Valuing the Economic Benefits of Maine's Great Ponds in the 21st Century

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Introduction

Ecological, Economical, and Social Value

Ecological services: critical wildlife habitats, water filtration, flood control, climate regulation

Recreational value: swimming, boating, fishing, hunting

Econ Value of ME Great Ponds study in 1990s:

— **$11 billion/yr in net economic value***

— $5 billion/yr in direct and indirect sales*

*Inflation adjusted to 2023 $

Lake Expenditures v. Net Economic Value

Expenditures

Net Economic Value

Direct: sales directly associated with the good or activity of interest

E.g., fuel, meals, accommodation, fishing tackle, boating equipment

Indirect: additional local sales from direct expenditures received

E.g., local residents spend income received from lake visitors on restaurants, repairs, etc.
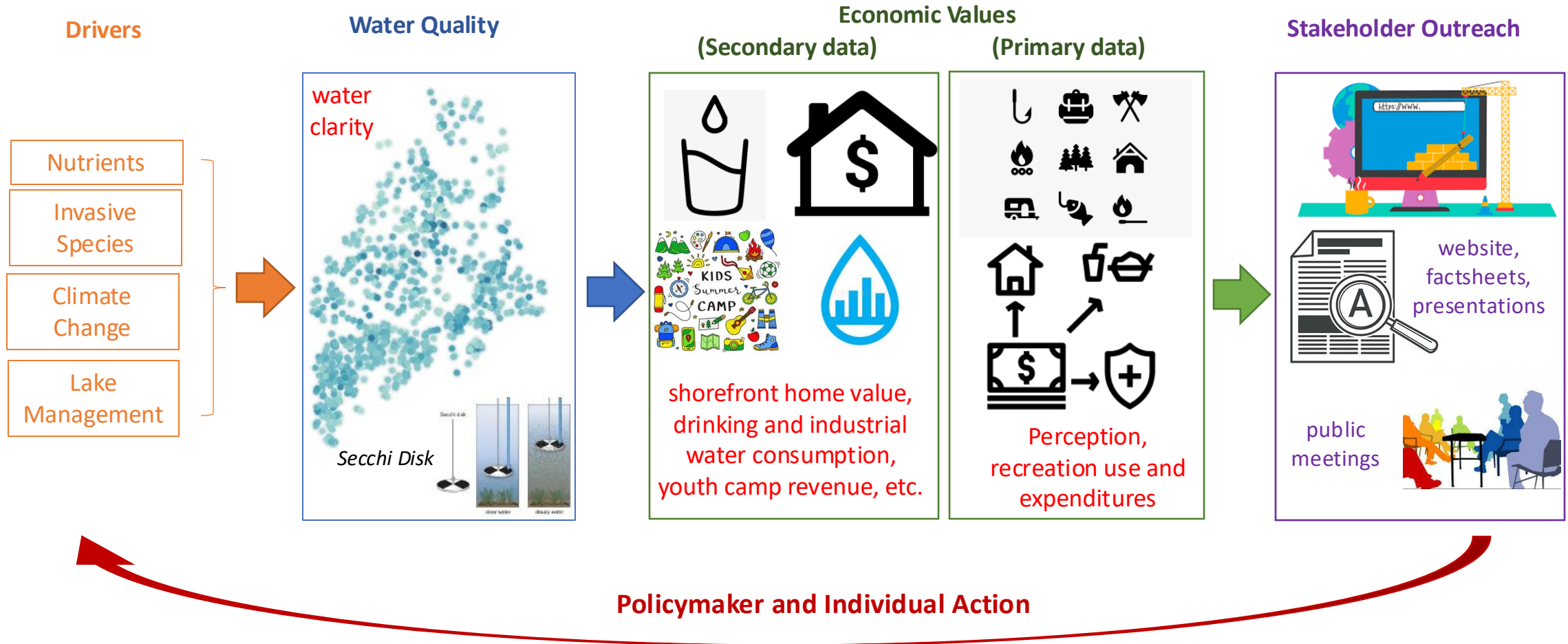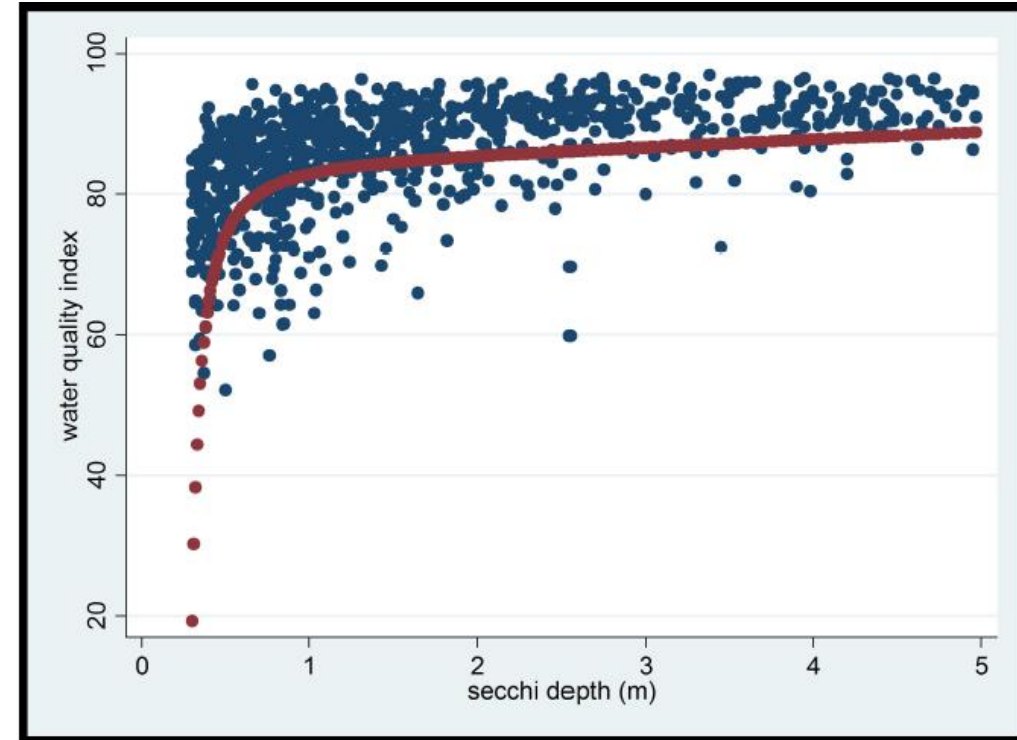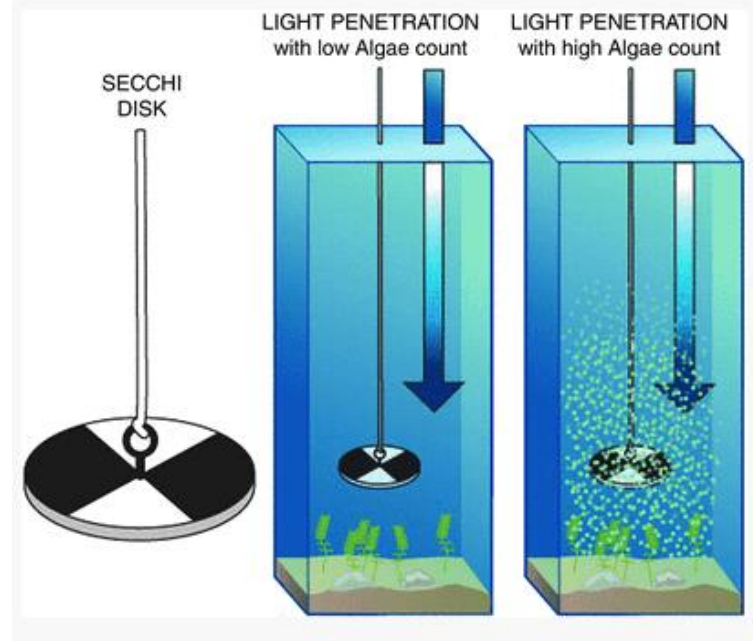
"Profit" or additional value that people receive above their willingness to pay (spend) on a good or activity

E.g., spend $50 to travel to park and purchase entry fee, but willing to pay $100, if required

Current Project Framework

Drivers

Water Quality

Economic Values

(Secondary data)

(Primary data)

Stakeholder Outreach

- Nutrients
- Invasive Species
- Climate Change
- Lake Management

water clarity

Secchi Disk

shorefront home value, drinking and industrial water consumption, youth camp revenue, etc.

Perception, recreation use and expenditures

website, factsheets, presentations

public meetings

Policymaker and Individual Action

Measuring Water Quality /Clarity

SECCHI DISK

LIGHT PENETRATION with low Algae count

LIGHT PENETRATION with high Algae count

4 Key Economic Drivers

Lakefront Property Values
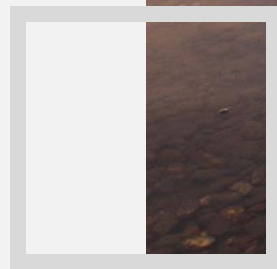
Summer Camps

Recreation

Water Consumption

Recreation and Perception Survey

Survey Info

- Online questionnaire

- Representative sample of Maine public

- Mainers could report:

  - Trips frequency & Expenditure up to 5 lakes

  - Access and barriers to using lakes

  - Perceptions of environment and water quality

  - Socio-demographic data

Lake Recreation Trips & Expenditures

In this first section of the survey, we would like to find out which lakes and great ponds you or any members of your household visited and what you did there. To simplify language, we will use the term `lake' to refer to lakes and water bodies classified as great ponds.

1. Have you or any household members visited any lakes in Maine this year?

   ☐ Yes

   ☐ No

If you answered "No" to question 1, please skip to **question 6**.

We are very interested in your household's usage of Maine's lakes and your typical trip-related expenses while visiting them.

On the table below, we ask you to do the following for the five lakes you most frequently visited:
- Identify the lakes in Maine where you recreated. Count all trips from your home to a lake as a recreation trip. Count any part of a day you recreated on a lake as a day of recreation.

- Record the number of single-day and overnight visits you made between **April 1, 2022, and March 31, 2023**.

- And, for any lake you visited, please estimate the amount of money you spent for a typical trip to that lake and choose the corresponding expense bracket, taking into consideration all of the categories listed below:

Please give a rough estimate of expenses with the letter A, B, C, D, or E using the following scale:

A = **more than $500**
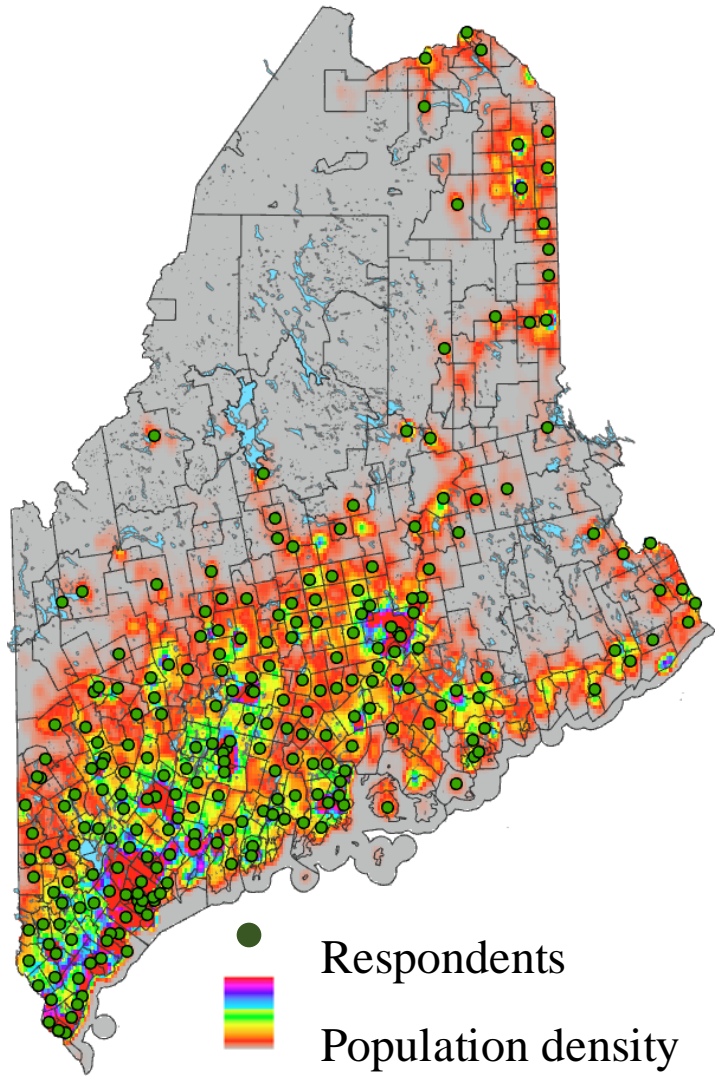B = **$200-$500**
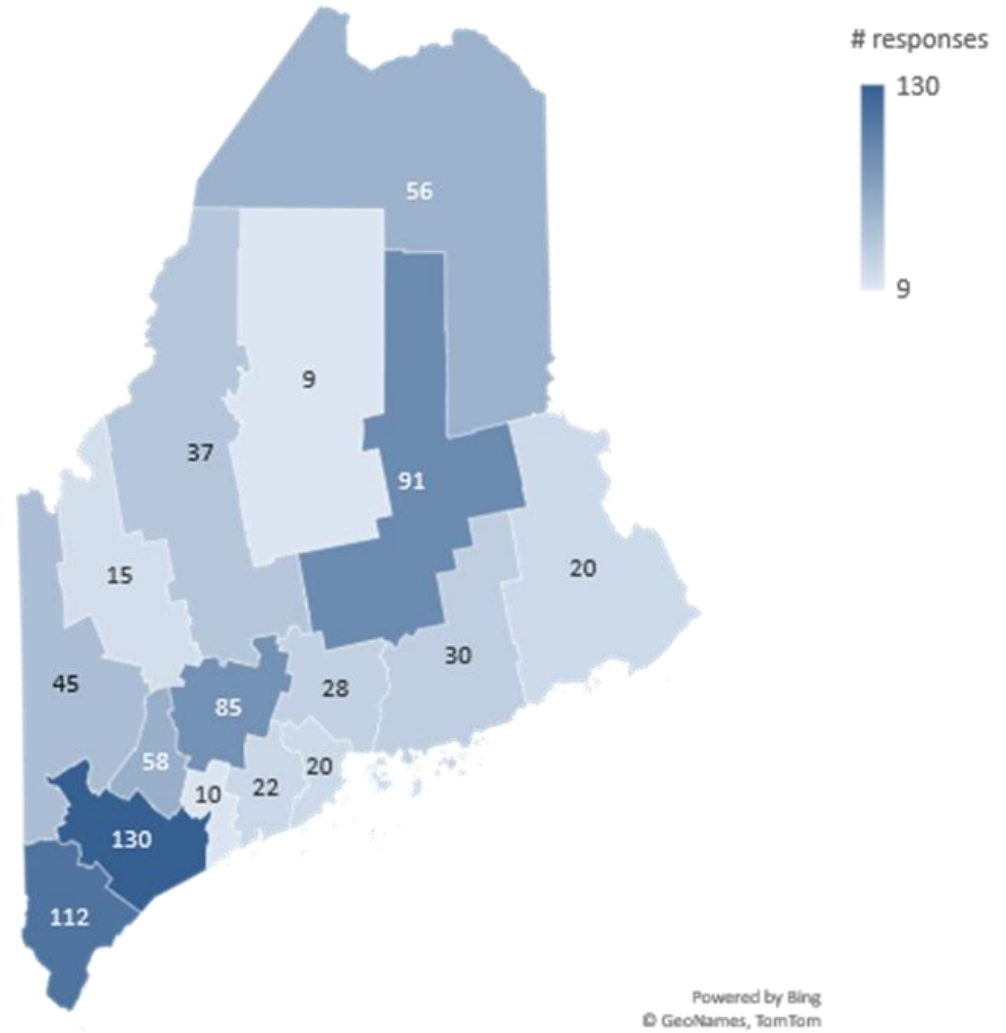C = **$100-$200**
D = **$50-$100**
E = **$20-$50**
F = **less than $20**

Expense estimations should include the following:
- Fishing Supplies (bait, tackle)
- Camping/Picnicking Supplies (bug spray, charcoal, paper plates)
- Food and Beverages (restaurants, grocery/convenience stores)
- Lodging (camping fees, hotels, cabin rentals)
- Boat Fuel
- Equipment rentals (boats, lifejackets)
- Other miscellaneous expenses

Respondents
Population density

Survey Responses by County

responses
130
9

56
9
37
91
15
20
45
85
28
30
58
20
10 22
130
112

Powered by Bing
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768 respondents total

Connection to Lakes

Do you own a house or camp that has waterfront access to a lake?

Are you part of a lake association and/or local environmental group?
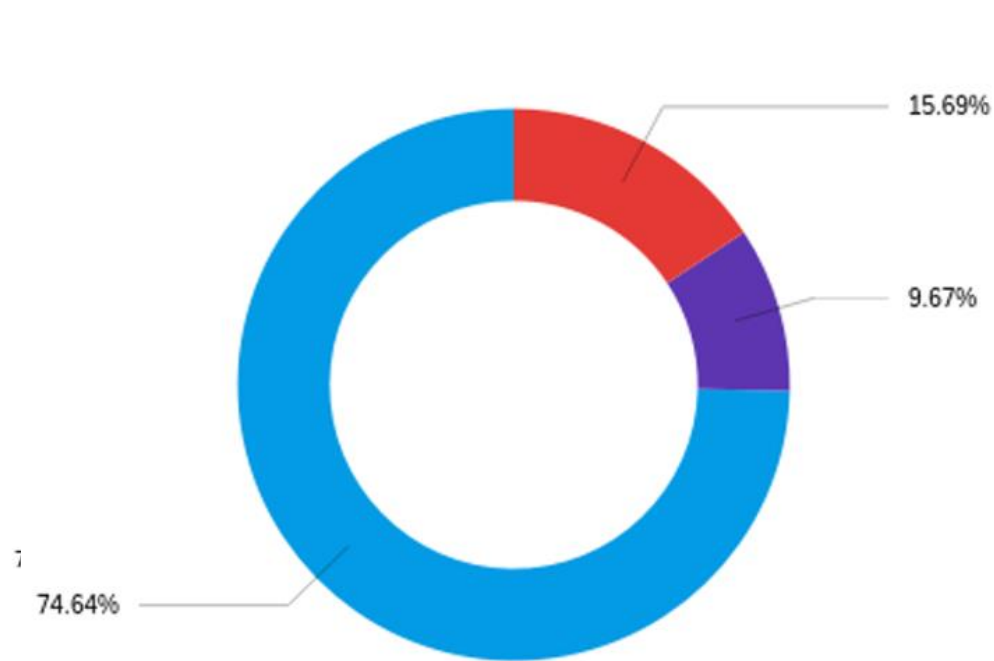
Legend (left chart): Yes, my primary residence · Yes, a secondary or vacation home · No
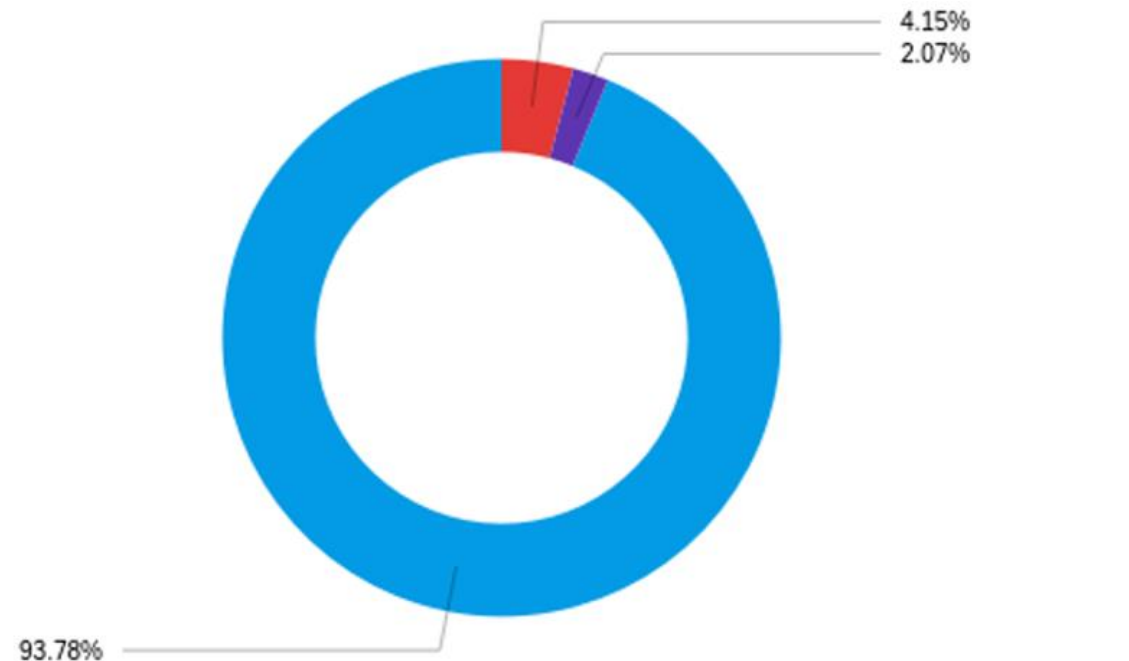
Legend (right chart): Yes, a lake association (if yes, please list) · Yes, an environmental group (if yes, please list) · No

Key Findings

- 77% of residents visited lakes

- Majority visited between July and August

- Top visited lakes:
  1. Sebago
  2. Moosehead

- 78% of respondents rate the water quality of Maine's lakes as good or very good

92% of respondents want to take more trips to Maine lakes

Top 3 barriers:

1. Lack of time (70%)
2. Travel cost (57%)
3. Lack of public access (44%)

Most useful resources for visiting lakes:

1. Online maps showing access points
2. Improve parking areas and trails that enable access
3. More public access to lake near home

Underserved Groups

Top 3 groups underserved by lakes:
1. People with disabilities (73%)
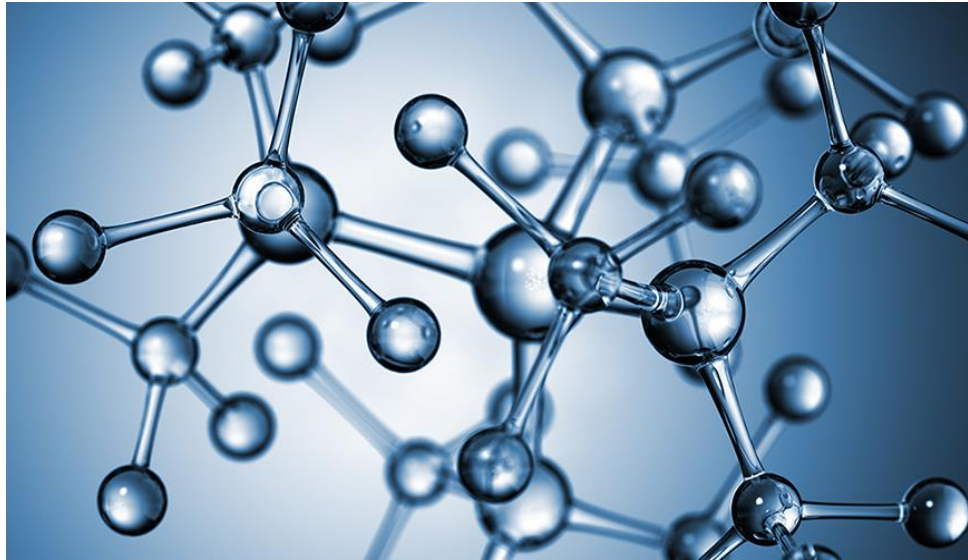2. Seniors (62%)
3. People living in urban areas (34%)

Top factors limiting these groups:
1. Travel cost (66%)
2. Lack of public access (55%)
3. Personal health (44%)

Perceived Impacts to Lake Quality

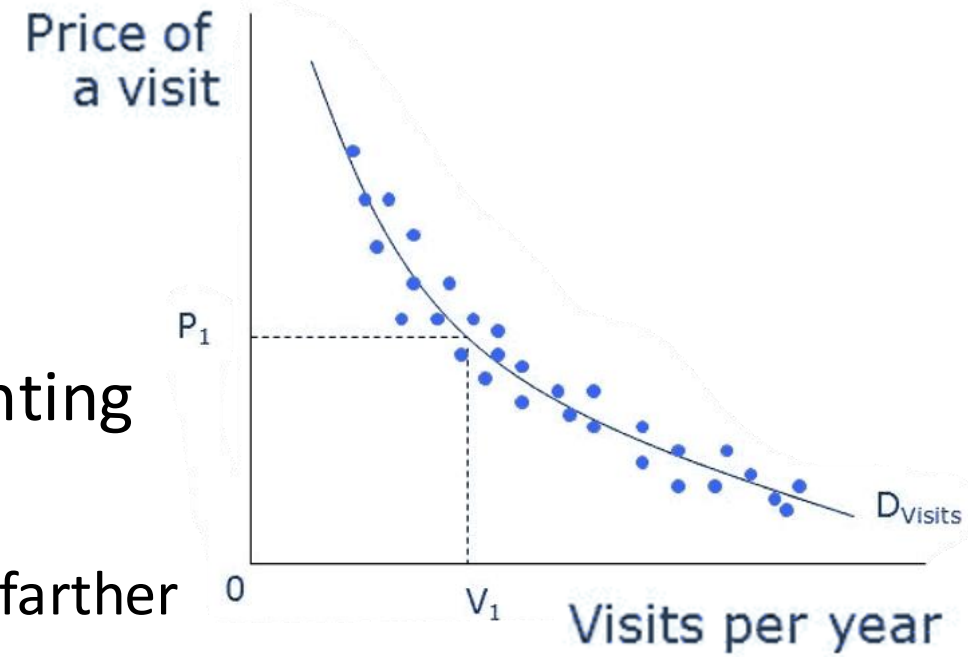1. Trash/litter

2. PFAS / Forever chemicals

3. Algae/green scum/Eurasian Milfoil
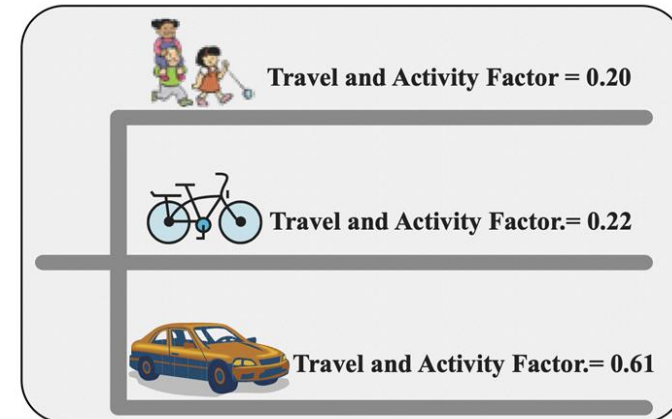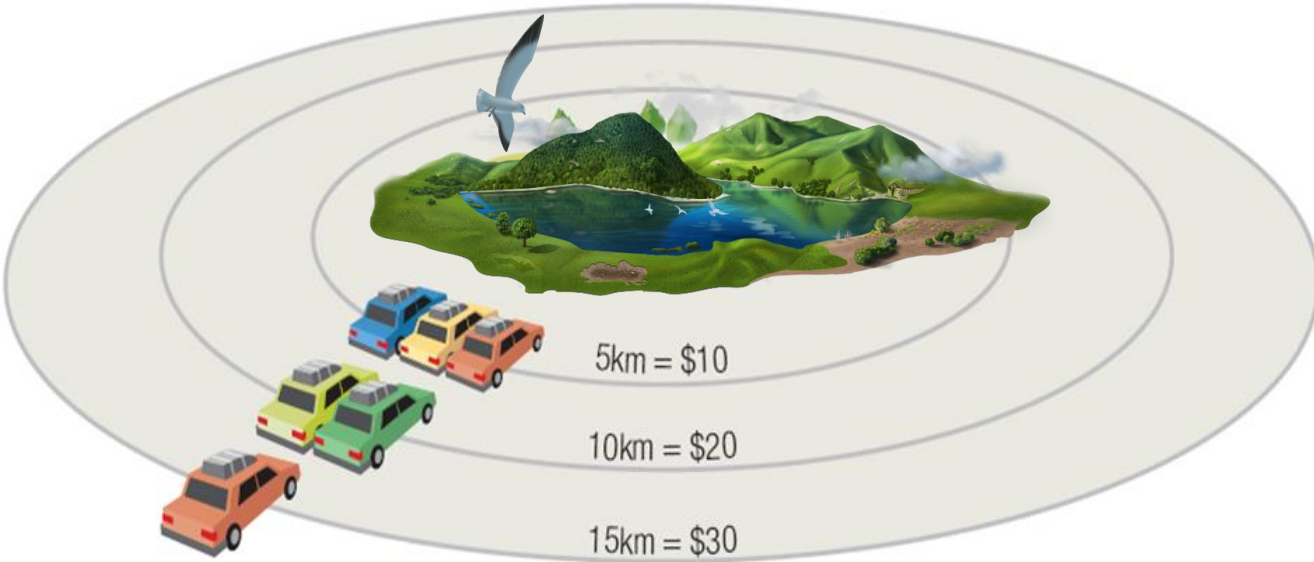
Recreation Value

Recreation Demand

- Collected using survey-based estimates

- Activities include boating, fishing, swimming, hunting

- Estimates based on travel cost
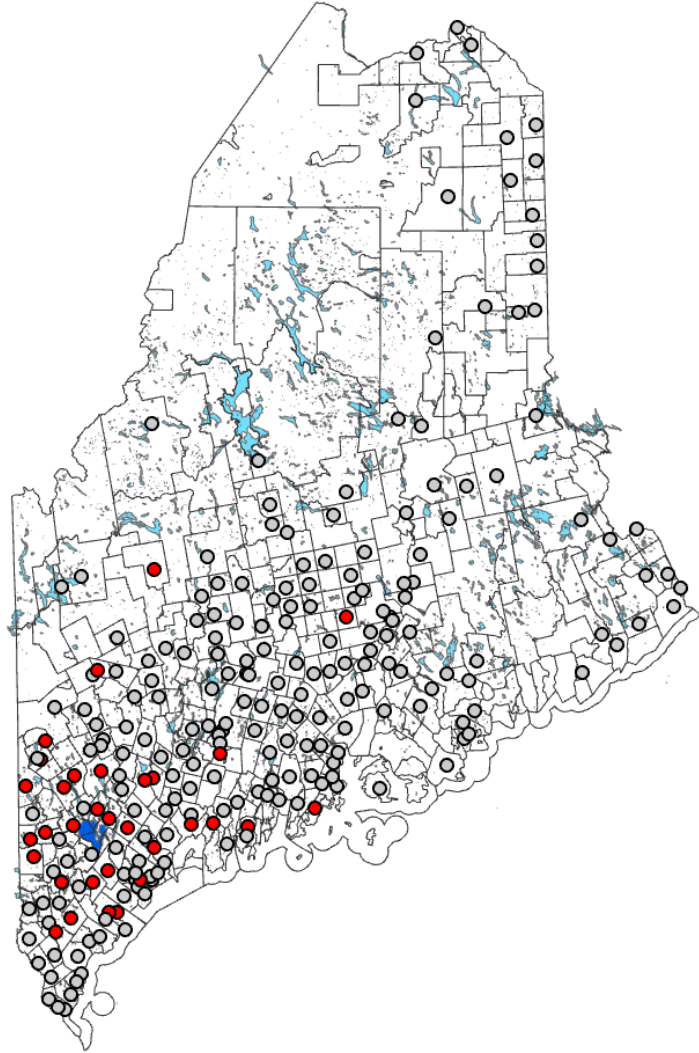 - Higher quality or better amenities → willing to travel farther

Travel cost: the value of a recreational site can be estimated from the number of visitors and the cost of travelling there
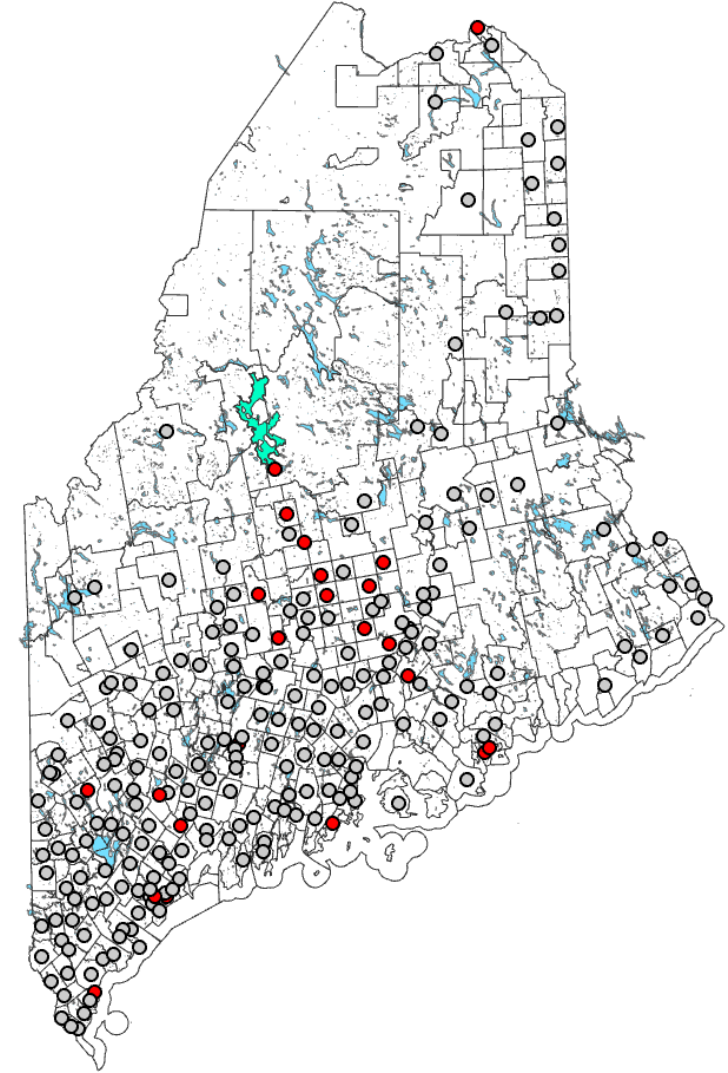

5km = $10

10km = $20

15km = $30

House

Travel and Activity Factor = 0.20

Travel and Activity Factor.= 0.22

Travel and Activity Factor.= 0.61

Lake Recreation Survey

Trips frequency & Expenditure up to 5 lakes (150 different lakes in responses)

- 2022 actual trips (13.3 trips/ person/ yr)

- Anticipated trips – water quality changes (2 less trips / person /yr)

2. Please list the top five (5) lakes you visited and used for recreation during the past 12 months and then complete all categories in the table for each lake listed. We know this table asks for a lot of information, but your responses are very important for understanding the uses of Maine's lakes. So please give your best answers. We have completed the first line as an example.

Lake name and location?		Frequency of lake use?			Expenses?		Camp/cabin?		Water quality?
(FILL IN **BOTH BLANKS**)		Number of visits (Apr. 2022 - Mar. 2023)			Typical expense (A-F)		Were the trips to a camp you own?		What was the typical water quality?
Lake name	Nearest town to where you visited lake	Single-day trips	Overnight trips	Total days at lake	Single-day trips	Overnight trips	Single-day trips	Overnight trips	Water quality ladder
Ex: Sebago Lake	Naples	0	1	2		B		Yes	7
1.									
2.									
3.									
4.									
5.									

Lake visits

Sebago

Moosehead

- 77% residents visited lakes
- 22% visited Sebago lake
- 13% visited Moosehead

Visited lakes
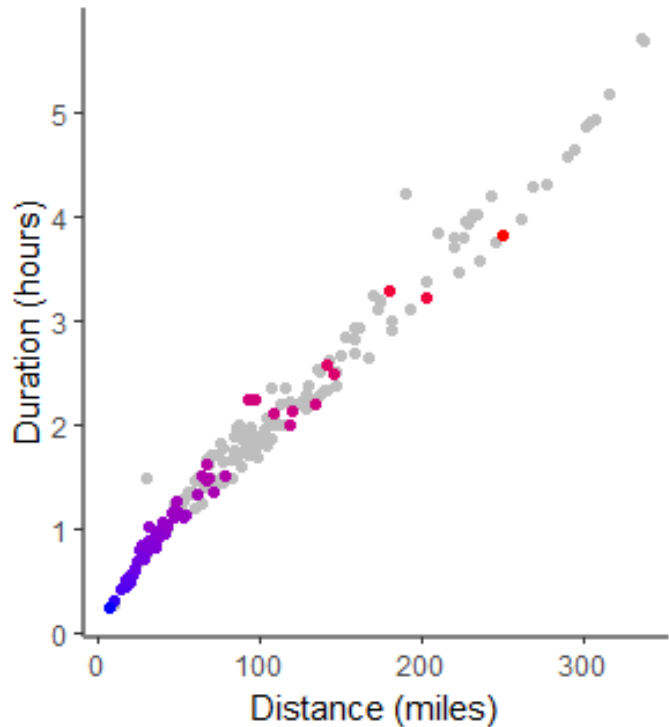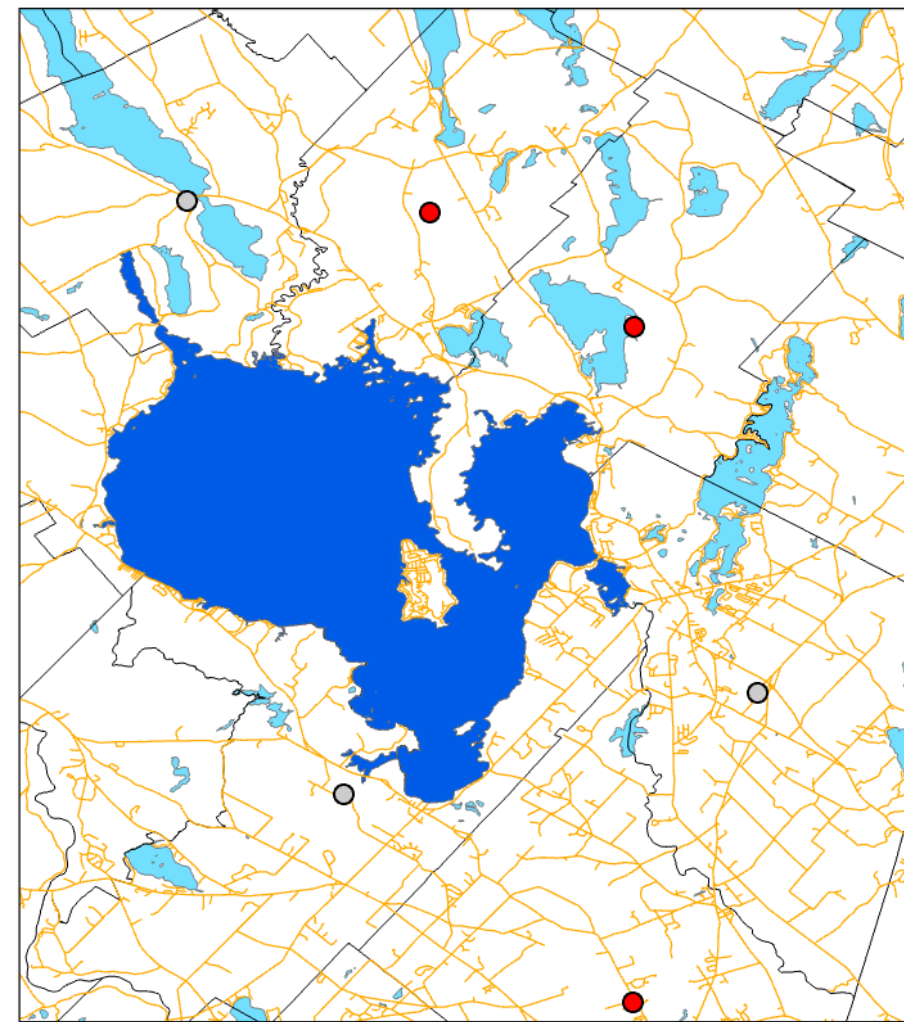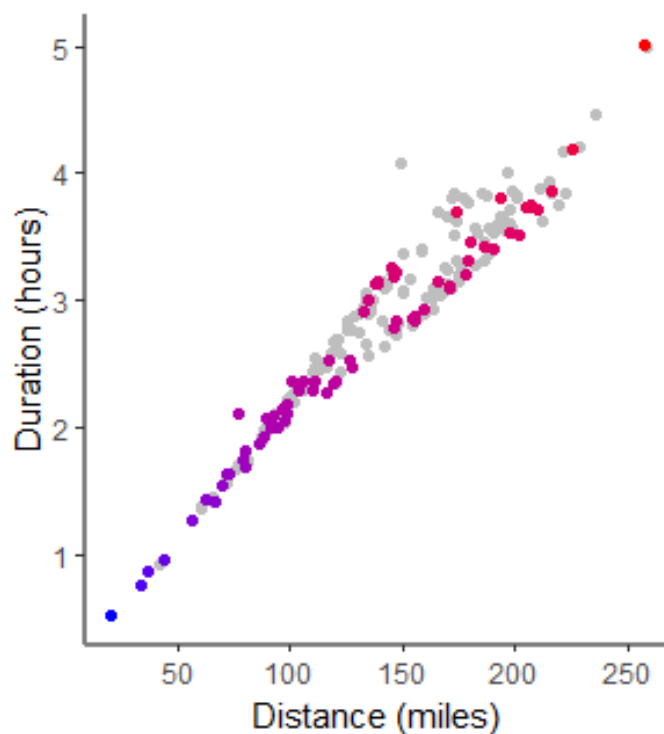- No
- Yes
- Moosehead
- Sebago
- All lakes

Travel cost

- More people take trips when they are close to lake

- Travel distance and time are highly correlated
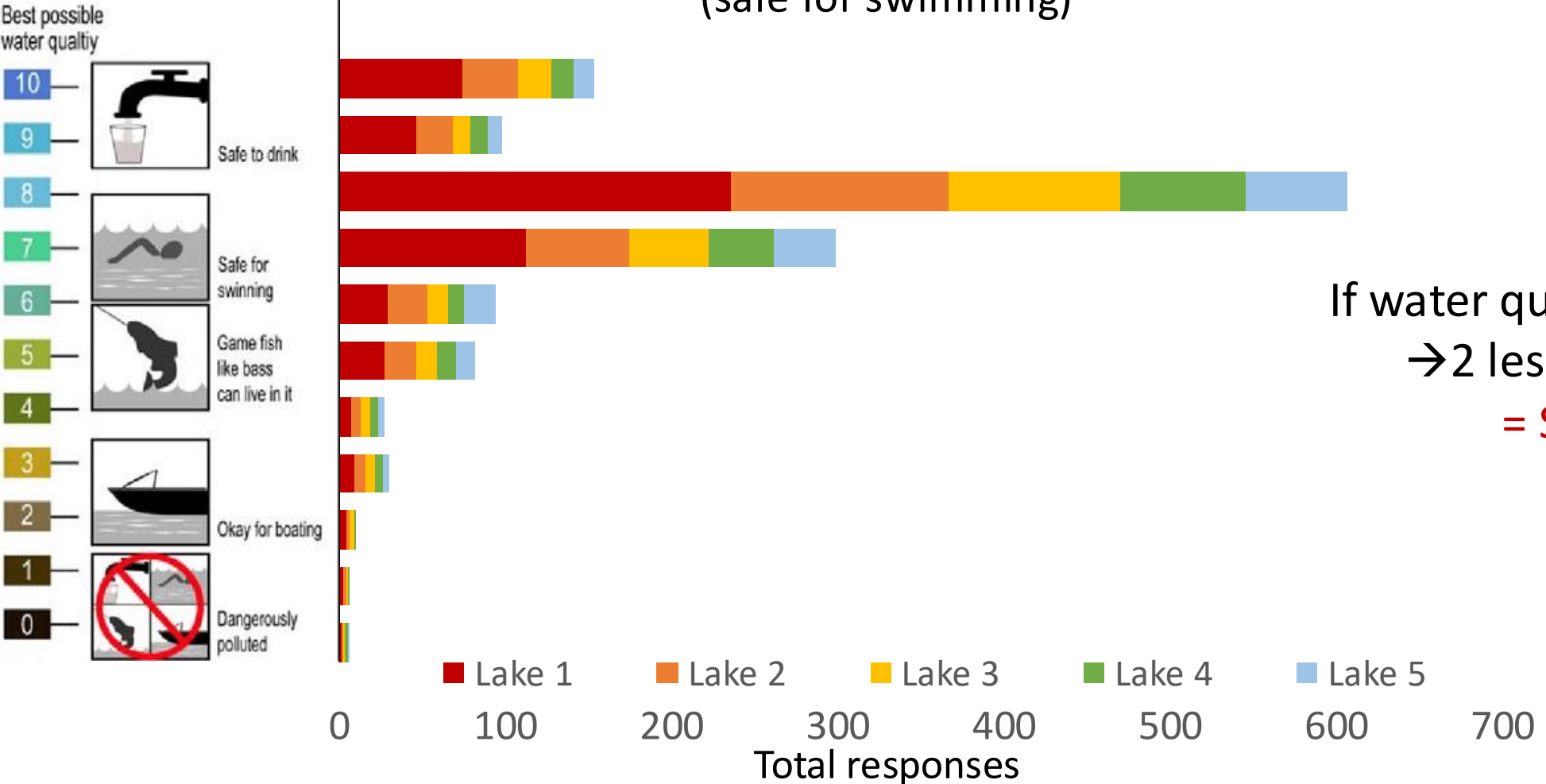
Distance vs Time

Visited lakes
- No
- Yes
- Sebago
- National Highway

Water quality


Average water quality perception = 8
(safe for swimming)

If water quality *declined* 2 points
→2 less trips / person /yr
= $33 million/yr

Net Economic Estimates

	Sebago Lake	Moosehead Lake	All lakes in Maine
Per trip per capita per lake	$29.88	$43.48	$33.80
Predicted Trips /yr	4.6	3.3	13.3
Visit rates	15.8%	6.4%	76.7%
Net economic value ($/yr)	$31 million	$13 million	$501 million
EPA water quality ladder (2 degree degrade)			6% ↓ or $33 mil ↓

Lake Recreation Expenditures

Share of Total Direct Lake Trip Expenditures
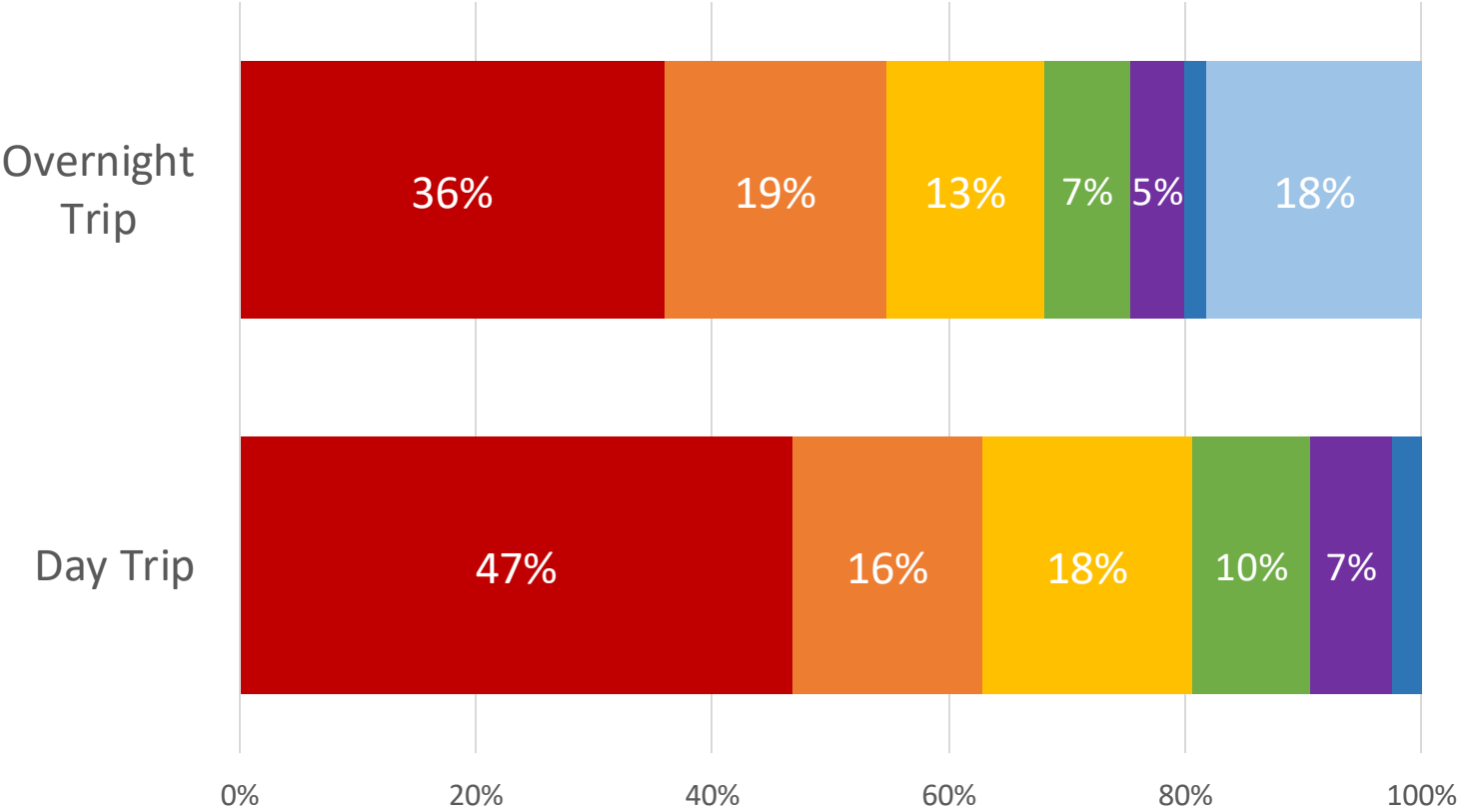
Mean Lake Day Trip Expenditures ($/trip)

Expense	$/Day Trip
Food & beverages	$33
Other misc. direct expenses	$13
Camping/picnicking supplies	$11
Fishing Supplies	$7
Fuel for boating	$5
Equipment rental	$2
Total Direct	$71
Indirect sales	$41
Total Direct + Indirect	**$112**

Lake Recreation Expenditures

- Mean Expenditure per day trip: $71/trip
- Total Maine Resident Lake Trips: 14.3 million/yr
- Total Direct Expenditure: $1.0 billion/yr

Direct Expenditure

$1.0 Billion

+

Indirect Expenditure
(58% Direct)

$586 Million

=

Total Direct + Indirect

$1.6 Billion
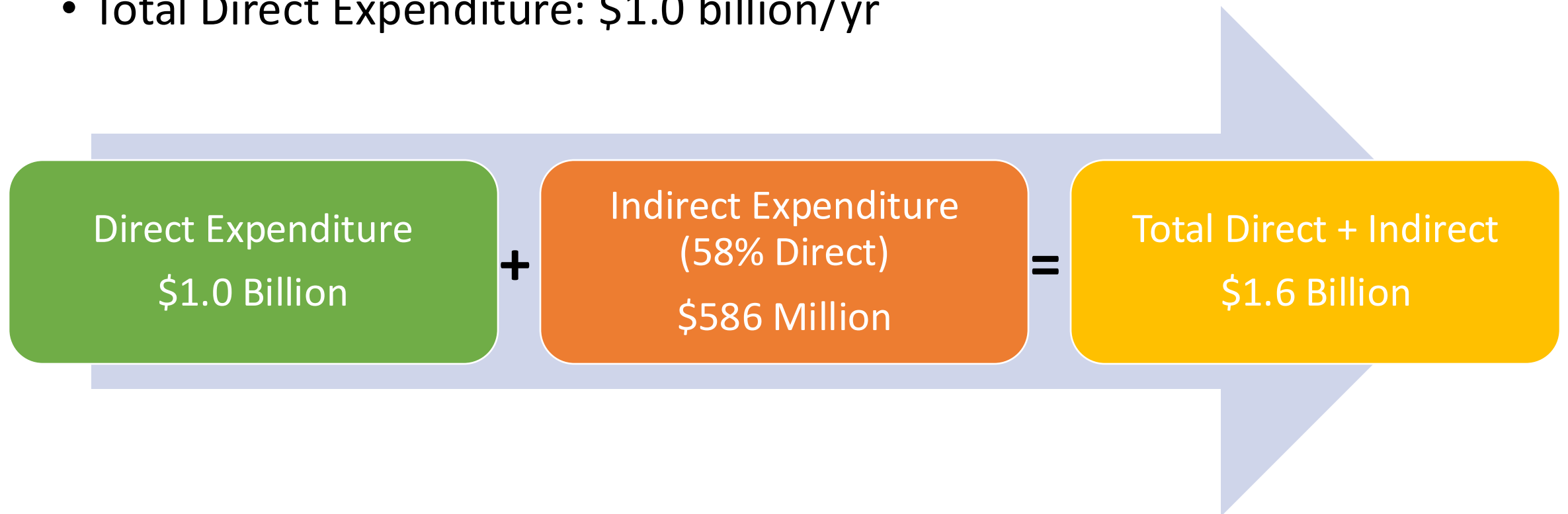
Lakefront Property Value

Housing Value

Demand rising for lakefront houses

- Net migration: 2.7% population rise (2019-2023), sales price (>14% rises)

- COVID-19 impacts: value high on privacy, space, and natural setting

- Recreation opportunities

- Convenient life (travel efficiency, network, etc.)

Zoning and Development

Economic factors: interest rates, inflation, insurance

Lake quality

Regional Lake Analysis

Original Groups (1990s)	New Groups (Today)
Lewiston/Auburn Area	Lewiston/Auburn Area
Augusta Area	Winthrop Lakes Region
Waterville Area	Belgrade Lakes Region
Newport/Dexter Area	Newport/Dexter Area
Ellsworth Area	Ellsworth Area
Northern Maine	Northern Maine
Camden	Camden
	Greenville
	Sebago
36 lakes	150 lakes
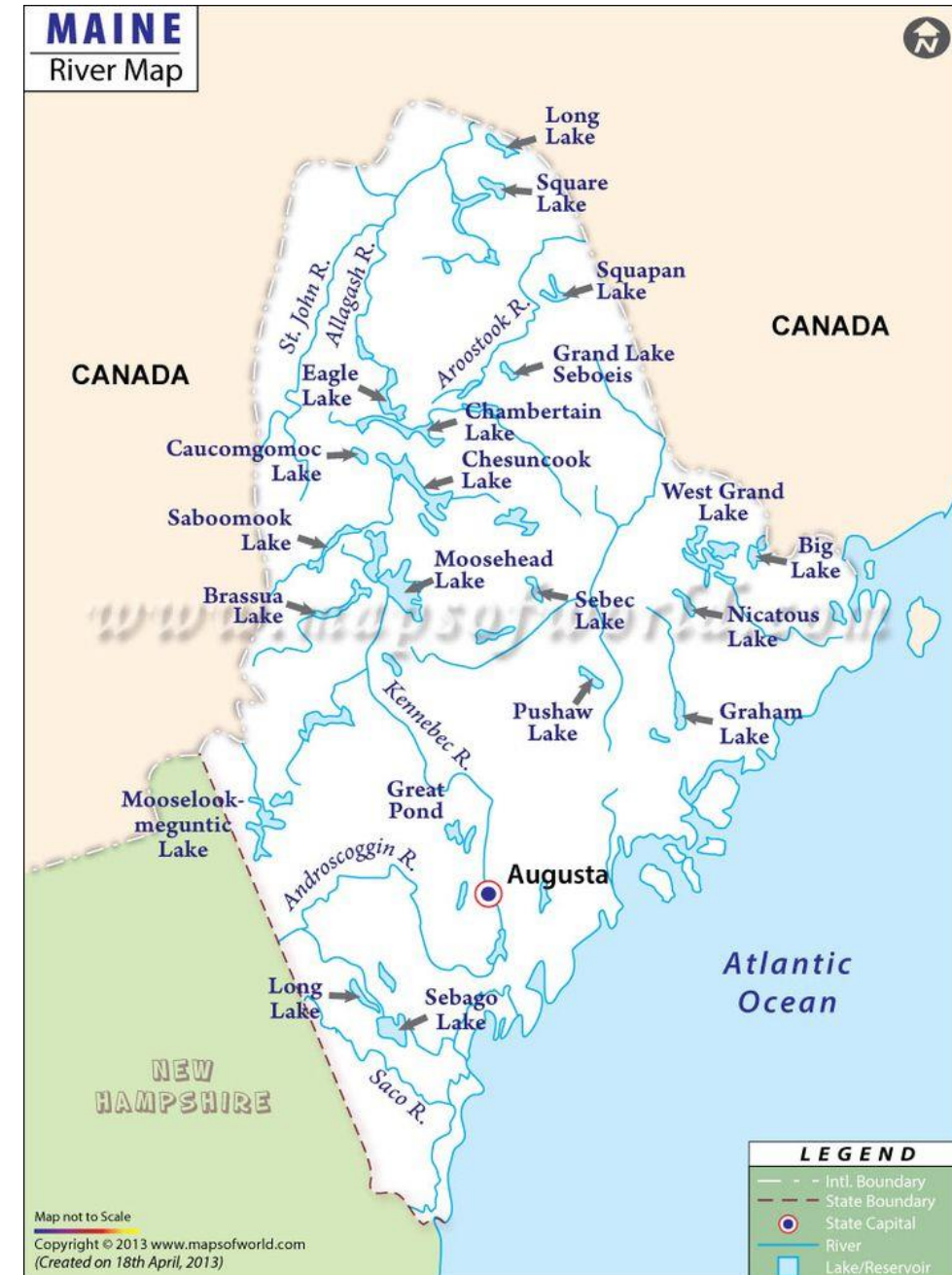
Hedonic Pricing Models

Hedonic pricing estimates economic value of ecosystems that are linked to market goods

Logic: people pay more for goods associated with high environmental quality

Data Collection

Key variables

— Property prices

— Property characteristics

— Indicator for water quality

Sources: Redfin, Zillow, Maine DEP, VLMP

— Time range: 2017-2022

— Lakefront single-family properties

— Over 3,800 housing transactions

— Around 150 lakes

Legend:
- Greenville Area
- Lewiston/Auburn Area
- Newport/Dexter Area
- Northern Maine
- Augusta Area
- Sebago Area
- Camden Area
- Waterville Area
- Ellsworth Area
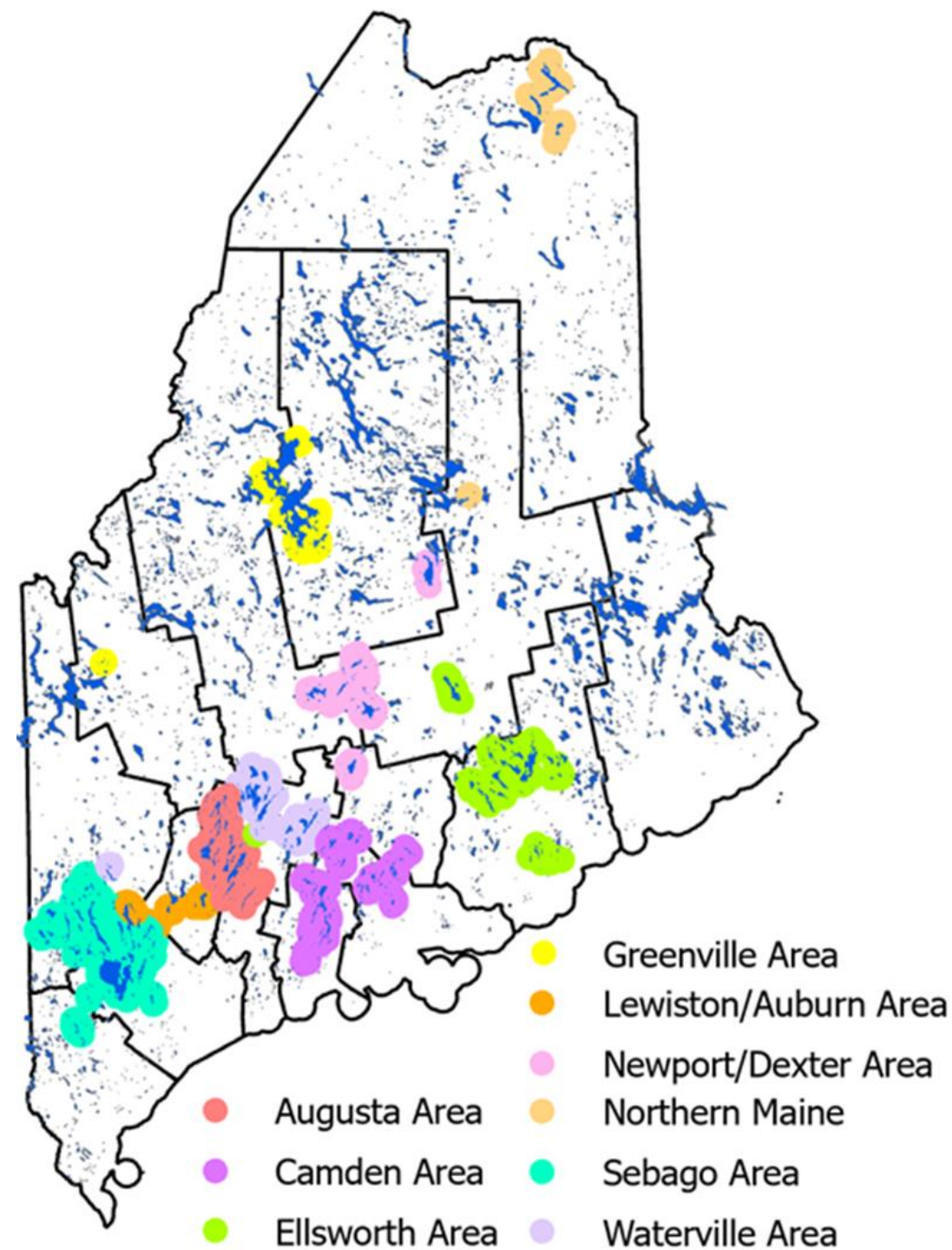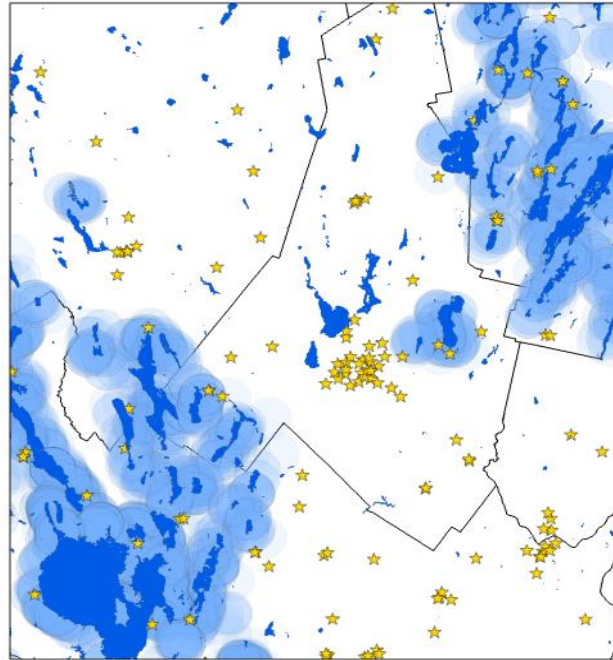
Housing Attributes

— # Rooms, Lot Size
— Fireplace, Garage, Private water
— Water frontage, Site characteristic

Location Attributes

— School district ratings
— Population density
— Household income
— Geographic information: Zip code, Census tract

Lake Attributes

— Shoreline length
— Lake area
— Secchi depth

Finding: Lake related variables

- Secchi depth (+), Private water (+),
- Water frontage length , Lake area no effect, Intersection terms with Secchi depth (+)

Results:

Prices much higher with higher Secchi depth

Water quality ↑ brings more add values

- property with longer water frontage or near larger lake area.
- property located to Lewiston/Auburn Area , Ellsworth Area, Augusta Area

($2023 dollars)	Net economic value
Lake-front Properties	$13.3 billion
1 foot water quality (+)	1.1%
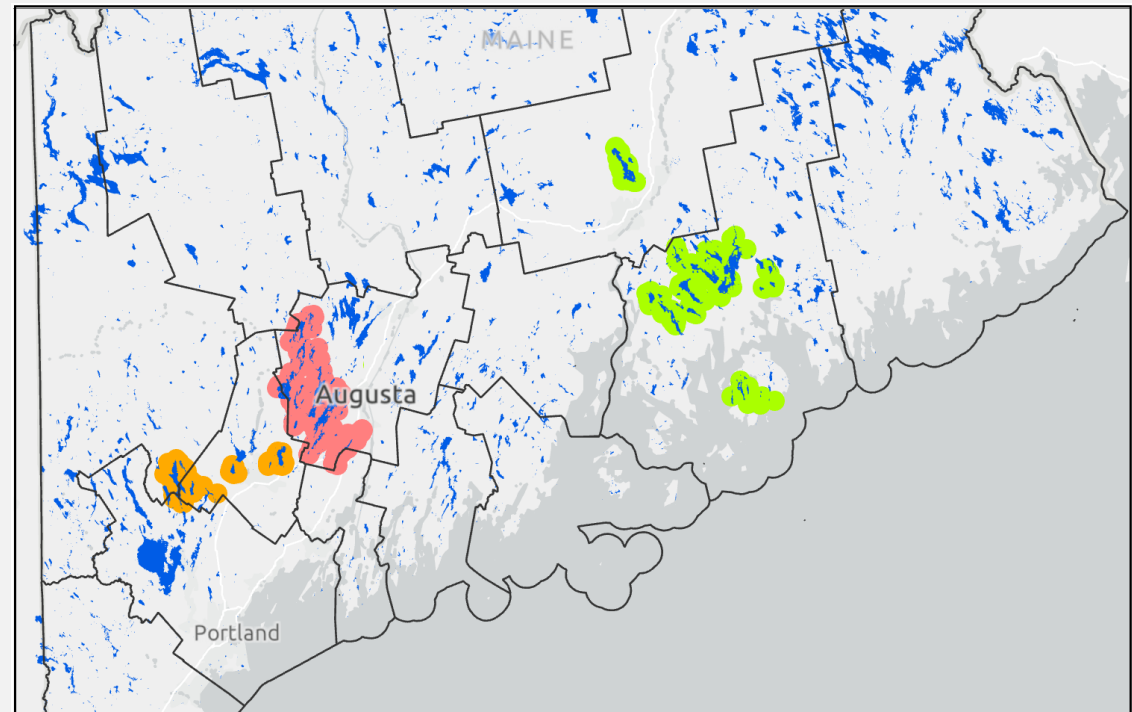
Expenditures

- Mean Frontage/Lot 137 ft

Expense	Million /yr
Taxes	$524
Purch +Maint	$256
Total Direct	$785
Indirect sales	$85
Total Direct + Indirect	**$865**

Direct Expenditure
$780 Million

+

Indirect Expenditure
(11% Direct)
$85 Million

=

Total Direct + Indirect
$865 Million
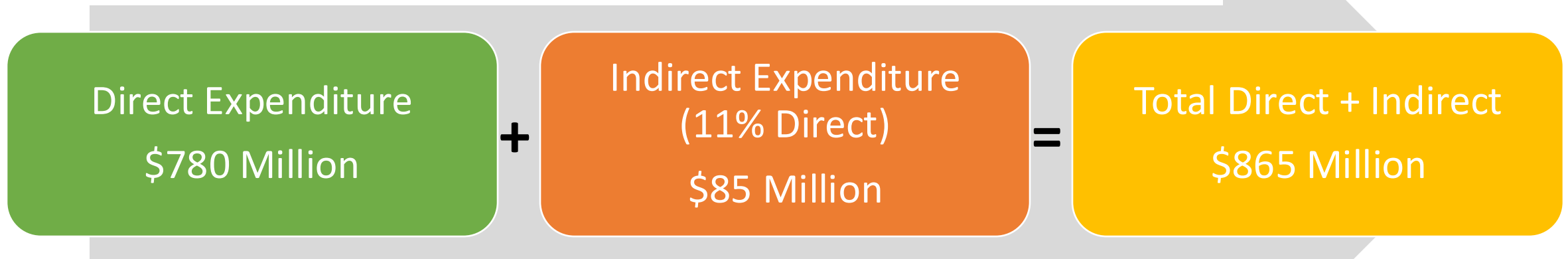
Water Consumption and Lake Summer Camps

Water Consumption

- 2020-21 Annual Reports to ME Public Utilities Commission

- ~ 45 ME water districts with surface water source
  - Serves a population of ~435,000

- Data on total water consumption and revenue
  - Residential, industrial & commercial users

- Mean net value: $765/p/yr = $334 million/yr

- Mean expenditure: $290/p/yr = $126 million/yr

OFFICE OF THE
Maine Public
Utilities Commission
STATE OF MAINE

○ Public water system with groundwater source

☐ Watershed for public water system with surface water source

30   15   0   30 Miles
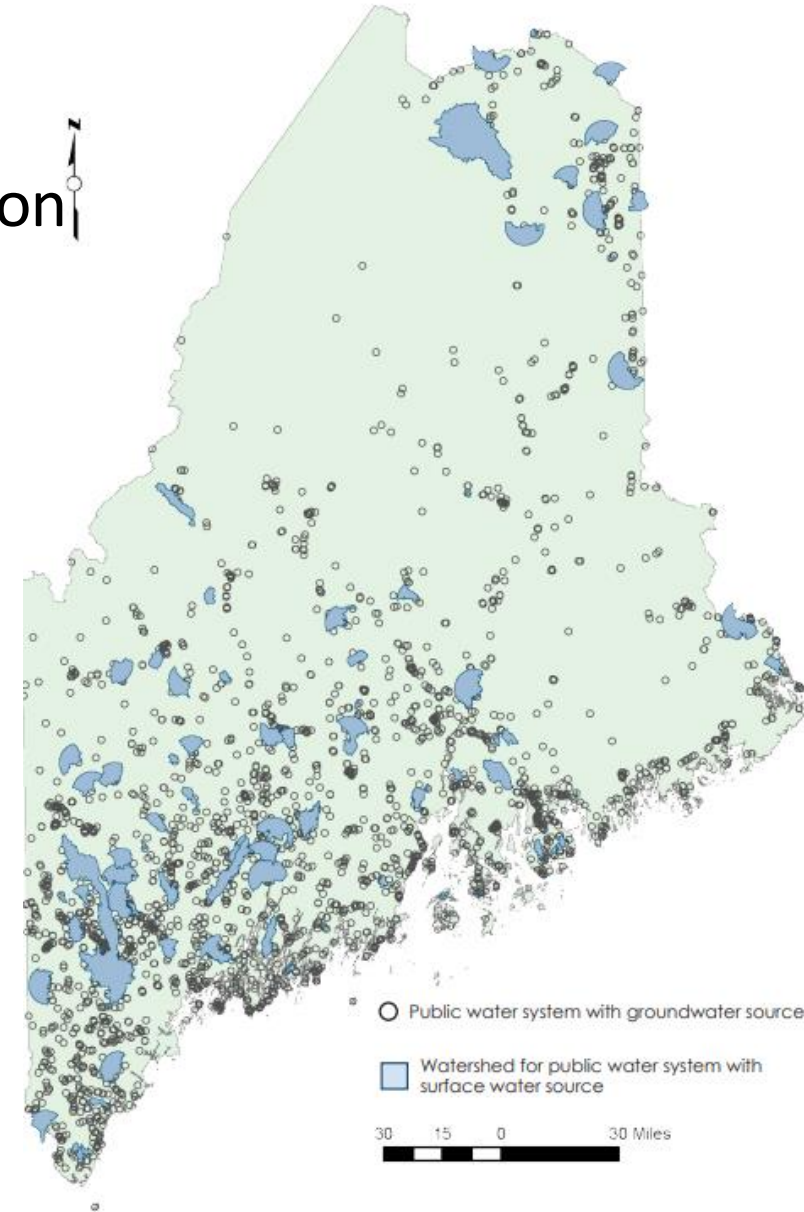
Summer Camps

91 summer camps on lakes and ponds

~48,000 campers/yr

- Net value = $311/camper/wk

- Tuition cost = $2,262/camper/wk

- Travel + Visit cost = $1,304/camper/wk

- Net econ value: $15 mil/yr

- Direct expenditure: $170 mil/yr
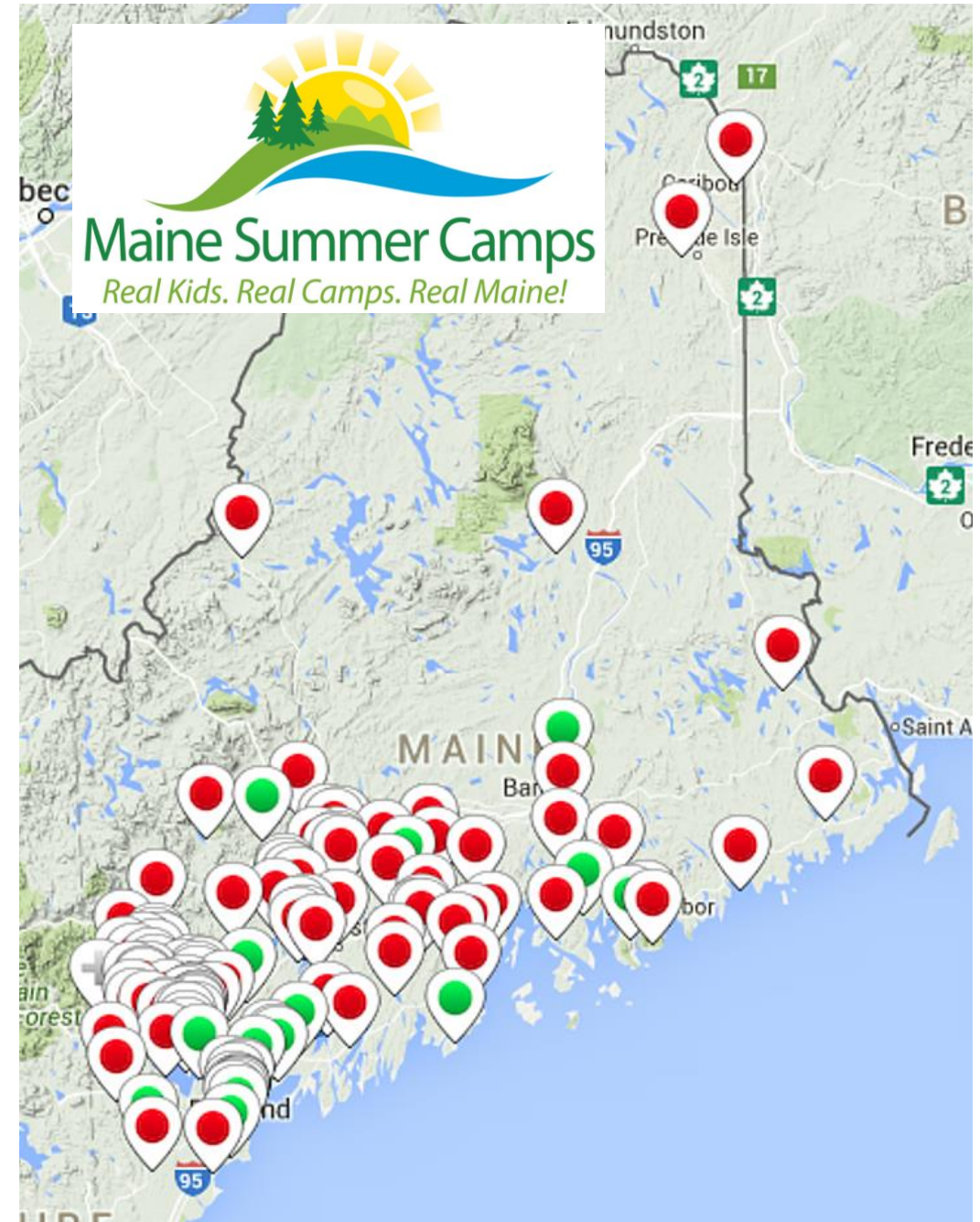
Summary

Summary

- Maine's lakes = **net economic value of $14.1 billion/yr**
- Lakes generate **$3+ billion/yr in direct and indirect sales**
- 78% of public polled perceived that lake water quality is good or very good
- 92% would like to visit lakes even more!
  - Time, cost, and public access are biggest barriers

Final Numbers

Total Net Economic Value: $14.2+ Billion/yr
Total Direct + Indirect Expenditures : $3.0+ Billion/yr

	Lakefront Property Values	Summer Camps	Recreation	Water Consumption
Net Economic Value	$13 billion	$15 million	$501 million	$334 million
Direct + Indirect Expenditures	$865 million	$325 million	$1.60 billion	$241 million

Outreach Campaign

- Maine Lakes website
- Maine Calling episode
- Maine Nonprofit Lobby Day
- Poster at the Maine Sustainability and Water Conference
- Press release & associated news articles
- News interview(s)

THIS MAINE NATURAL RESOURCE IS SAID TO BE WORTH MORE THAN $14 BILLION!

Matt James | Published: June 5, 2024

Canva Pro

MainePete 1 week ago

So maine produces lakes now? Way to go maine! Glad we have nice places for out of staters to go and be happy.

👍 Respect ↩ Reply ⤴ Share

Like | Reply

Todd Wilson · 3rd+
Senior Construction Professional

1w ···

That's what one camp on a lake cost to purchase now!

@agy234 2 weeks ago

Time to sell them to the highest bidder

👍 1   👎

Re

Rob Bryce · 3rd+
--

1w ···

Worst lakes in the U.S.
Go to New York

Like | Reply

YouAllSuck
4 June, 2024

They're worth a whole lot more than that. Try priceless (unless of course you're Poland Spring/Nestle, then it's the lowest possible price)

👍 3 👎 · Share

Christopher Clancy · 3rd+   1w ···
Helping Guide Talents to Top Biotechs Across the ...

I would argue Priceless! There need to be more safeguards on letting Nestle Corp. and others profit off the water sources the public own rights too in Maine.

Carl Marsano, P.E. · 2nd   2w ···
Senior Project Manager/Engineer at Wood.

With views like this, I would say lake's are priceless too. $14 billion may be under counting it.

Like · 👍 5 | Reply · 1 Reply

Matthew V. (He/Him) · 3rd+   2w ···
Production Manager at Kennebec Compan...

Agreed. Maine lakes are priceless. I love

George Pullen · 2nd   2w •••

Senior Economist | Prof & Speaker | Space...

Maine lakes are priceless, but this is a good estimation.

But, don't get any crazy ideas to make some quick cash. Maine's lakes are NOT, I repeat, NOT for sale!

More?

https://www.lakes.me/economics

Acknowledgements

Additional Slides

92% of respondents want to take more trips to Maine lakes

Top 3 barriers
1. Lack of time (70%)
2. Travel cost (57%)
3. Lack of public access (44%)

Bottom 3 barriers
1. Lack of interests from family or friends to visit lakes (35%)
2. Personnel health (31%)
3. Lack of natural amenities (15%)

Overall rating of ME's Lakes and Environment

78% of respondents rate the water quality of Maine's lakes good-very good

Legend: ■ Very bad   ■ Bad   ■ Adequate   ■ Good   ■ Very good

The overall state of water quality of Maine's lakes is: 3% | 19% | 42% | 36%

The overall state of the natural environment in Maine is: 2% | 15% | 37% | 46%

% Total Responses
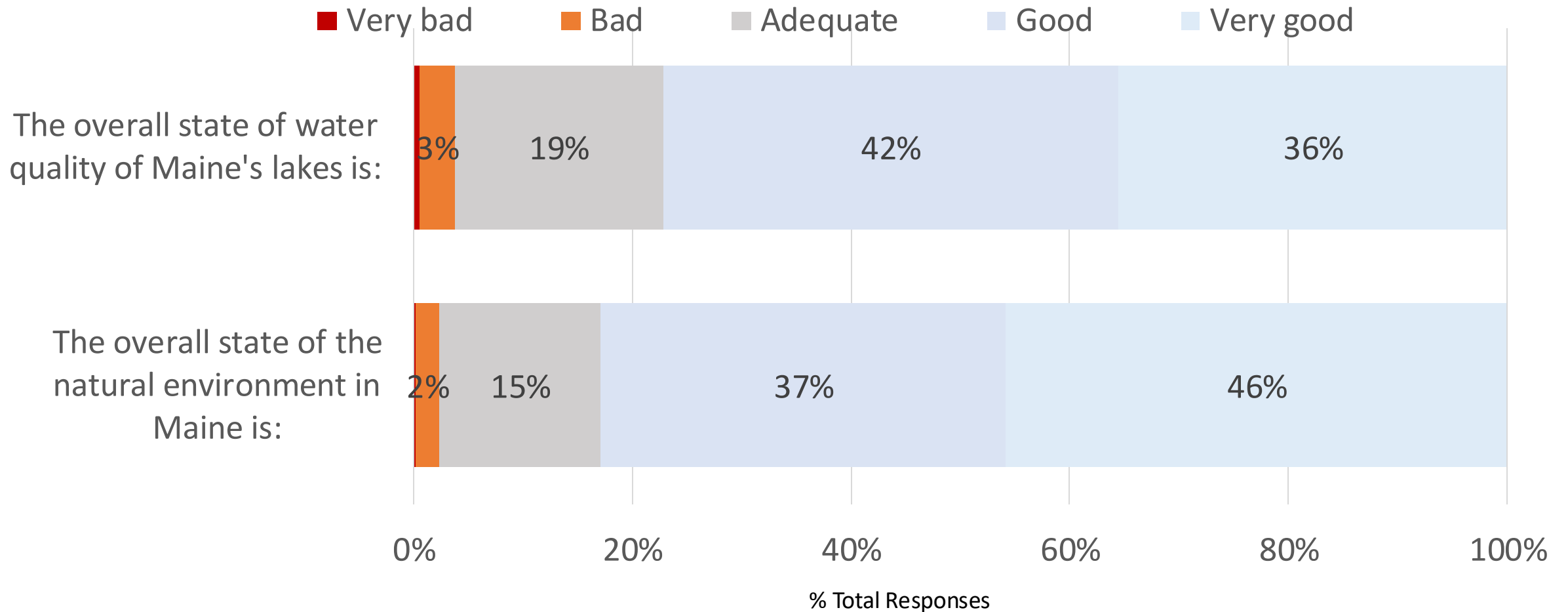
Lake visits

77% residents visited lakes

Trips per Person

	Percentage of Respondents (%)
1-5	47%
6-15	30%
16-25	10%
26-180	13%
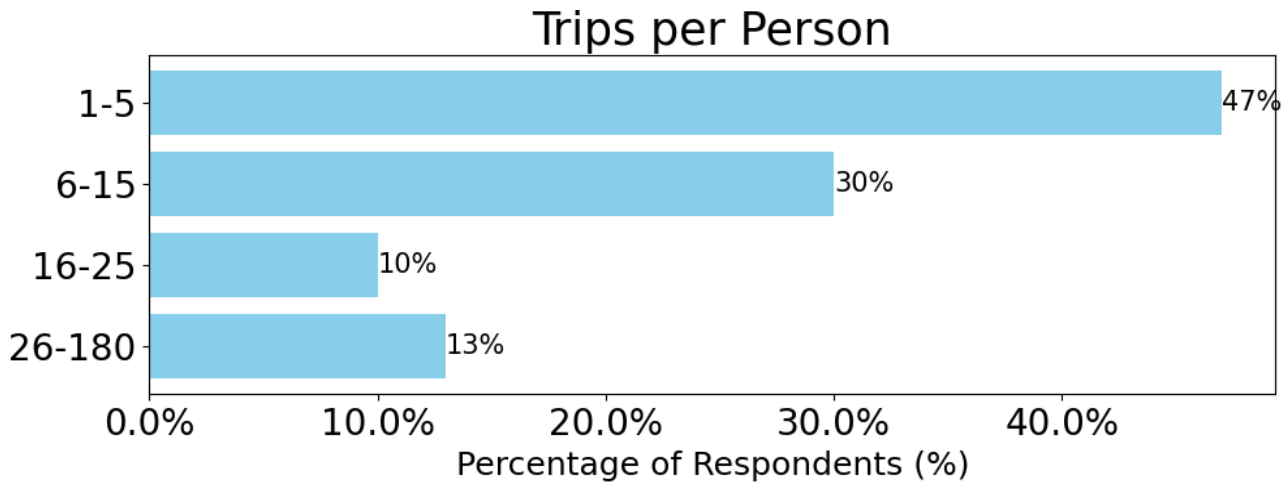
Majority visited between July (81%) & August (73%)

May	21.92%
June	55.31%
July	81.34%
August	73.29%
September	29.28%
October	10.96%
Other	5.48%
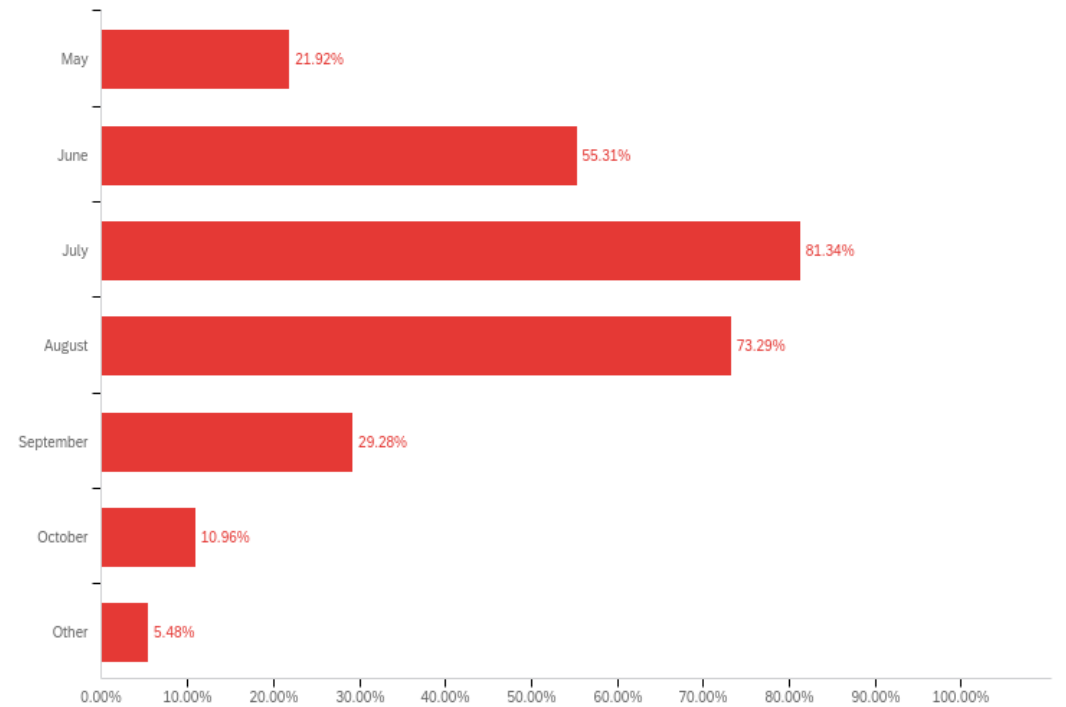
Resources

Q: How useful would the following resources be to help improve your ability to visit and participate in activities at Maine's lakes?

1. Online maps showing access points
2. Improve parking areas and trails that enable access
3. More public access to take near my homes

Q: To what extent do you think the following categories impact Maine's Lake Water Quality?

Legend: No impact | Slight impact | Moderate impact | Strong impact | Extreme impact

Category	No impact	Slight impact	Moderate impact	Strong impact	Extreme impact
Trash/litter	5%	17%	28%	27%	23%
PFAS (forever chemicals)	6%	18%	28%	24%	25%
Algae (green scum)	3%	24%	36%	24%	13%
Milfoil	5%	22%	34%	23%	15%
Urban and residential land runoff…	5%	22%	37%	24%	13%
Agricultural runoff (fertilizer, sediment)	5%	22%	36%	22%	15%
Other invasive species	6%	25%	31%	26%	12%
Climate change	12%	19%	29%	23%	17%
Oil or other household wastes	8%	27%	31%	18%	17%
Timberland runoff (harvest residues,…	6%	33%	34%	19%	9%
Septic system malfunction	8%	31%	28%	17%	16%
Mercury	10%	30%	29%	18%	13%
Excessive wakes from recreational…	11%	32%	33%	16%	8%
Other (please list)	42%	13%	17%	17%	13%

Under served groups

Q: List the top 3 groups that are currently most under served by the various amenities and services provided by Maine's lakes

1. People with disabilities (73%)
2. Seniors (62%)
3. People living in urban areas (34%)

Q: List the top 3 factors that limit these under served groups from better utilizing Maine's lakes?

1. Travel cost (66%)
2. Lack of public access (55%)
3. Personal health (44%)

Perceived Impacts to Lake Quality

Q: To what extent do you think the following categories impact Maine's Lake Water Quality?

1. Trash/litter
2. PFAS / forever chemicals
3. Algae / green scum / Milfoil

Changes

Challenges

25 years later, much has changed…

- Climate change
- Invasive species
- Housing demands
- Recreation interests

How have these changes affected value of ME lakes?