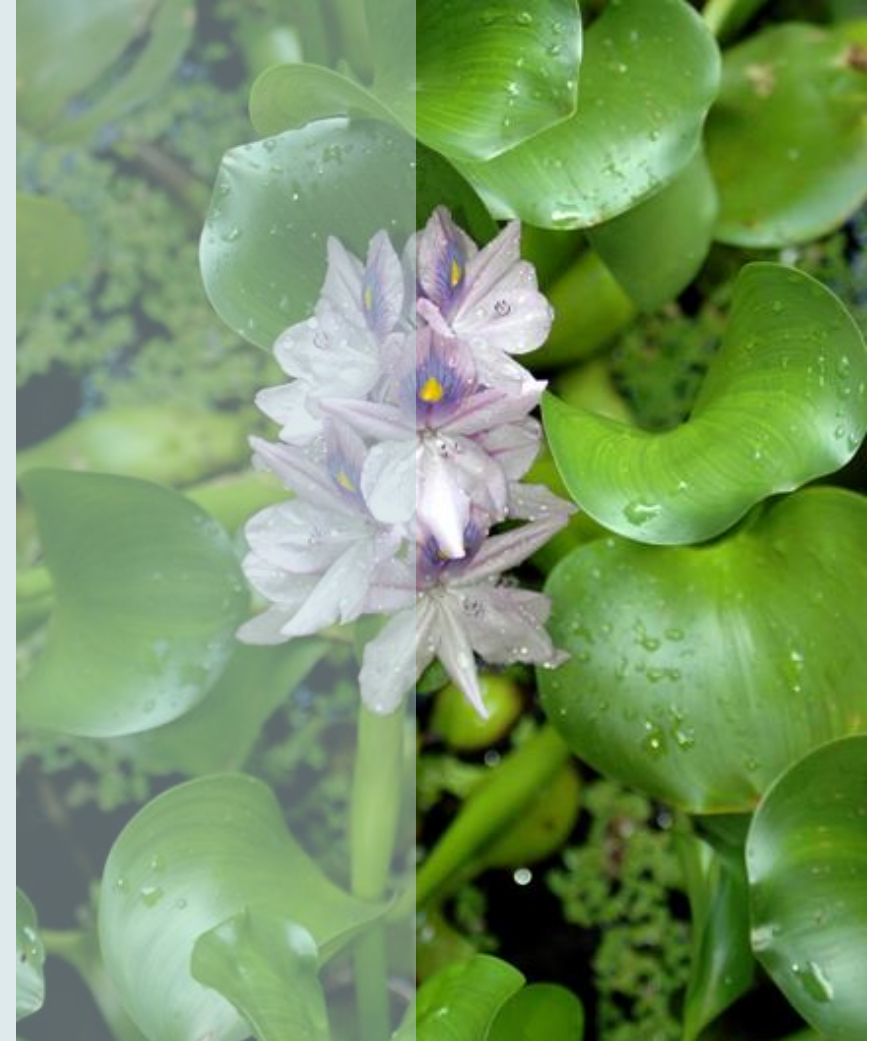


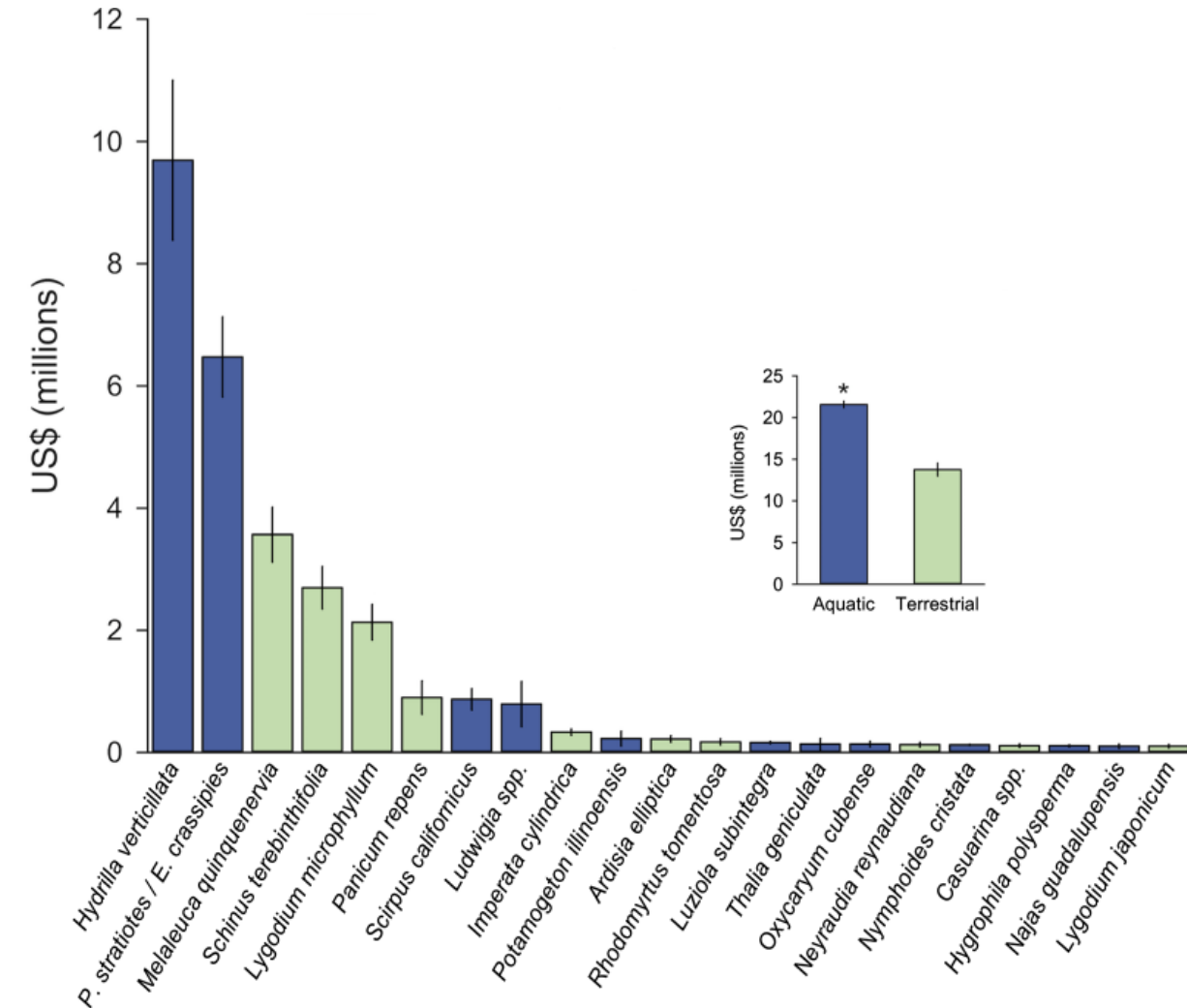
# PERCEPTIONS AND MANAGEMENT OF INVASIVE AQUATIC PLANTS IN FLORIDA PUBLIC LAKES

Olesya Savchenko  
University of Florida



*In collaboration with:* Abhishek Rajan, Candice Prince, and  
James Leary, University of Florida

# INVASIVE SPECIES MANAGEMENT



- US spends over \$27B to manage invasive species every year
- Florida is among the most invaded regions in the world

# INVASIVE PLANT MANAGEMENT IN FLORIDA

- The largest invasive plant management program in the US
- ~170 invasive plant species
- Annual yearly expenditures: \$45 million



~\$10 million



~\$6 million



~\$4 million

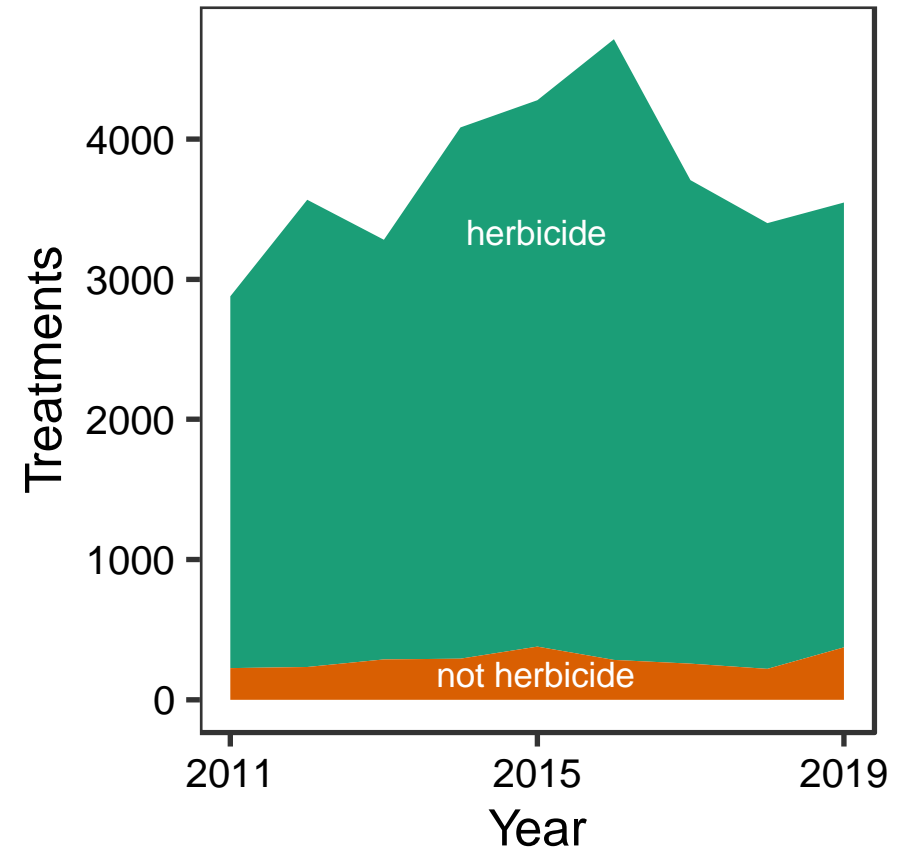


~\$2.2 million

# AQUATIC INVASIVE PLANTS IN FLORIDA

- Major concern due to our 2.5+ million acres of freshwater systems
- Several control methods are used (prevention, mechanical, herbicides, etc.)
- Herbicides are the most common method by far due to cost and effectiveness

Aquatic Plant Management Activities in FL



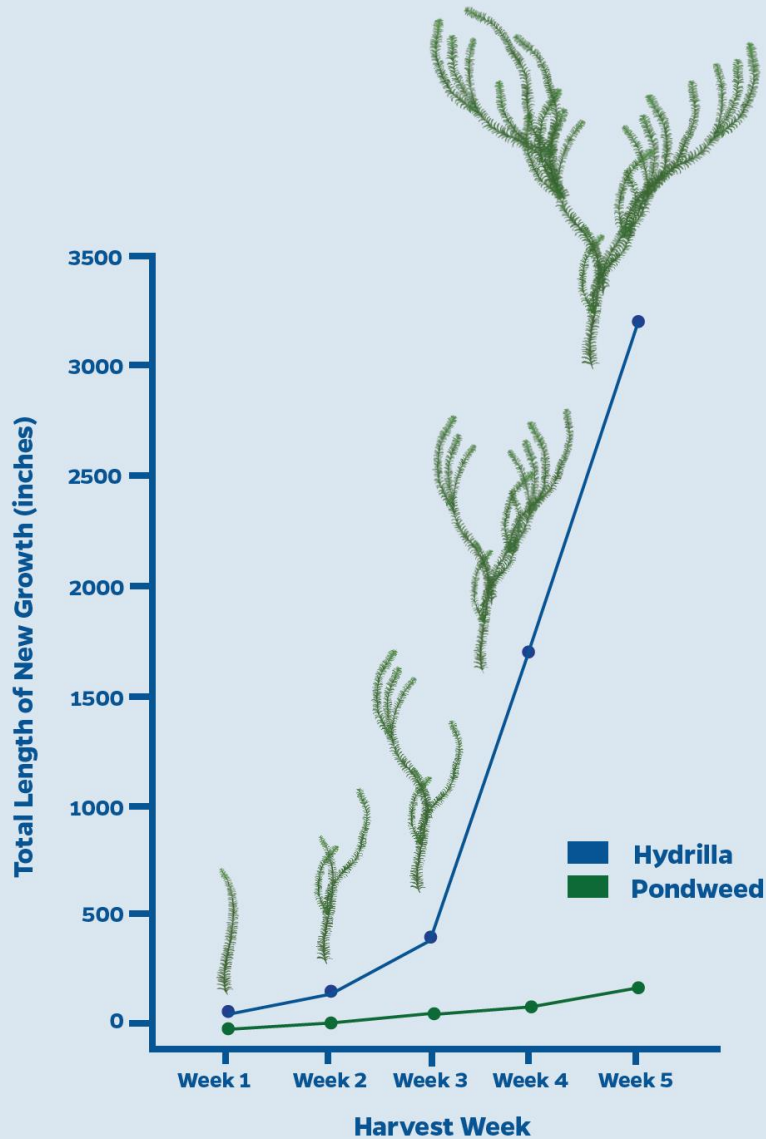
# HYDRILLA (*HYDRILLA VERTICILLATA*)

- Submersed aquatic plant introduced to FL in 1950's
- Valued by some stakeholders (fishermen, duck hunters)
- Enemy #1 to others (naturalists, recreationists, waterfront homeowners)





Average Hydrilla Growth Rate Compared to a Common Native, American pondweed



## MATURE HYDRILLA CAN GROW ~4.8 M PER DAY

- Mechanical harvesters are unable to keep up with growth during summer months
- Harvesting is 2-3x more expensive than herbicide and may be economically infeasible





U.S. Department of Agriculture  
Natural Resources Conservation Service



INVASIVE PLANT  
MANAGEMENT IS  
COMPLICATED IN FLORIDA





# STAKEHOLDER CONCERNS ABOUT AQUATIC HERBICIDE USE

- Concerns over water quality issues, impacts to native plants and fish, and safety
- 2019: FWC halted all management activities for 3 months to gather public input

## State pauses spraying of exotic plants along St. Johns, other waterways



▲ HIDE CAPTION

An airboat operator sprays aquatic vegetation along the St. Johns River, part of a multi-agency, multimillion dollar annual effort to keep exotic plants at bay and maintain navigability of waterways. Many fishermen and environmental groups question the extent to which the spraying is done across the state. [Photo provided by the St. Johns Riverkeeper]

By Dinah Voyles Pulver

@DinahVP

Posted Feb 3, 2019 at 12:01 AM

Updated Feb 3, 2019 at 7:12 PM

*The Daytona Beach News-Journal*



**Florida Fish and Wildlife  
Conservation Commission**



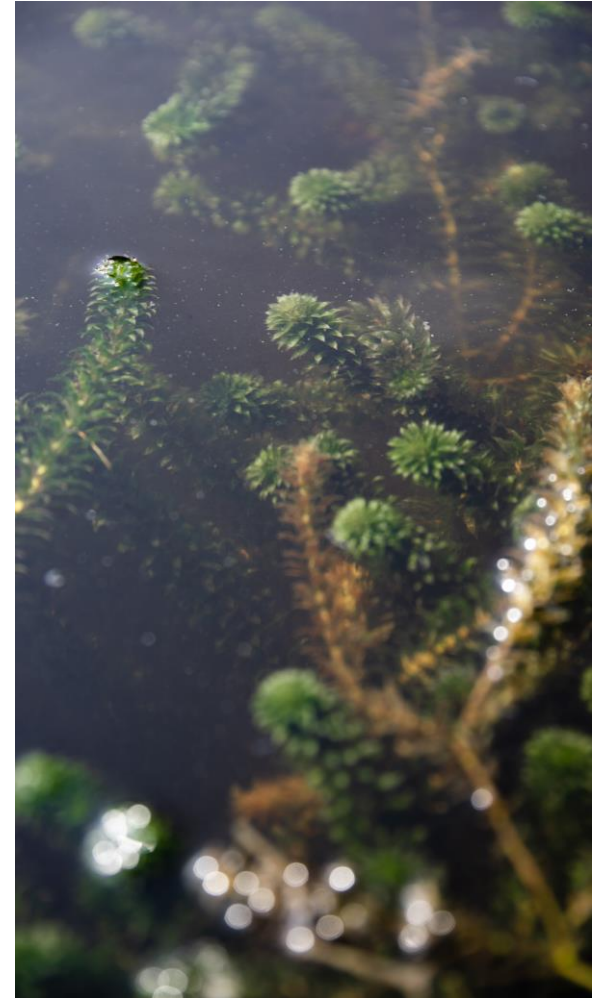
# EVALUATING PREFERENCES FOR HYDRILLA MANAGEMENT IN FLORIDA

- Awareness & preferences for different hydrilla management options among the broader population of Florida
- Florida residents' WTP for attributes of herbicide and mechanical harvesting management options
- Impact of information on preferences for hydrilla management methods
- Public trust in sources of information about invasive species



# STUDY DESIGN

- Survey of 3,000 FL residents
- Choice experiment to elicit preferences over different management options & its attributes
- Quasi experimental design to test impact of information on preferences



# CHOICE EXPERIMENT

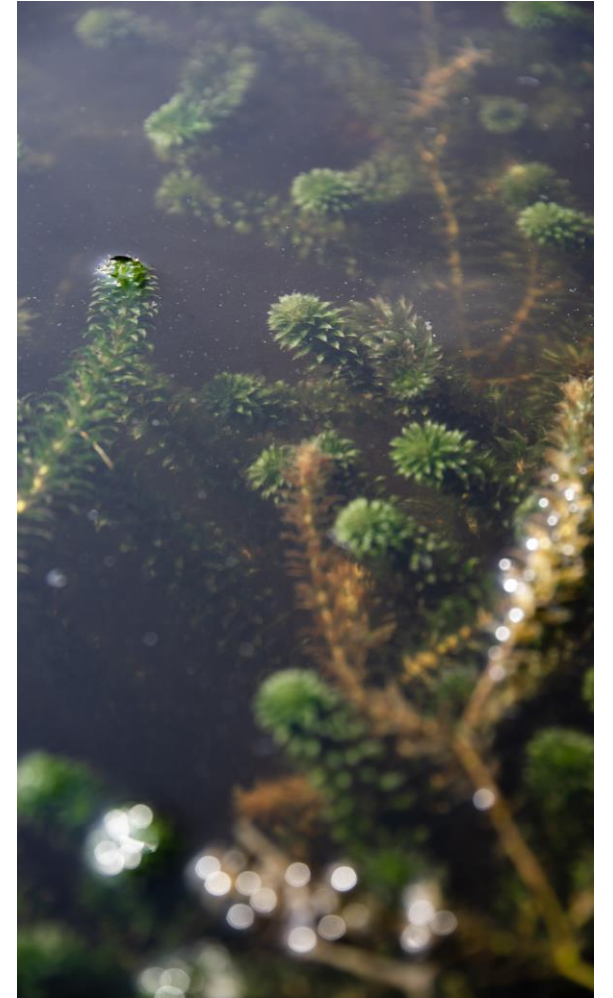
<b>Attributes</b>	<b>Levels</b>
<b>Management approach</b>	Herbicide Mechanical harvesting Herbicide and mechanical harvesting
<b>Hydrilla cover left after treatment</b>	25% 50% 75%
<b>Effectiveness (days of suppression)</b>	60 days 150 days 300 days
<b>Habitat impact</b>	Low impact Medium impact High impact
<b>Annual cost to you</b>	\$10, \$25, \$75, \$150



# INFORMATION TREATMENT

- How herbicide and mechanical harvesting work;
- Impacts of humans and the environment;
- Cost & effectiveness

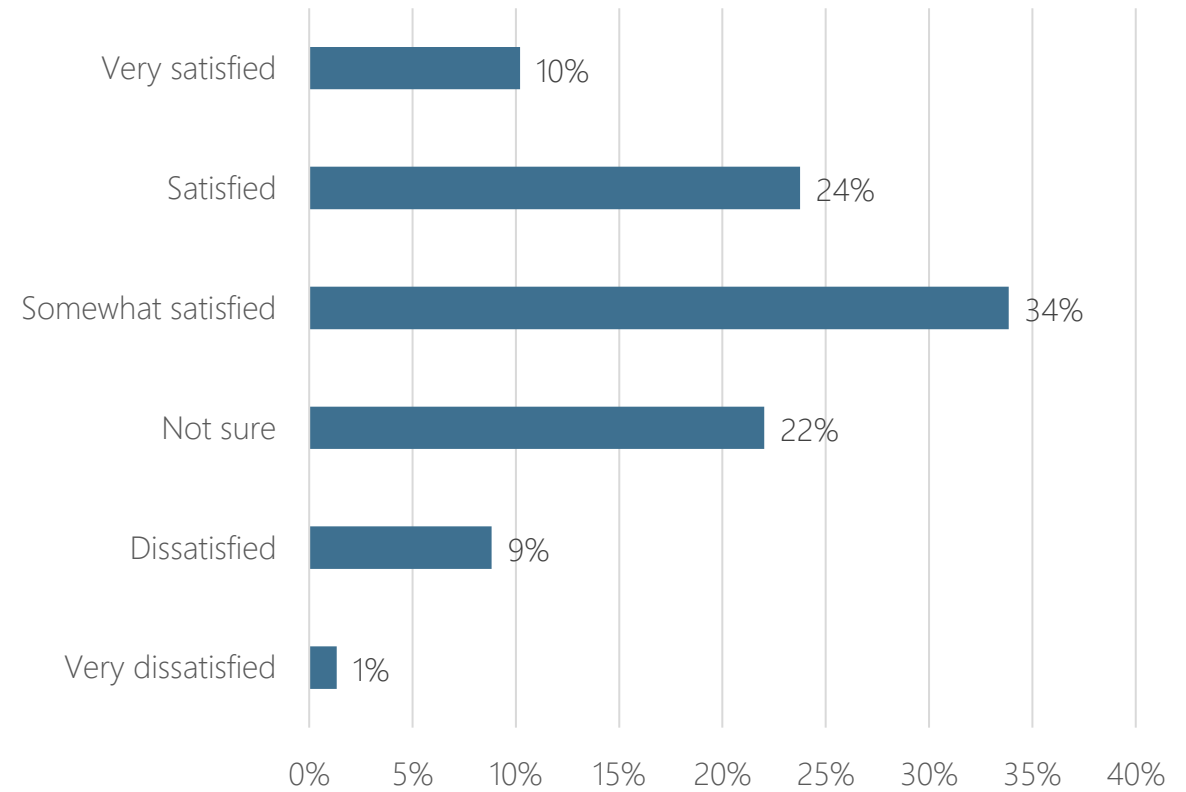
[\(Text\)](#)



## RESPONDENT CHARACTERISTICS

- Mean age: 45 years old
- Females: 51%
- White: 57%
- Educated (bachelor/graduate): 34%
- Fishing license: 33.5%
- Waterfowl: 11.5%
- Visited Florida lakes: 69%
- Familiar with hydrilla: 53%

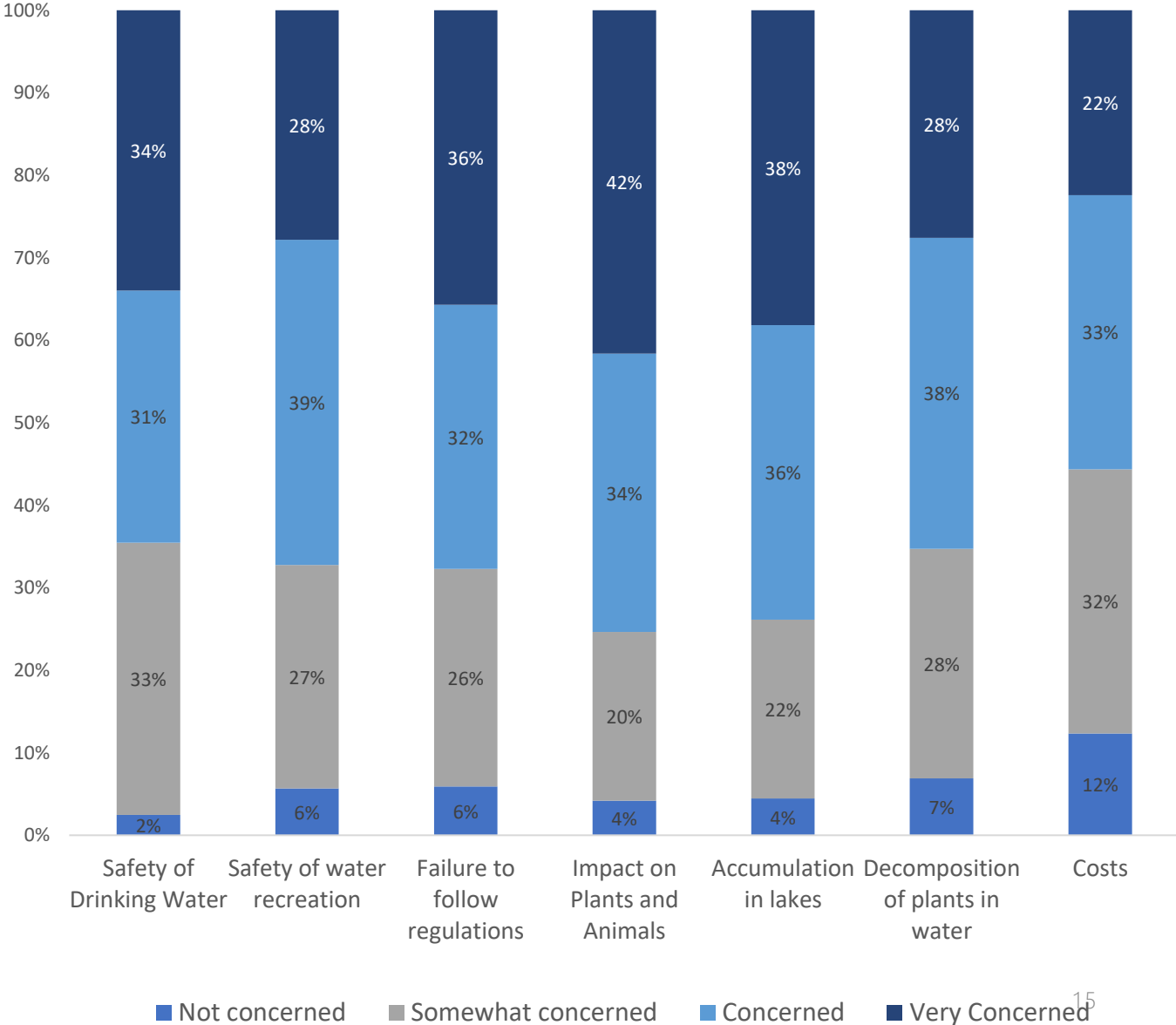
# SATISFACTION WITH HYDRILLA MANAGEMENT





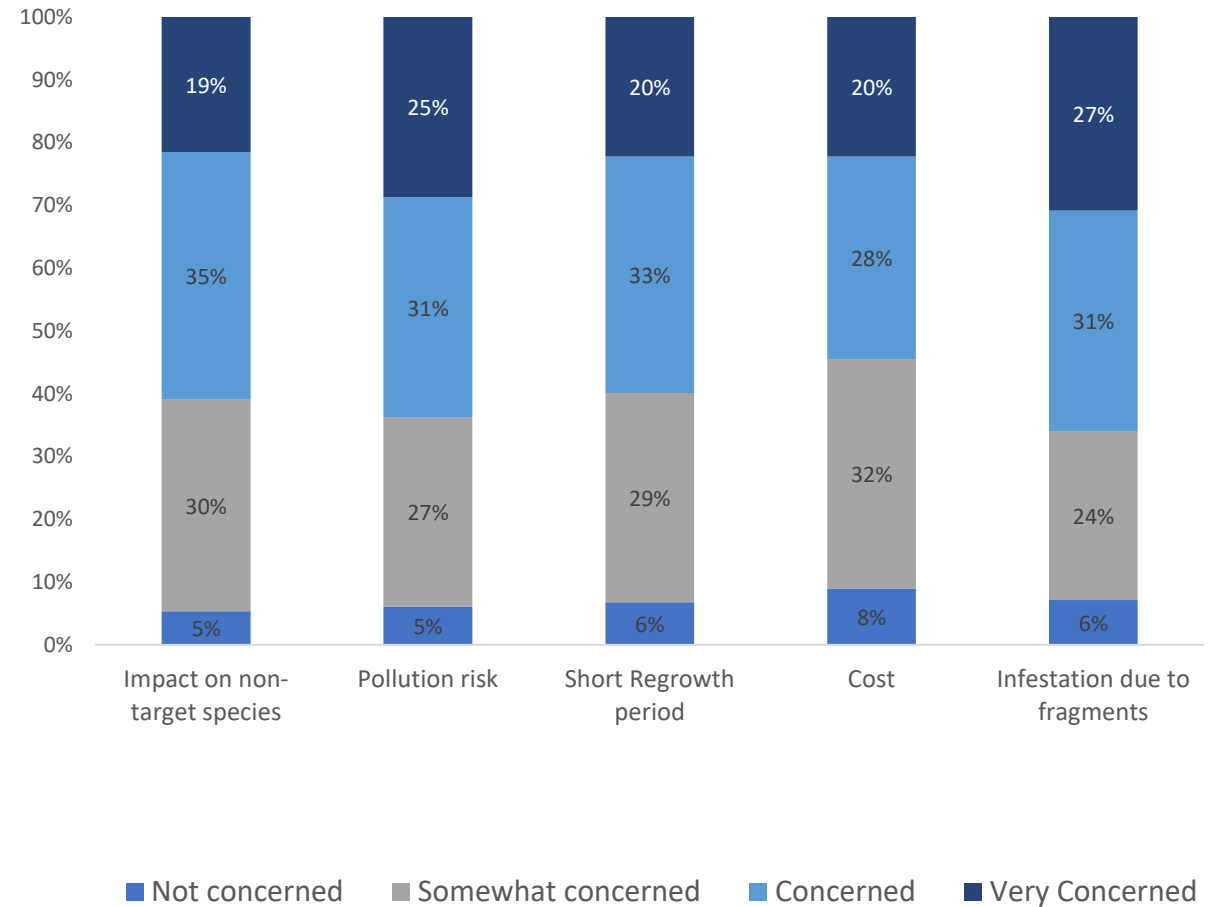
# HERBICIDE CONCERNS

- Concerned: 39%
- Somewhat concerned: 34%
- Not concerned: 16%
- Not sure: 11%



# MECHANICAL HARVESTING CONCERNS

- Concerned: 34%
- Somewhat concerned: 28%
- Not concerned: 26%
- Not sure: 12%



# WTP

Hydrilla Management Approach	Mechanical Harvesting	26.1 <sup>***</sup> (12.3)
	Harvesting and Herbicides	45 <sup>***</sup> (13.5)
Hydrilla Cover Left after Treatment	50%	-48 <sup>***</sup> (13.8)
	75%	-79 <sup>***</sup> (15.2)
Effectiveness (days of suppression)	60 Days	-65 <sup>***</sup> (14.7)
	100 Days	-38 <sup>***</sup> (11.9)
Impact on non-target plants and animals	Medium	-48 <sup>***</sup> (12.1)
	High	-108 <sup>***</sup> (18.4)

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Relative to:

- Aquatic herbicide applications
- 25% cover left
- 300 days of suppression
- Low impact on habitat



# IMPACT OF INFORMATION ON WTP

		No info	Info
Hydrilla Management Approach	Mechanical Harvesting	77*** (15.8)	25 (14.3)
	Harvesting and Herbicides	67*** (15.2)	30* (14.7)
Hydrilla Cover Left after Treatment	50%	-37*** (13.9)	-58* (13.9)
	75%	-58*** (14.6)	-72*** (14.8)
Effectiveness (days of suppression)	60 Days	-38** (14.8)	-66*** (14)
	100 Days	-17 (12.7)	-29* (12)
Impact on non-target plants and animals	Medium	-38*** (12.7)	-49* (12.5)
	High	-100*** (16.7)	-104*** (17.5)

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

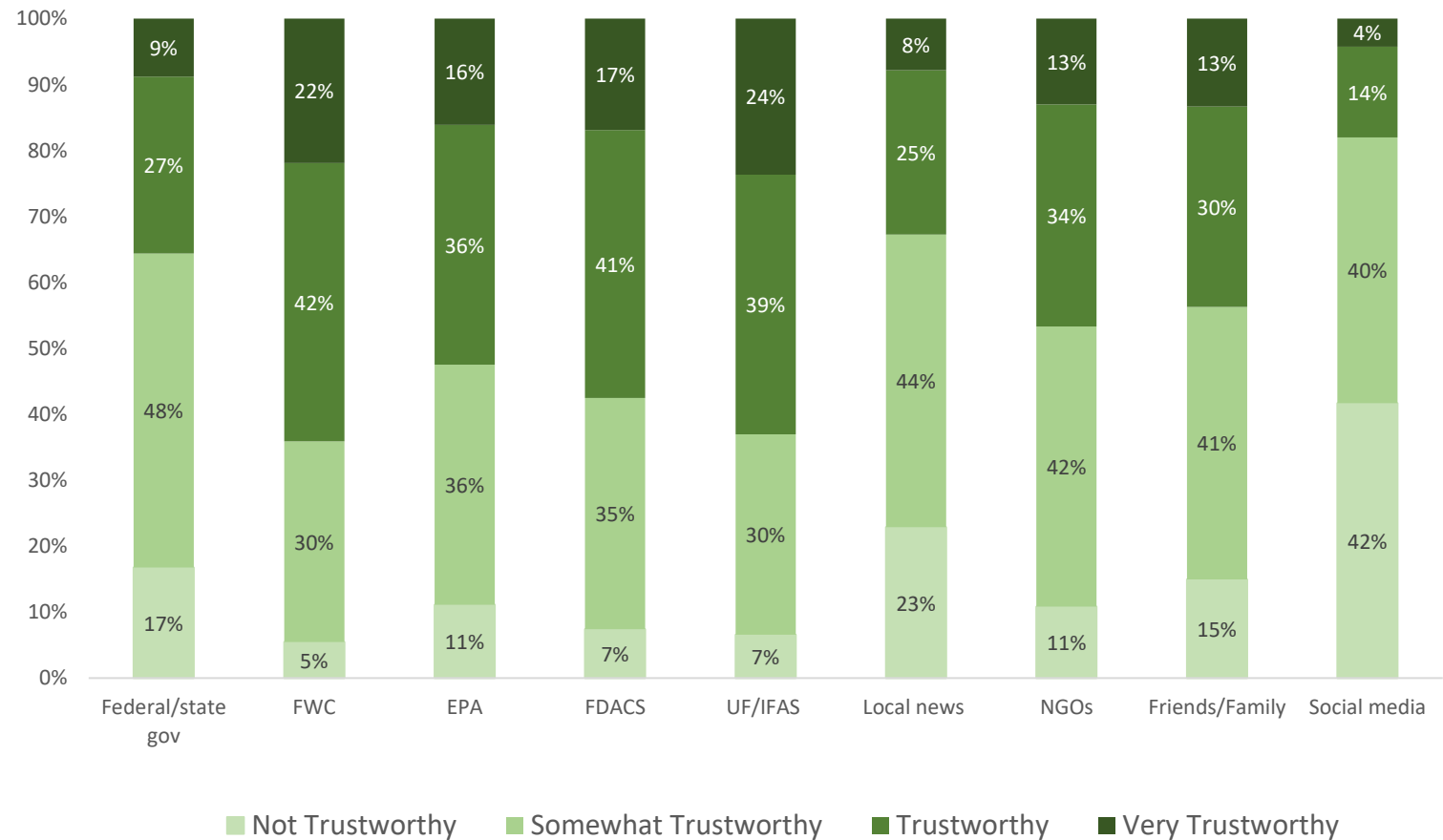
# HETEROGENEITY IN STAKEHOLDER PREFERENCES

		Lake Visitors	Boat Owners	Waterfowl Permit	Fishing License
Hydrilla Management Approach	Mechanical Harvesting	36*** (7.5)	24 (21.8)	78 (70.7)	48*** (11.5)
	Harvesting and Herbicides	50*** (7.5)	42* (21.7)	54 (65.7)	41*** (11.3)
Hydrilla Cover Left after Treatment	50%	-48*** (7)	-59** (22.8)	-170 (101.9)	-40*** (10.7)
	75%	-84*** (8.1)	-102*** (25.9)	-236 (125.4)	-81*** (12.3)
Effectiveness (days of suppression)	60 Days	-62*** (7.5)	-93*** (24.8)	-132*** (87.7)	-52*** (11.2)
	100 Days	-36*** (6.4)	-66** (21.6)	-76** (66.9)	-33*** (9.9)
Impact on non-target plants and animals	Medium	-47*** (6.5)	-63** (21.7)	-42** (59.3)	-45*** (10.3)
	High	-108*** (8.8)	-123*** (28.6)	-161*** (99.4)	-102*** (13.3)

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

# TRUST IN SOURCES OF INFORMATION

- Ordered logistic regression
- Higher income, higher education, lake visitation, and information about management options increases trustworthiness



## TAKEAWAYS

- Overall, high concern of using aquatic herbicides to control invasive plants
- Respondents are willing to pay for a combination of herbicide and mechanical harvesting approaches
- There is substantial heterogeneity in stakeholder preferences
- Providing information about both management options may ease some concerns over herbicide use
- The source (i.e., messenger) of the information is important



**Thank you!**