

Extending the frontiers of citizen science: new applications to lake development, recreation & associations

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Outline

- Thank You!
- Context
- ME VLMP Survey
 - Purpose
 - Research design
 - Implementation
 - Results
 - Development
 - Recreation
 - Lake Associations
- Reflections & Future Directions

2009 VLMP SURVEY

THE UNIVERSITY OF MAINE

LAKES IN MAINE'S CHANGING LANDSCAPE



Please record your name, the lake you monitor, the town(s) in which your lake is located, and the number of years you have monitored this lake for VLMP below.

What is your name? _____

Which lake do you monitor for VLMP? _____

For how many years have you collected information about this lake for VLMP? _____ YEARS

In what town(s) is the lake located? _____

Thank You !

- Our team greatly appreciates your time and attention.
- 75 % response rate
- Thank you for helping to create a more complete picture of Maine lakes !

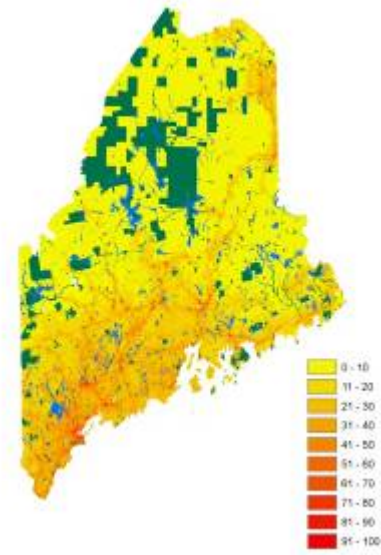


Context – Research Project



- **Sustainable Lake Management in Maine’s Changing Landscape**
 - **Funded by US EPA Collaborative Science and Technology Network for Sustainability Program**
 - **Interdisciplinary team (Bell, Leahy, Vaux, Wilson, Sader)**
 - **Objectives**
 - **Assess vulnerability of Maine lakes to multiple threats at multiple scales**
 - Residential development; water quality; invasive plants and fish; recreation conflict and congestion; remoteness
 - State- and lake/community- scales
 - **Develop useful tools and research products to transfer knowledge to action and promote sustainable lake management**

Vulnerability assessments



Development pressure



Water Quality
Nutrients
Secchi



Invasives
Plants
Fish



Recreation
Congestion
Conflicts



Remoteness



Vulnerability



Data gaps

- **Incomplete picture of Maine's lakes**
 - Residential development
 - Recreation
 - Institutions



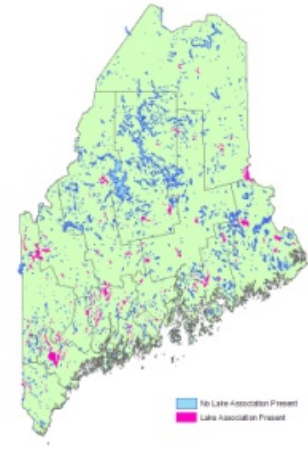
Hill (2009), “From Secchi Disk to Bucket Scope,” *Volunteer Monitor.*



Photos:

<http://www.mainevolunteerlakemonitors.org>

From Secchi Disk to Bucket Scope to Housing Development, Recreation and Institutional Assessments



Photos:

<http://www.mainevolunteerlakemonitors.org>

Frontiers

- **Can citizen scientists monitor important sustainable lake management indicators such as development, recreation, and associations? (Carr, 2000; Savan et al., 2003)**



Frontiers

- **Citizen science often proven:**
 - **Accurate, credible, & reliable (Bandon et al., 2003; Fore et al., 2001, Tudor & O'Malley, 2007)**

- **Citizen science useful for:**
 - **Social learning (Krasny & Lee, 2002)**
 - **Building partnerships (Oscarson & Calhoun, 2007)**
 - **Communication (Calhoun & Reilly, 2007)**
 - **Influencing agendas (Lawrence, 2006)**

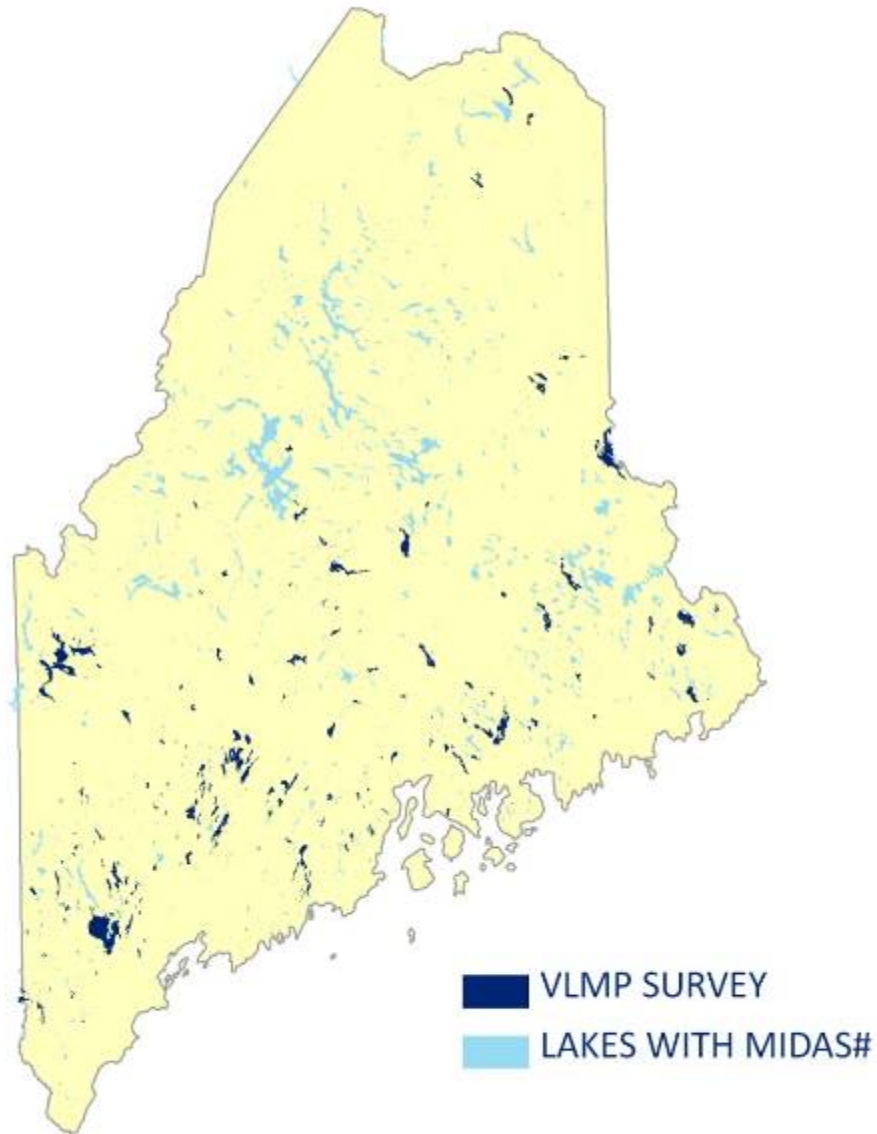
Frontiers

- **Concerns to consider in social monitoring:**
 - **Non-comparability of the data**
 - **Data completeness**
 - **Standardized protocols**
 - **Distribution across time and space**
 - **Subjectivity or bias**
- **These are concerns in biophysical monitoring as well (Brandon et al., 2003; Gouveia et al., 2004; Engel & Voshell, 2002; Goffredo et al., 2004; Lepczyk, 2005)**

2009 VLMP Survey

- Design and implementation (Dillman 2008)
- Sent survey to all (417) active water quality monitors (76.02% response rate)
- Surveyed volunteer lake monitors to gain information about
 - Built environment
 - Recreational use
 - Changes over time
 - Housing
 - Water quality
 - Invasive plants
 - Recreation
 - Local lake management
 - Lake, road, and watershed associations

302 Respondents (236 Maine Lakes)



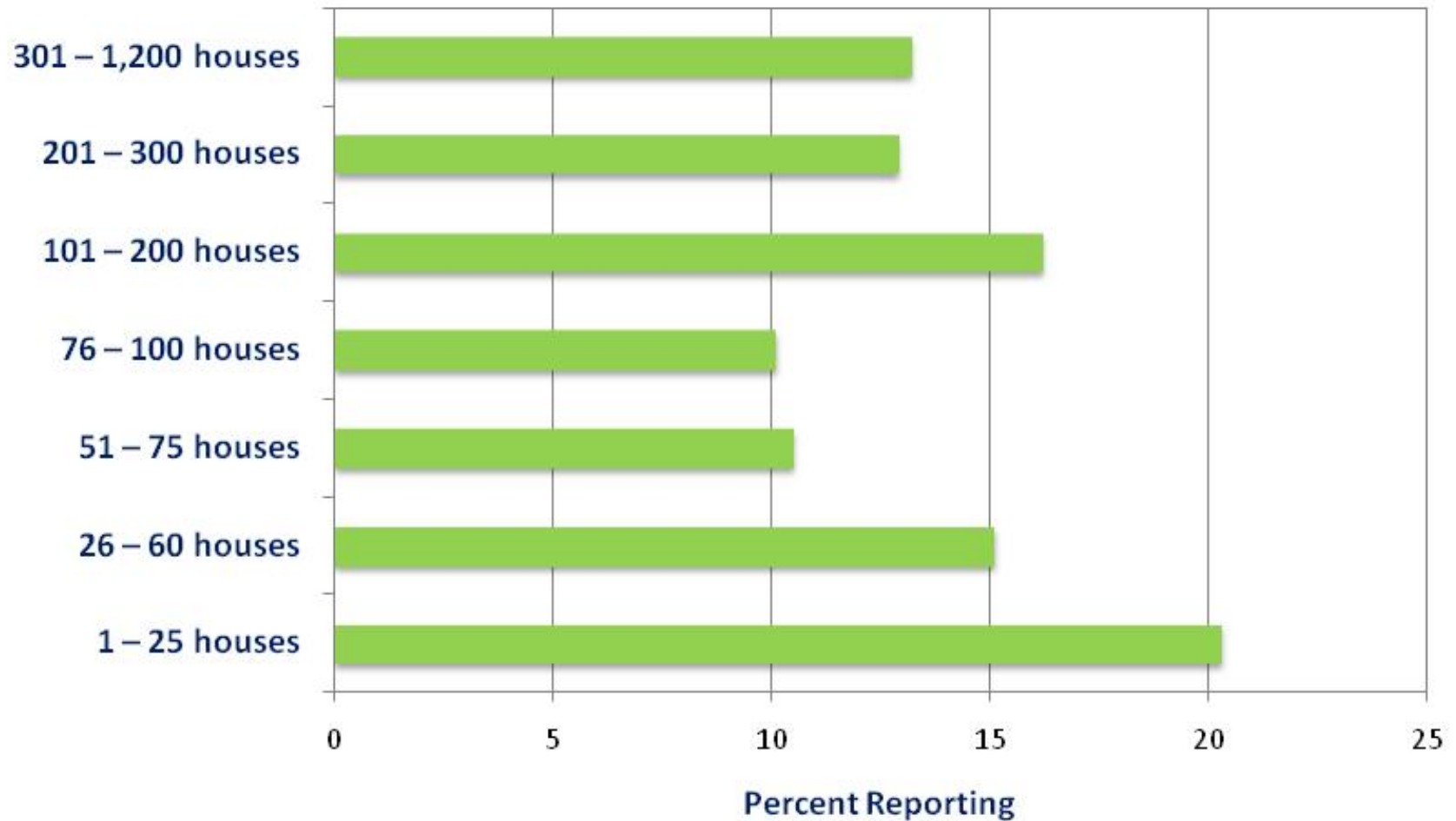
Research – 2009 VLMP Annual Survey

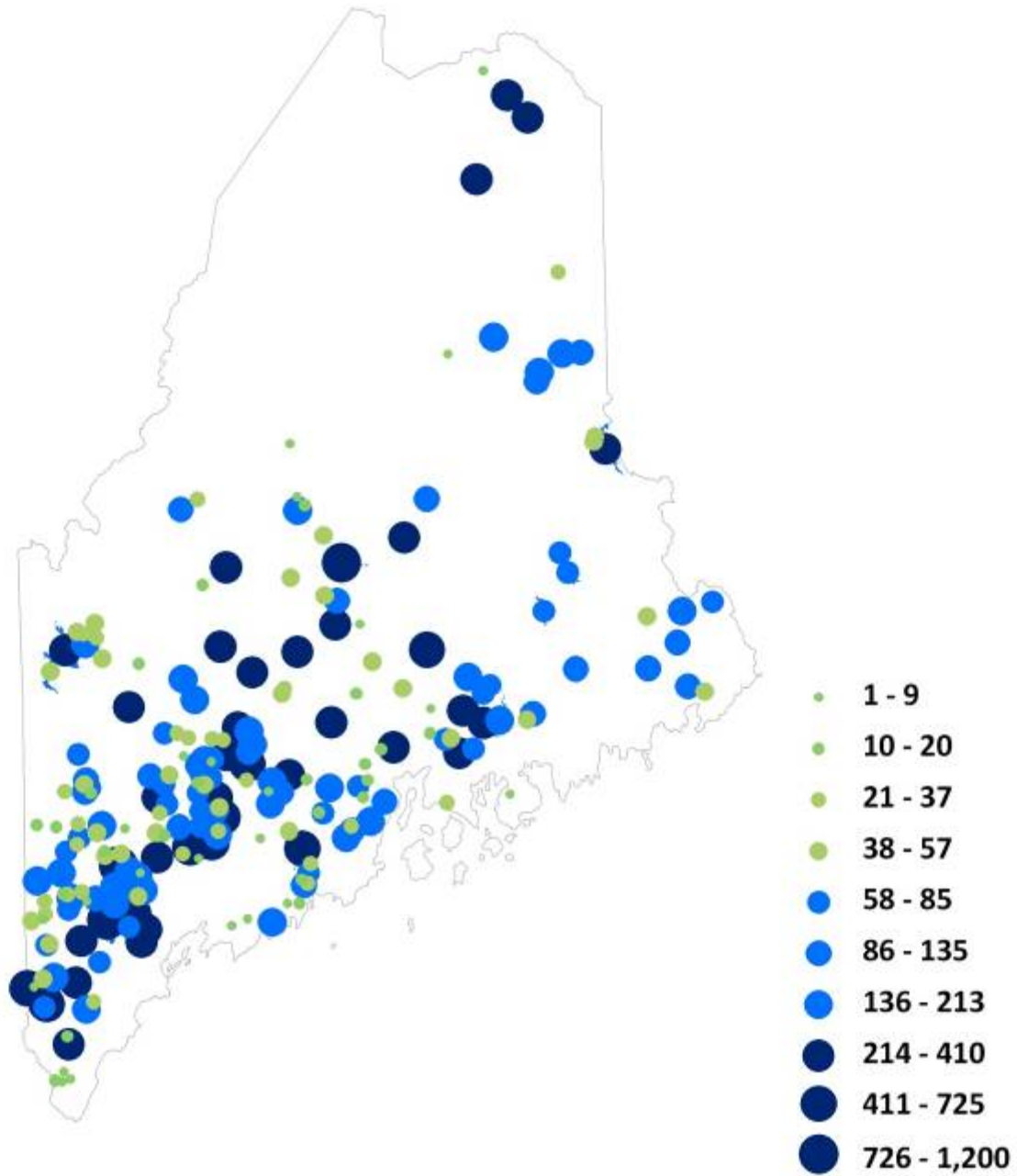
- **Preparing a technical report of survey responses. Will share with VLMP when completed.**
- **Examining feasibility of using citizen scientists to fill in these significant data gaps.**
 - **Planning a formal comparison of stated responses and objective data**
 - **Ground-truthing on subset of pilot lakes**

Lake development

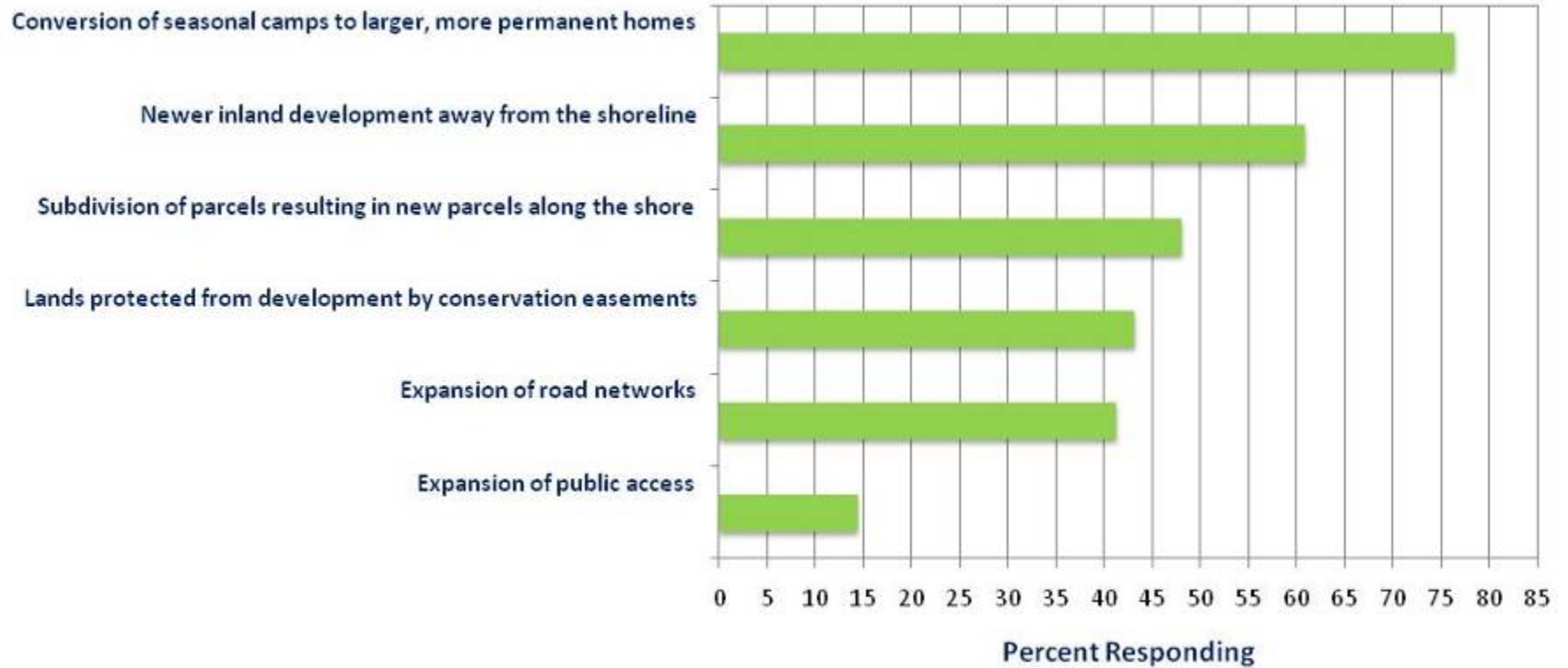


Number of Houses on the Lake





Changes occurring around the lake



VLMP Survey Comments

Have other changes related to housing occurred on your lake?

- Themes included conflicts with development and size of development, water quality, lot maintenance (lawns and clear cutting), zoning, and conversions from seasonal to year-round housing.
- The most frequent comment was in regards to development and size of development. Respondents commented that **many camps were being enlarged, rebuilt or renovated**. **New developments**, such as condominiums, created conflicts such as construction runoff. Also, respondents mentioned **lot maintenance** (rain impervious surfaces and landscaping) and a fear of decreasing water quality due to increased runoff of herbicides and pesticides into lakes.

VLMP Survey Comments

❖ For example:

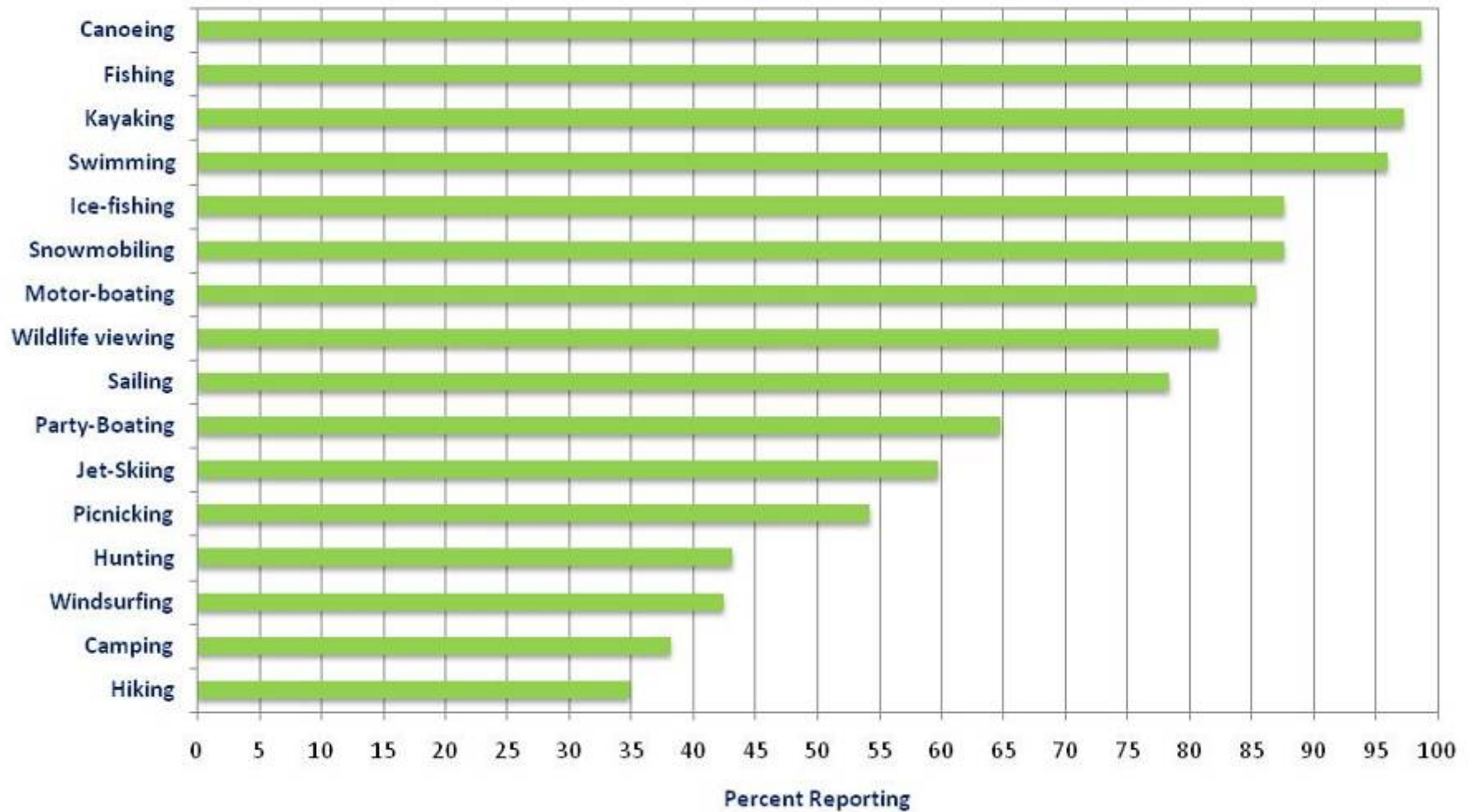
- "Larger and more expensive camps are being built. Many camps are turning into year-round homes."
- "A large home was built within the last few years, back from the pond out within the watershed, with no silt fencing erected. Substantial runoff entered our pond and new aquatic waterplants have emerged around the shoreline; pickerelweed is increasing."
- "My concern is more and more vegetation has been removed close to the shoreline. Trees and bushes have been replaced with lawns. Code enforcement has been strict on building expansions (sqft.) but lax when protecting the landscape."



Lake recreation



Types of Recreational Activities On Lakes

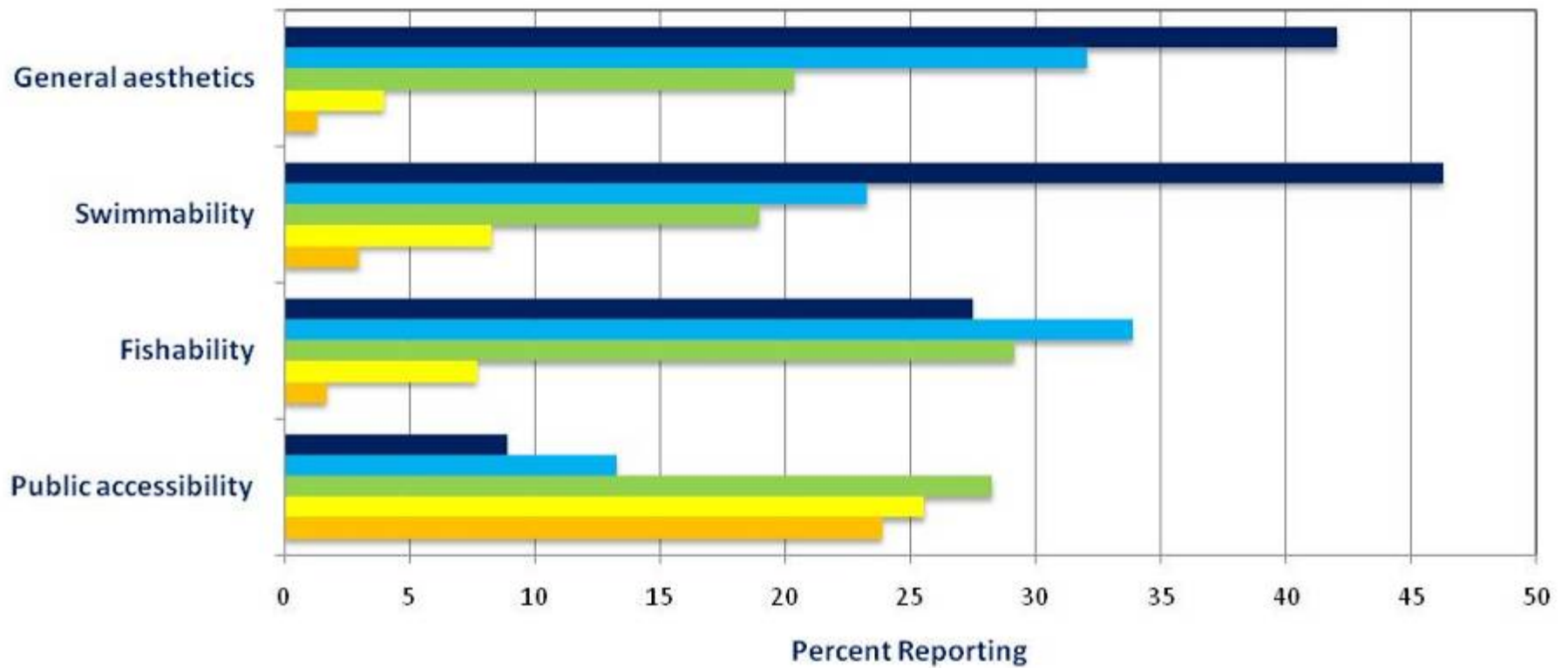


Number of watercraft on a typical Saturday in July

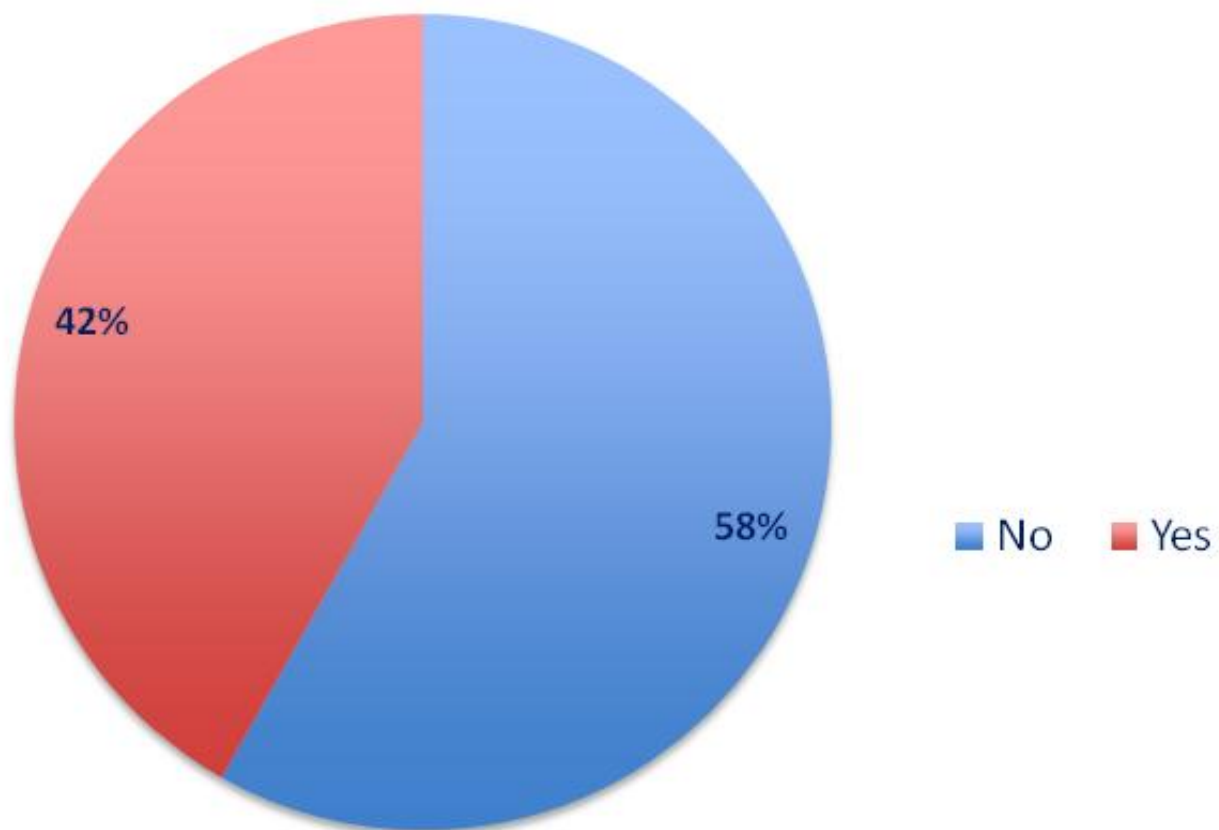
Type	N	Mean	Median	Range	SD
Motorboats	293	12	7	31	15.6
Kayaks	295	7.3	5.5	40	6
Canoes	296	4.4	3	68	4.4
Jet skis	292	4.1	2	109	7.7
Party boats	294	4.8	2	87	8.6
Sailboats	292	2.5	2	71	3.8

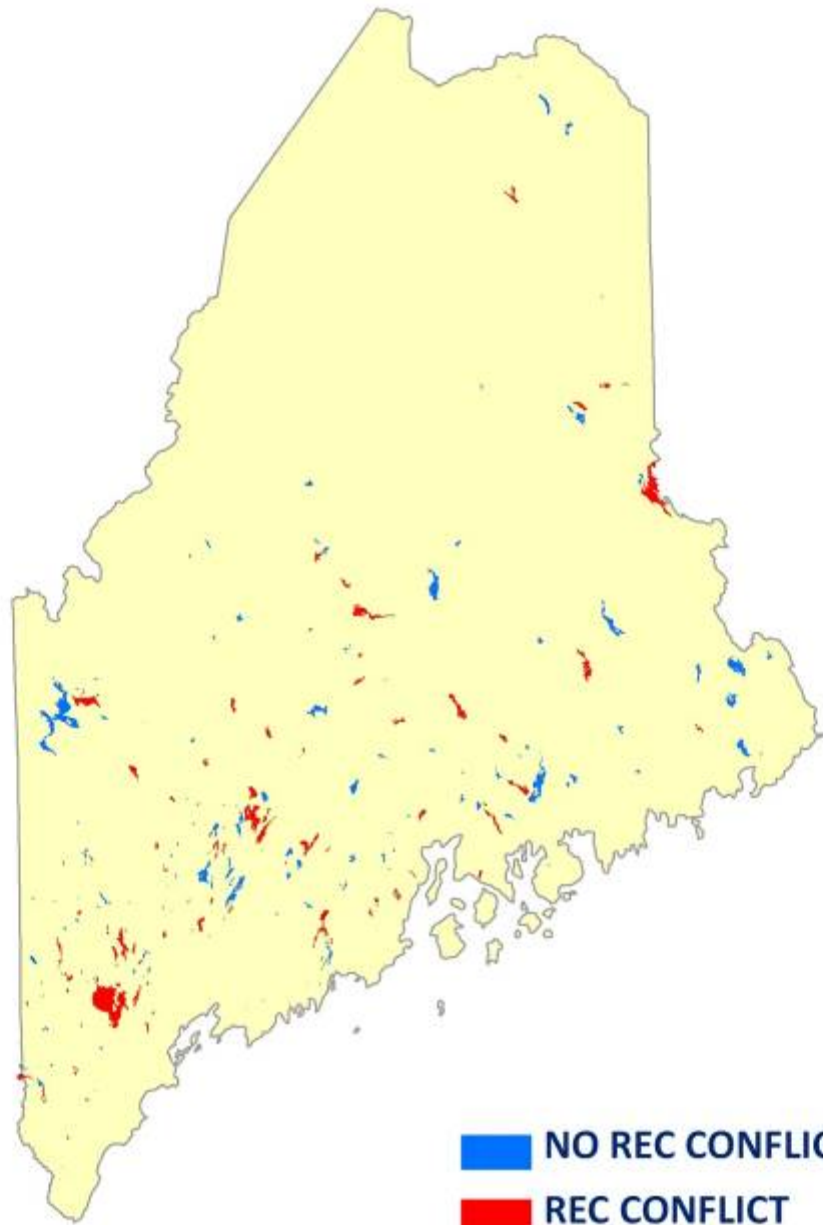
Quality Ratings

■ Excellent ■ Very Good ■ Good ■ Fair ■ Poor



Are there conflicts among different user groups on your lake?





NO REC CONFLICT

REC CONFLICT

VLMP Survey Comments

Are there conflicts among different groups of recreationists on your lake?

- Themes included conflicts with **jet skis**, boat conflicts (**motorized v. non-motorized**), and **general** recreation conflict.
- The most frequent comment was in regards to **jetskiers**. Conflicts included noise, waves, interference with other recreationists, ecological impacts, and impacts on wildlife.

VLMP Comment Summaries

For example:

- *"Use of jet skis on this small (185 acre) pond is negatively effecting the quality of life for others. This pond is mostly used to fish, swim, and to enjoy non-motorized craft. Fools on jet skis on such a small pond are also a major threat to our nesting loons in the spring."*

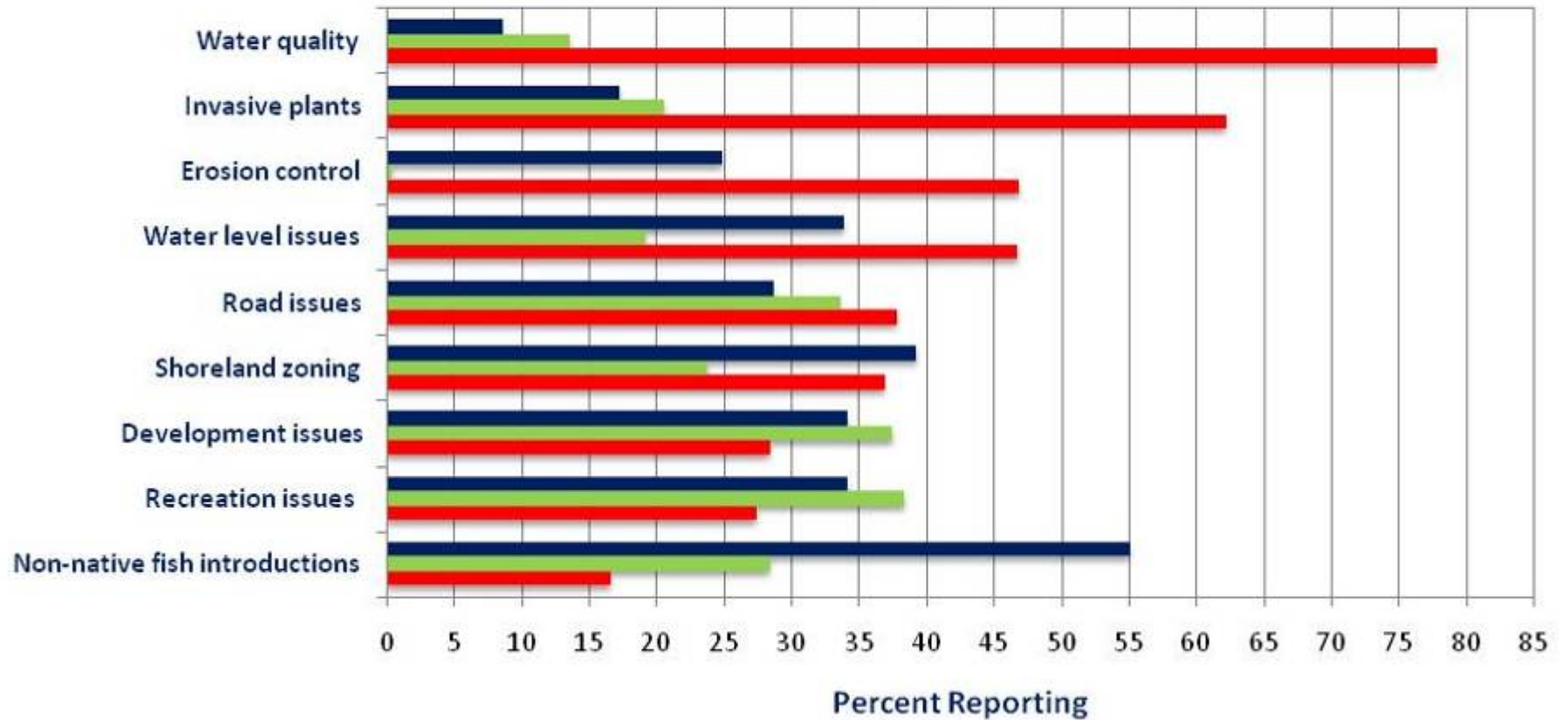


Lake associations



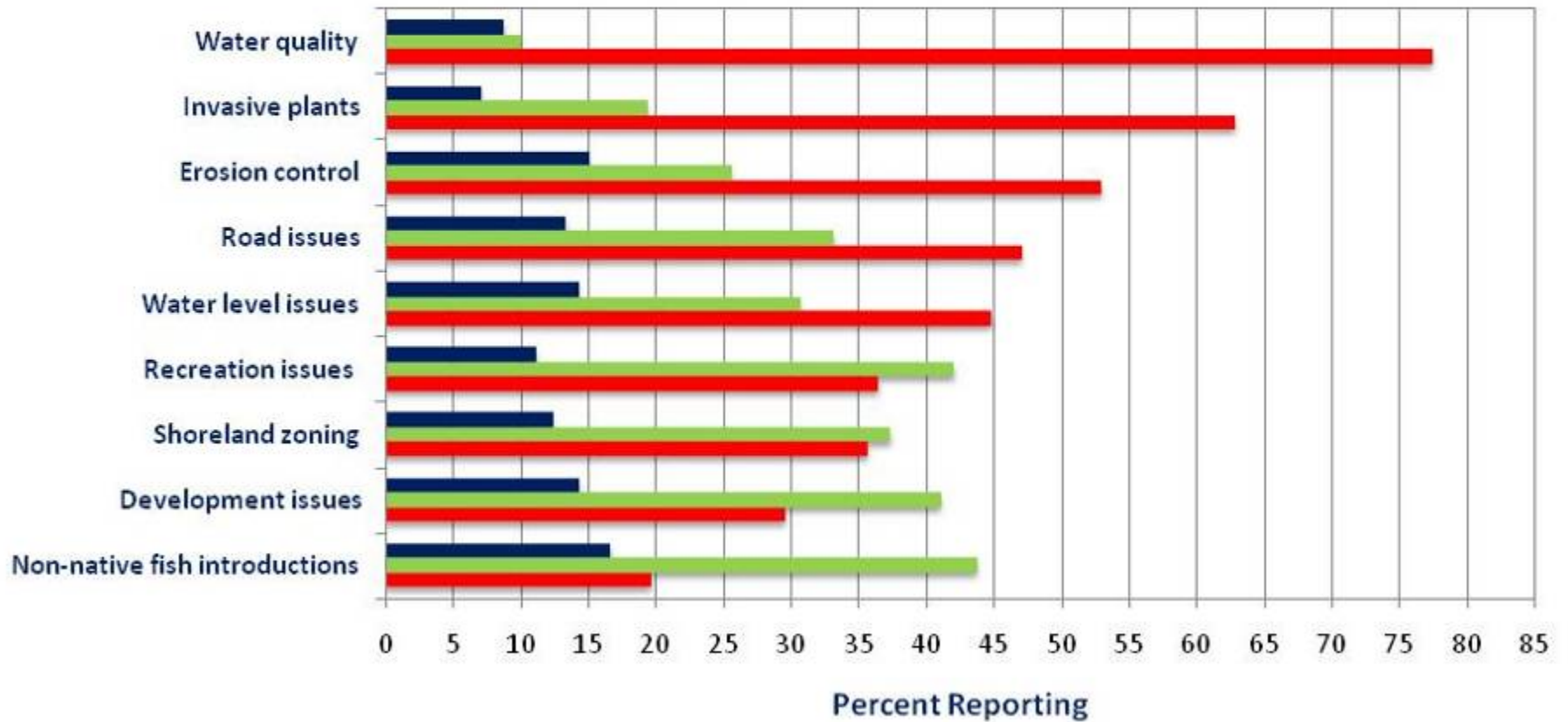
Association Attention to Issues

■ Less Attention ■ Moderate Attention ■ More Attention



Association Success on Issues

■ Less Success ■ Moderate Success ■ More Success

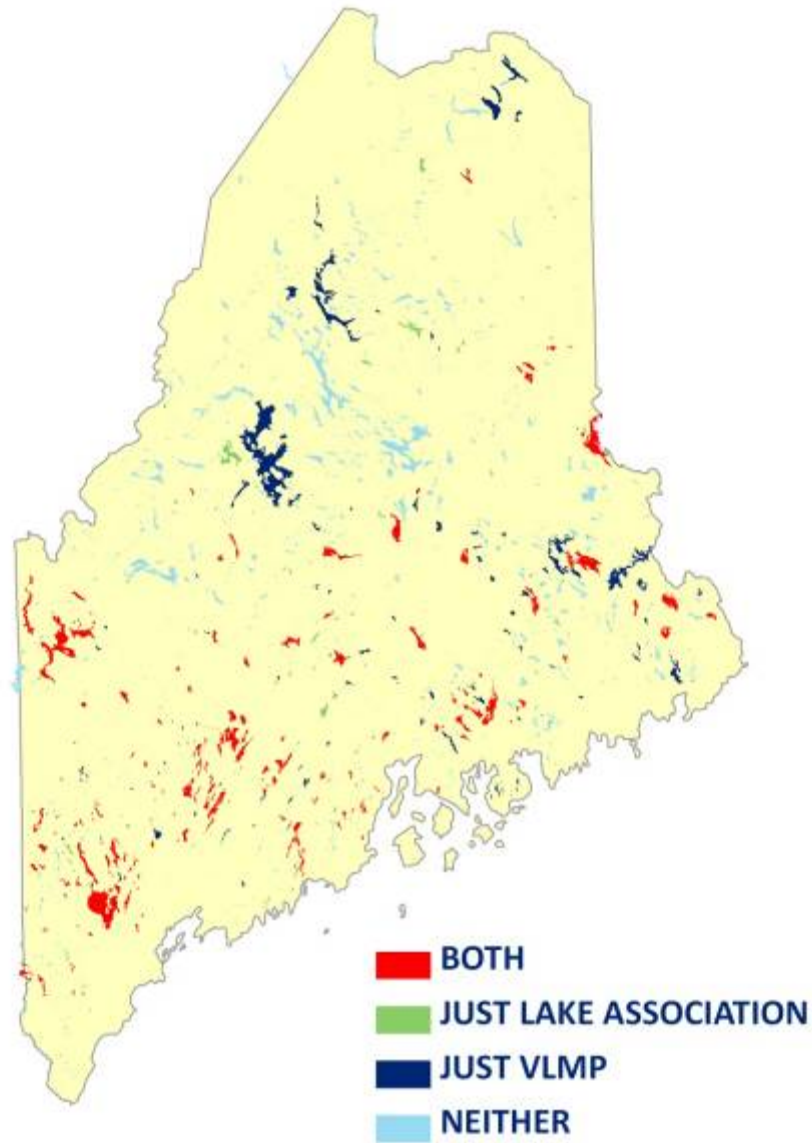


Lake associations

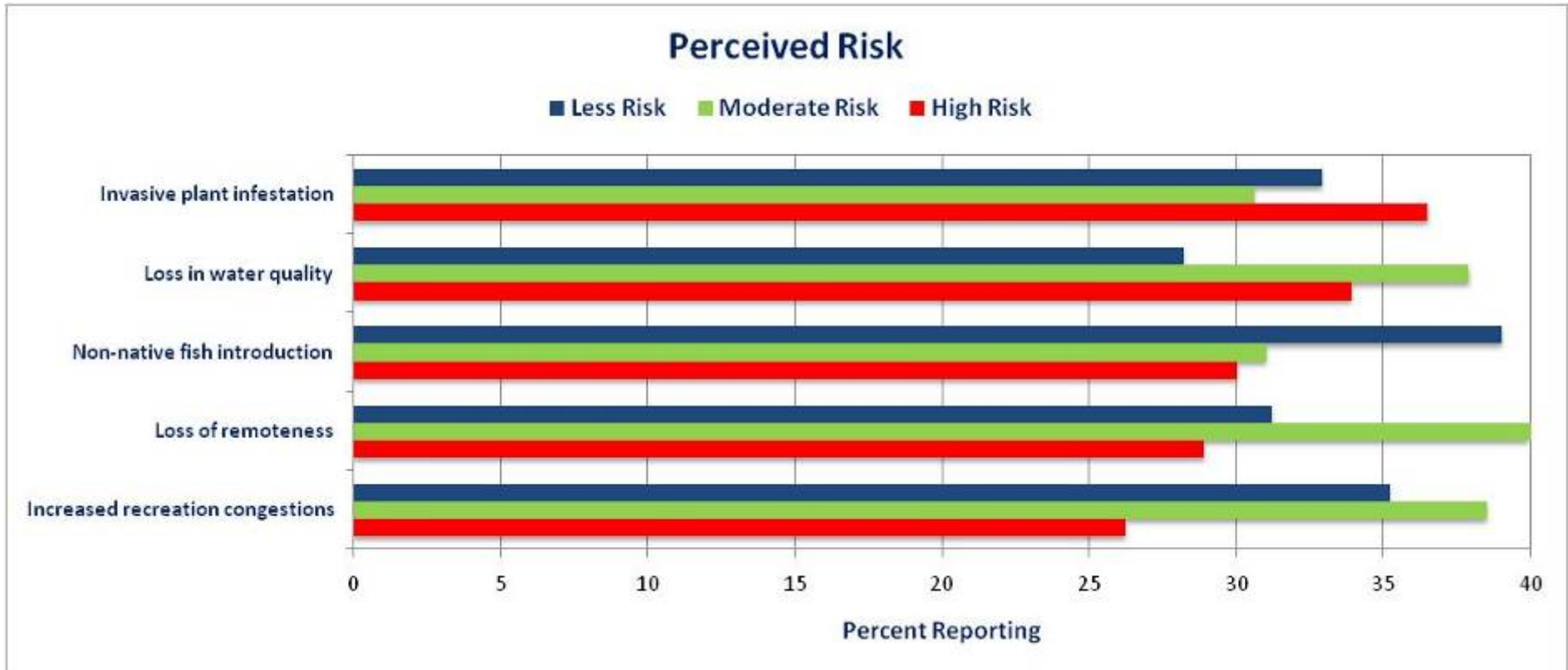
- Lake associations are more likely to be present around lakes...
 - with a boat launch
 - with a significant bass or cold water fishery
 - near a known invasive plant site
 - on the NPS priority list
 - with recent housing construction
 - with higher housing unit density
 - with a volunteer lake monitor
 - that cross multiple jurisdictions
 - not protected by special LURC zoning

Variable	Coefficient	P-value	Marginal effect
Constant	-5.3130	0.0000	-0.1277
<i>Resource characteristics</i>			
SHORE	0.0029	0.0550	0.0001
DEPTH	0.0015	0.0837	0.00003
WATER SOURCE	-0.5333	0.1299	-0.0103
BOAT LAUNCH	0.5801	0.0046	0.0139
DAM	0.0480	0.9514	0.0011
INVASIVE PLANT	1.9058	0.0043	0.1190
FISHERY	0.6785	0.0279	0.0160
<i>Community characteristics</i>			
REGIONAL CENTER	-0.0033	0.6874	-0.0001
SEASONAL POPULATION	-0.0019	0.7022	-0.0001
PERCENT BUILT 1990-2000	0.0358	0.0095	0.0009
MEDIAN HOUSING VALUE	0.0053	0.0628	0.0001
HOUSING UNIT DENSITY	0.0073	0.0287	0.0002
NATURAL RESOURCE EMPLOYMENT	-0.0214	0.7363	-0.0005
RECREATION EMPLOYMENT	0.0218	0.7308	0.0005
<i>Institutional characteristics</i>			
VLMP	0.3356	0.0272	0.0081
JURISDICTIONS	2.4885	0.0000	0.1575
LURC	-0.9553	0.0317	-0.0171
LnL	-448.2669		
BIC	1030.2225		
Pseudo R2	0.4385		

* Marginal effects are calculated at the mean values of the explanatory variables.
 Bold indicates significance at the 0.05 level.



Vulnerability



VLMP Survey Comments

Final Thoughts from Survey Respondents:

- Themes included **collaboration, or lack there of, with lake associations and other organizations, collaboration conflict, water level, access, recreation, development changes, and erosion.**
- There was a great deal of feedback regarding **interactions with lake associations** and other groups and organizations, both nonprofit and government. For example, groups worked closely with **water districts** to help regulate water quality and lake usage. Some respondents cited **good relationships with the state, while others reported not enough state support.**
- Access for recreation users was also a concern, particularly for boaters, and included conflicts and **differing opinions over how much access should be allowed.**

Lessons learned so far

- **Data on human dimensions and other lake characteristics are sparse**
 - opportunities for innovative solutions
 - citizen science collection – THANK YOU!
 - provided immediate help with project
- **Repeatability**
 - Volunteer overload
 - Finding the appropriate volunteers
 - Rate of change
- **Training and standardized protocols**
 - Caution when asking quantitative assessments
 - Wording of specific questions
 - Consistency of assessments

Lessons learned thus far

- Demand for integration of biophysical and social science research is strong
- Lake database has an eager audience
 - integrating data from various agencies and groups
- Interest of partners is strong
 - widespread support by lake NGOs
 - widespread support by state agency staff
 - media coverage



Thank you !

■ Questions for you:

- What are interesting comparisons we should evaluate using your survey responses?
- What was your reaction to monitoring human dimensions or social settings on your lake?
- Are there other human dimensions that should be monitored?
- Do you see need for other kinds of social science?
- Other feedback?

Questions?

