

Freshwater Recreation in the North Puget Sound Region

Volume I: Participation and Destinations



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Abstract

This study examines freshwater recreation participation patterns in the rapidly growing North Puget Sound region during summer 2023. A survey of residents found that 76% of adult residents (2.2 million people) engaged in freshwater recreation activities. Participation rates were highest among younger adults (82% for ages 18-34) and those with higher incomes (85% for \$200,000 or more annual household income). The most popular activities were walking/jogging/hiking (89% of participants), sunbathing/relaxing (81%), and picnicking (62%). Lakes were more frequently visited than rivers (59% vs. 41% of trips), with 44% of trips occurring to waterbodies with Washington Department of Fish and Wildlife (WDFW) water access areas. Respondents valued cleanliness, good water quality, and natural scenery, with 18% prioritizing boat launches and 24% emphasizing fishing opportunities. The findings highlight the importance of understanding participation patterns for effective management of public water access. This research provides insights for WDFW and other entities managing water access in the region, serving as a model for similar studies elsewhere.

1 Introduction

Beyond Puget Sound itself, the watersheds that feed into the basin host an array of freshwater resources, including over 1,500 lakes and nearly 6,000 stream miles that contribute to the region’s diverse recreational opportunities. As the population in Western Washington has grown, the demand for these freshwater recreation resources has also increased. This is especially evident in the growing diversity of recreational uses of lakes and rivers, ranging from fishing and boating to paddle sports and shoreline activities.

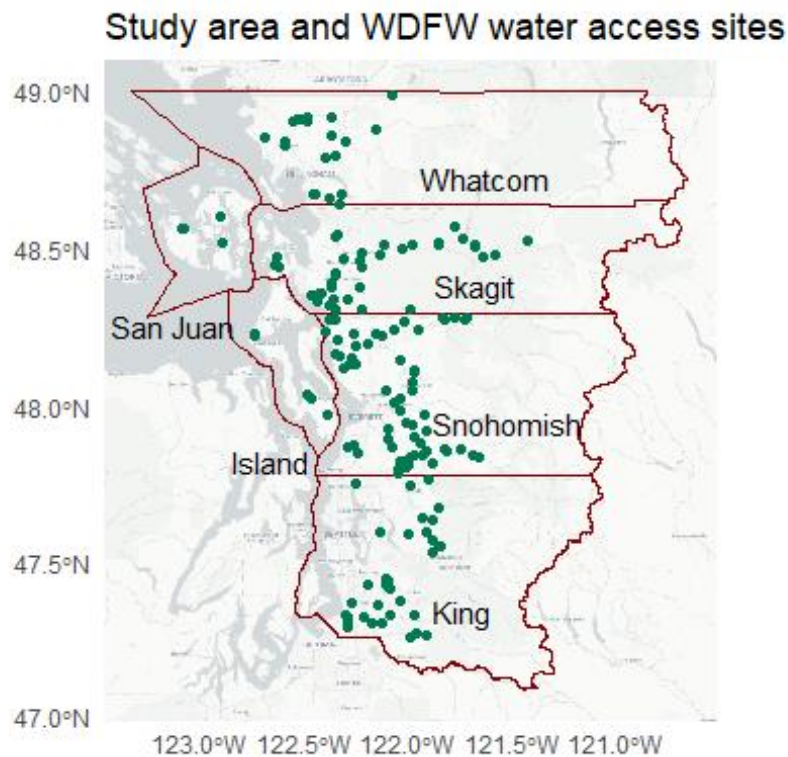


Figure 1.1: Map of study counties and WDFW access areas (in green).

The Washington Department of Fish and Wildlife (WDFW) manages 162 designated water access areas, providing public access to waterbodies across the North Puget Sound region (Figure 1.1).¹ These sites are managed primarily for fishing and boating, though other uses such as small watercraft boating (i.e., kayaking, paddleboarding, etc.), swimming, and other shoreline activities are also common. Access areas vary considerably in level of development (i.e., paved boat ramps, bathrooms, parking, etc.) and maintenance, as operations and maintenance budgets have remained flat in nominal terms in recent decades even as costs have increased and the population of the region has grown. Informal public

¹ The North Puget Sound Region is one of WDFW’s six administrative regions and includes King, Snohomish, Skagit, Whatcom, Island, and San Juan counties.

access and sites managed by other entities (e.g., city and county parks, state parks, National Forests, etc.) also play a role in serving the growing population. Understanding patterns of participation in freshwater recreation, both across demographics, geography, management agencies, and activities, can improve effective management of public water access areas.

To inform the management of these sites and identify potential public substitutes, empirical data was collected through a survey of residents in the North Puget Sound region conducted in November 2023. The survey aimed to capture insights into the participation levels, locations, and activities of North Puget Sound residents over the summer of 2023, defined for the purposes of this study as the start of Memorial Day weekend through Labor Day. This period represents the period of peak demand for freshwater recreation in the region and so was chosen as the focus of the study.

The survey sought to answer the following research questions:

- 1) How many residents of the North Puget Sound region participate in freshwater recreation? How does participation vary across the population?
- 2) How often do residents of the North Puget Sound region participate in freshwater recreation? How does effort vary across the population?
- 3) How does freshwater recreation activity vary across the landscape?
- 4) What freshwater recreation activities do residents of the North Puget Sound region participate in? How does participation in these activities vary across the population and across the landscape?

Several previous studies have approached similar research questions in other water recreation settings. Many studies (e.g., Mulvaney et al. (2020)) use on-site surveys to measure visitation at a more local scale. Mazzotta, Merrill, and Mulvaney (2022) use participation and site choice survey data to estimate participation and effort for coastal recreation in Southern New England at a geographic scale more similar to the North Puget Sound region. Vesterinen et al. (2010) use data from a survey in Finland to estimate participation and trip volumes across all waterbodies in Finland. Survey methods have frequently been applied to estimate participation and effort for fish and wildlife-related recreation in the United States, most notably through the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (*2022 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation 2023*).

This report presents the results of the survey, offering a detailed, comprehensive understanding of the scale and scope of participation in freshwater recreation and the potential pressures on sensitive freshwater resources in the North Puget Sound region. The analysis emphasizes key distinctions between activities such as boating and fishing, which are of particular interest to WDFW. Particular focus is given to distinctions between waterbodies with and without service from WDFW water access areas, as well as between rivers and lakes. Results from auxiliary questions regarding targeted fish species, transportation mode, information used to plan trips, site attribute preferences, and the impacts of wildfire smoke on recreation activity are also presented. The report closes with a discussion of the

limitations of this study, future extensions of the analysis of these data and the collection of additional data, and additional outreach efforts WDFW has conducted to inform planning.

Beyond WDFW planning efforts, the results presented here will also be of interest to other public entities in the North Puget Sound region, particularly those that also manage public water access areas. Finally, the results can provide a model for measuring recreation volumes in other regions, both across Washington and in other states, provinces, or countries.

2 Methods

2.1 Description of the study area

The study was focused on WDFW's North Puget Sound region, which consists of King, Snohomish, Skagit, Whatcom, Island, and San Juan counties (Figure 1.1). Nearly half the population of Washington state reside in these six counties. The study region contains both rural and highly urbanized areas, including Seattle, the state's largest city and economic epicenter, and six of the state's ten largest cities. Note that because of their smaller populations and similar demographics, Skagit and Whatcom counties and Island and San Juan counties were combined for the purposes of statistical analyses.

The region's climate is characterized by warm and dry summers. July and August mean daily maximum temperatures were 25°C (77°F) from 1991-2020 with an average of three days per year with maximum temperatures above 32°C (90°F) and combined average precipitation of 40mm (1.7in) (National Centers for Environmental Information (NCEI) 2024).

2.2 Sampling

The survey was conducted using two sample frames: (1) an Address Based Sample (ABS) including a random sample of residential addresses and (2) a fishing license holder census (FLC) within the North Puget Sound region. The sampling aimed to cover a broad demographic spectrum and ensure inclusivity in recreational activity representation. WDFW also has a particular interest in fishing uses of agency-managed water access areas and unique access to the state fishing license database. To achieve these goals and make efficient use of available resources, a two-sample approach was developed which combines responses across both an address-based sample to capture use by the general public and a census of freshwater fishing license holder residents to capture fishing uses with greater precision.

The ABS consisted of 11,000 addresses randomly selected from a database generated from the United States Postal Service Delivery Sequence File and maintained by Marketing System Group, Inc. The sample was not stratified, meaning every address in the six-county study region had an equal chance of being selected into the sample. The birthday method, asking the adult with the most recent birthday currently living in the household to complete the survey, was used for individual respondent selection. The FLC included all purchasers of fishing license products that permitted freshwater harvest with home

addresses in the study region and valid email addresses. The FLC list was further reduced by removing any duplicate cases with residential address also found in the ABS sample.

The ABS was contacted twice using a modified Tailored Design Method push-to-web approach (Dillman, Smyth, and Christian 2014). Households were contacted first via a letter sent on November 13, 2023 containing an invitation to complete the survey online and a unique access code, along with a one-dollar bill. A follow-up postcard was sent seven days later to addresses that had not yet responded. The FLC list was contacted via email invitation on November 10, 2023. Up to four reminder emails were sent weekly to license holders who had not yet responded. Both the ABS and FLC contacts varied the appeal language between each reminder. The survey was deployed in the fall to capture the full summer recreation season while also minimizing recall error.

2.3 Survey instrument and ethics



31%

Which lake or river did you visit during your most recent trip?

I don't remember lake's or river's name

Type lake/river/creek name to look it up...

Please double click (or push and hold for touch screen devices) on the map above at approximate location where you were accessing water and provide some details about water access point below.

<< Back | Next >>

The screenshot shows a survey interface. At the top left, a progress bar indicates 31% completion. The main content is a map of the Puget Sound region in Washington state, showing cities like Seattle, Bellevue, Tacoma, and various islands. A purple line is drawn across the map, likely representing a travel route. Below the map, there is a question: "Which lake or river did you visit during your most recent trip?". This is followed by a text input field and a checkbox labeled "I don't remember lake's or river's name". Below that is a smaller text input field with the placeholder "Type lake/river/creek name to look it up...". The next question is "Please double click (or push and hold for touch screen devices) on the map above at approximate location where you were accessing water and provide some details about water access point below.", followed by a large empty text box for the answer. At the bottom, there are two green buttons: "<< Back" and "Next >>".

Figure 2.1: Question item used for recovering trip destinations.

We used a web questionnaire to recover data from the survey sample. The questionnaire asked about the respondent's freshwater recreation activity during the previous summer (defined as between Memorial Day and Labor Day weekends, inclusive), details including destination and activities of their most recent summer trip, and demographic information. Respondents were asked to only consider trips to (a) freshwater, (b) during the summer of 2023, and (c) within the North Puget Sound region.

The site choice question was multipart, open-ended, and used interactive mapping features to allow for more precise and flexible input than the traditional practice of providing a pre-populated list of destination (Figure 2.1; Mazzotta, Merrill, and Mulvaney 2022). First, respondents were asked the county of their most recent trip. Next, they were asked to name the waterbody in a box that auto filled from a list of waterbodies maintained by WDFW, though suggested waterbody names could be overridden. Finally, respondents were asked to place a pin on an interactive map where they accessed the water. When a waterbody was selected from the known list, the map automatically panned to center on the waterbody to assist the respondent in identifying their specific access point.

The web questionnaire was pre-tested with ten agency staff to ensure question clarity and piloted with a subsample of 100 fishing license holders who were contacted via a single email prior to launching the survey. Feedback from the pre-testing and pilot rounds was considered and incorporated into the final questionnaire design, including removing a pre-populated list of access areas to avoid frustrating respondents who could not find their access area on the list.

The survey instrument, contact language, and sampling strategy was reviewed by Washington State University's Human Research Protection Program and certified as Exempt from full Institutional Review Board review (IRB #20097). All study participants gave informed consent.

2.4 Sample characteristics and weights

For the ABS portion of this study, 1,759 completed or partially completed the survey out of 10,573 eligible residents resulting in a 16.6% response rate. For the fishing license portion of this study, 3,968 completed or partially completed the survey out of 29,549 eligible, resulting in a 13.4% response rate.

The members of the ABS were more likely to be male, white, and over 35 years old than the overall population (Table 2.1). The FLC was considerably more likely to be male, white, and live outside of King County than the overall population, though these demographics are more in line with known demographics of Washington's angling population.

In the results that follow, survey weights are applied. As defined by Deming and Stephan (1940), the raking method or sampling balancing is used to adjust design weights according to available marginal distribution of demographic variables at the population level. The raking process included a series of steps to assign a weight value to each of the survey respondent so that the weighted distribution of the sample is in close agreement with marginal counts of the known variables Deville, Sarndal, and Sautory (1993). Island and San Juan counties have similar characteristics in term of water access points and in the adjacent geographical area thus these two counties were combined into one area. Similarly, Skagit and Whatcom counties were also combined into one area. The rake weighting was conducted based on

a known population proportion obtained from United States Census Bureau American Community Survey 5-year (2019-2023) data and known characteristics of fishing license holders provided by WDFW. First, inverse-probability weighting was used to correct for the differences in probabilities of selection between FLC frame and ABS frame. Then iterative proportional fittings were used to adjust the basis of demographics on (1) respondent’s age group (18-35 years old, 35-65 years old, and 65 years and older); (2) respondent’s gender (male and not male); and (3) respondent’s race (white only, Asian only, and all others). The marginal distributions were calculated at the area or county level which reflect the population of King County, Snohomish County, Skagit and Whatcom counties, and Island and San Juan counties.

Table 2.1: Respondent shares by demographics.

Category	Demographic	ABS	FLC	Total	Region Population
County	Island	3.5%	7.1%	5.7%	2.5%
	King	61.5%	49.5%	54.2%	63.9%
	San Juan	0.9%	1.0%	1.0%	0.5%
	Skagit	4.9%	7.5%	6.5%	3.6%
	Snohomish	21.3%	25.3%	23.7%	22.9%
	Whatcom	8.0%	9.6%	9.0%	6.6%
Gender	Female	44.5%	16.7%	27.7%	50.4%
	Male	55.5%	83.3%	72.3%	49.6%
Age	18 to 34	15.4%	10.5%	12.5%	31.2%
	35 to 64	49.9%	57.4%	54.4%	49.5%
	65 and older	34.8%	32.0%	33.1%	19.2%
Race	Alaskan native or Native American	0.5%	0.7%	0.6%	0.8%
	Asian	10.3%	8.4%	9.1%	17.4%
	Black or African American	0.9%	1.1%	1.0%	4.9%
	Hawaiian or Pacific Islander	0.1%	0.6%	0.4%	0.6%
	More than one race	4.8%	5.9%	5.5%	8.7%
	Some other race	2.2%	1.5%	1.8%	4.8%
	White	81.2%	81.8%	81.5%	62.8%

2.5 Participation model

To analyze participation, we fit a logistic regression model of the decision to participate in any freshwater recreation activities in the study area and period. The model included household demographics as explanatory variables: age, race (white, Asian, and all other [baseline]), sex (female [baseline], male, and other), household income, and county of residence. This model can be used to estimate the participation rate across geography and identify trends across different demographic groups. Heteroskedasticity-consistent standard errors were calculated using the HC3 jackknife method.

2.6 Effort model

To analyze effort, we fit a Poisson regression model of the number of trips an individual reported across the study period. The model included the same household demographic explanatory variables used in the participation model. This model can be used to estimate the expected number of trips originating across geography and to identify trends across different demographic groups. Heteroskedasticity-consistent standard errors were calculated using the HC3 jackknife method.

2.7 Recent trip destinations

Respondents were asked to identify the destination of their most recent freshwater recreation trip using a map and searchable list of waterbodies in the study region. Respondents first selected the county of their destination and the waterbody before they were prompted to drop a pin on an interactive map indicating the point where they accessed the water.

Trips were assigned to a waterbody first based on the proximity of the point provided by the respondent. If a point was not provided or no waterbodies were identified within 400m of the point, the waterbody identified by name in the previous step was used. If no waterbody was provided by name, then the trip was discarded. Routed distances between the centroid of each respondent's home ZIP Code Tabulation Area and the centroid of their waterbody destination were calculated using *openrouteservice* (Oleś 2024)

3 Results

3.1 Participation and effort

3.1.1 Overall participation

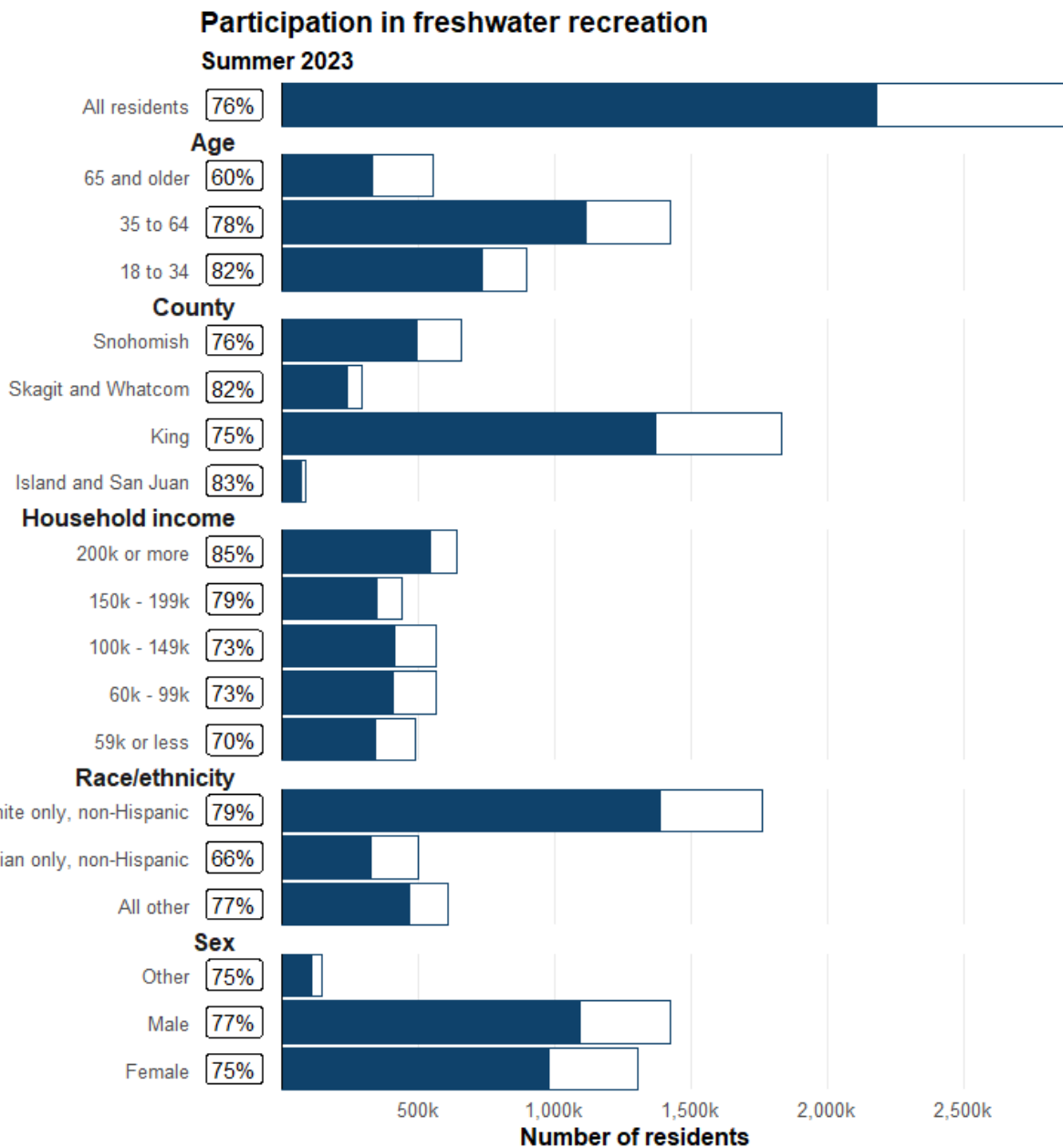


Figure 3.1: Participation in freshwater recreation in the North Puget Sound region among residents in Summer 2023.

Based on the weighted survey data, we estimate that 76% of adult residents of the North Puget Sound region, or 2.2 million people, participated in some form of freshwater recreation in the region during the

summer of 2023 (Figure 3.1). Across age groups, participation rates were highest among those in the 18 to 34 age group (82%) and lowest among seniors 65 and older (60%) (Figure 3.1). While the majority of participants resided in King County, participation rates were notably higher in Skagit, Whatcom, Island, and San Juan counties (Figure 3.1). Participation rates also increased monotonically across household income brackets, from 70% of those earning \$59,000 or less participating to 85% of those earning \$200,000 or more participating (Figure 3.1). Asian residents participated at a lower rate than other residents, while participation rates were consistent across sexes (Figure 3.1).

3.1.2 Participation by activity

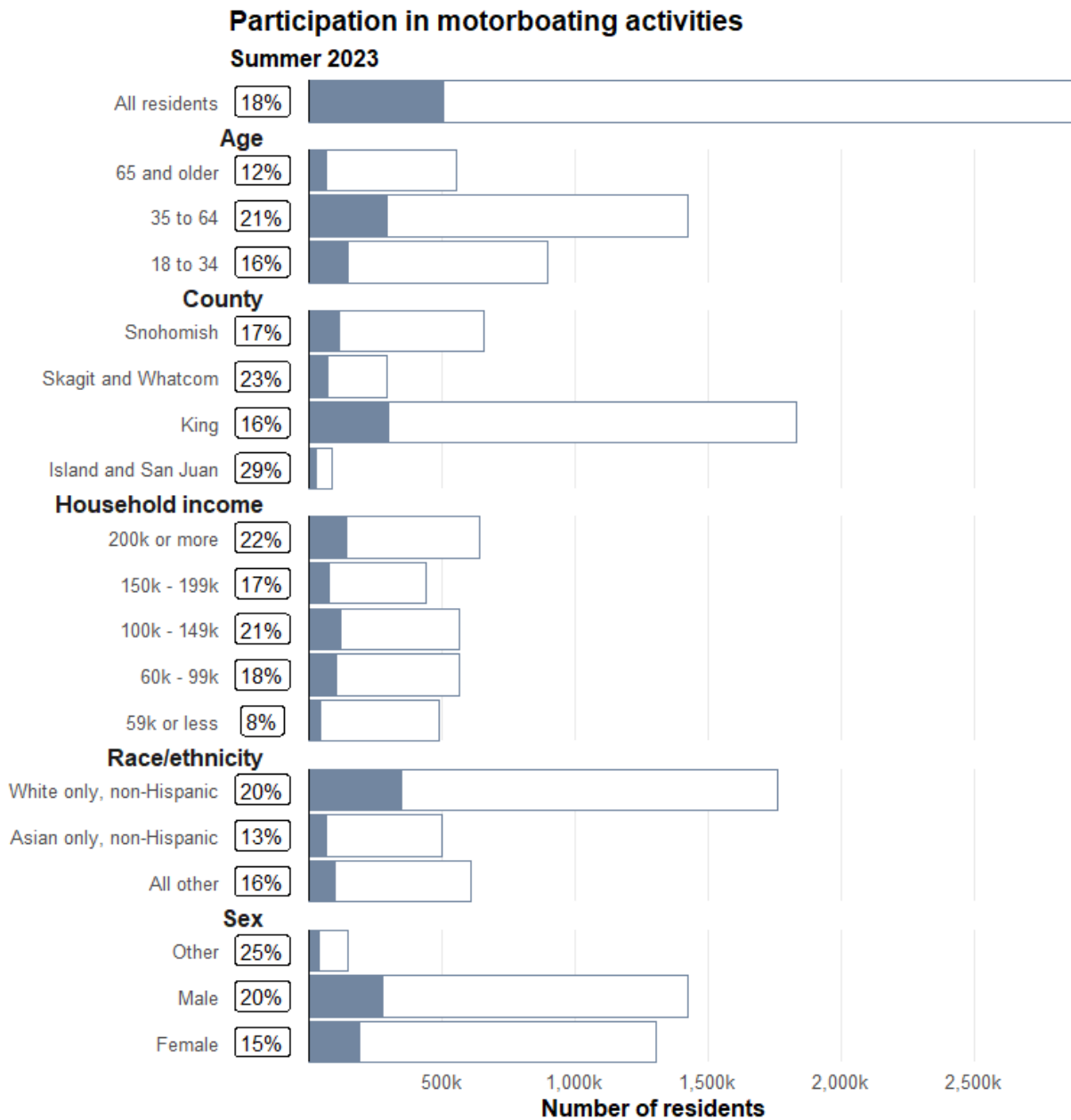


Figure 3.2: Participation in freshwater motorboating activities in the North Puget Sound region among residents in Summer 2023.

Participation in small watercraft activities

Summer 2023

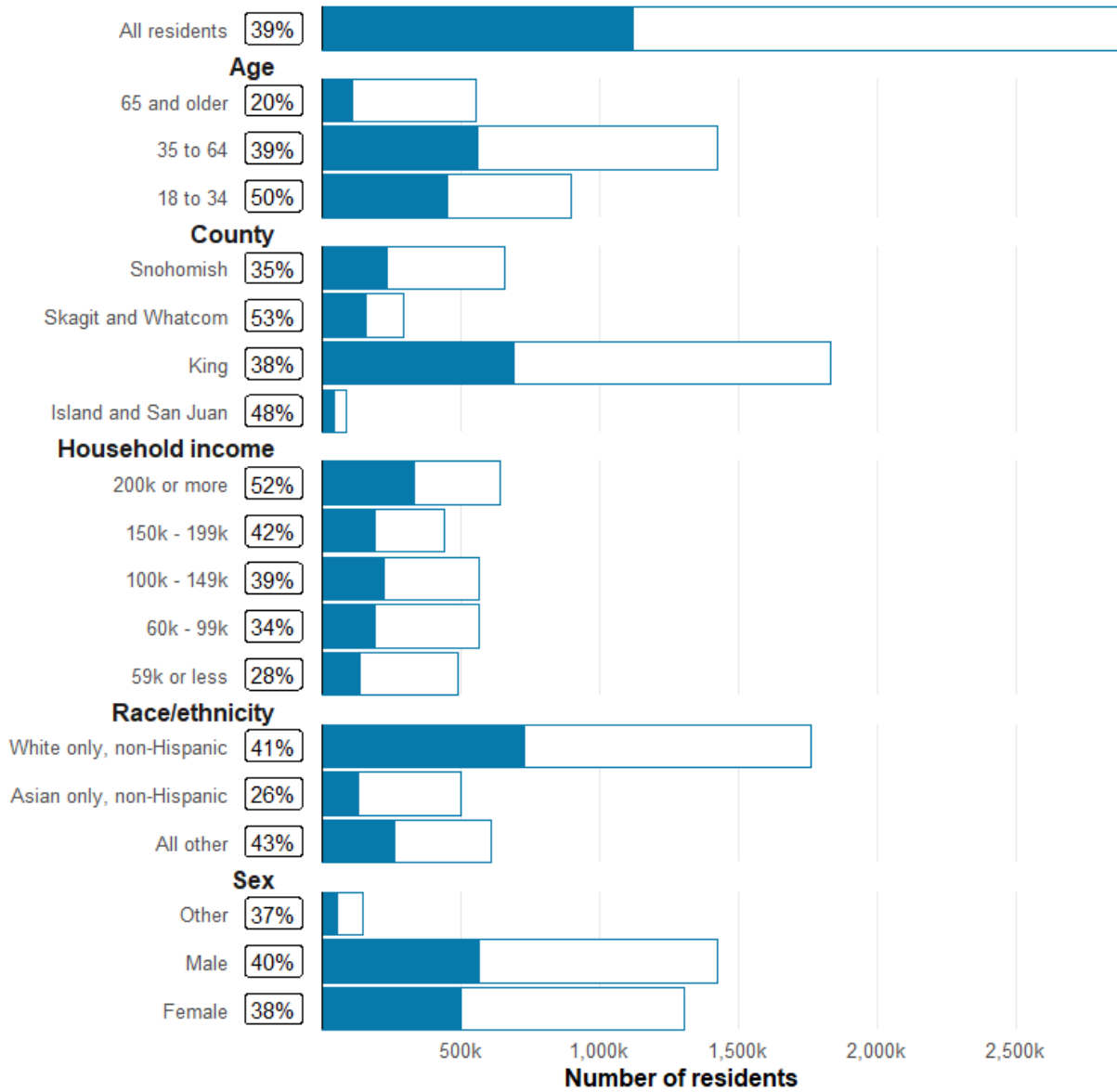


Figure 3.3: Participation in freshwater small watercraft activities in the North Puget Sound region among residents in Summer 2023.

Participation in shoreline activities

Summer 2023

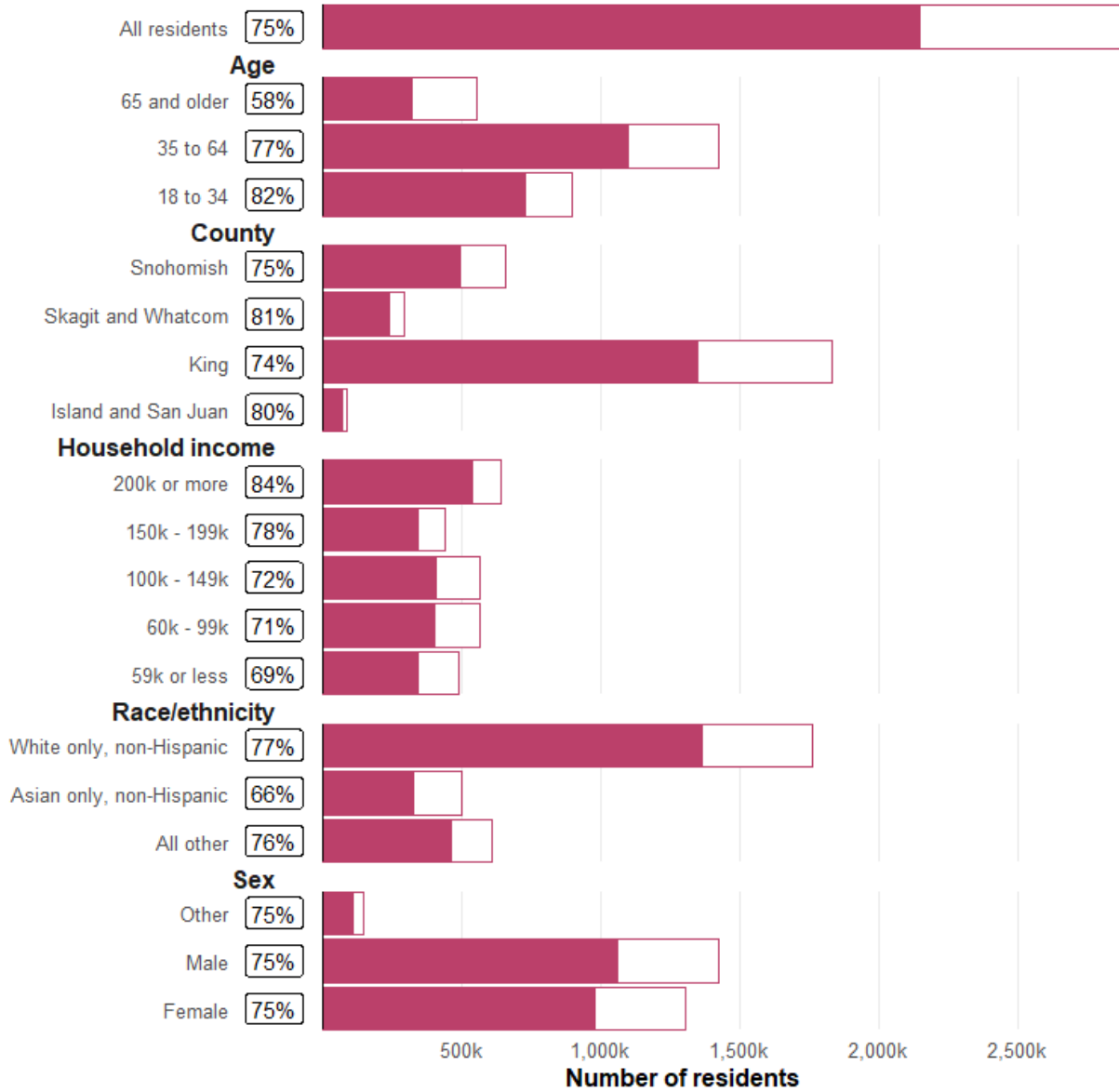


Figure 3.4: Participation in freshwater shoreline activities in the North Puget Sound region among residents in Summer 2023.

Participation in boat fishing activities

Summer 2023

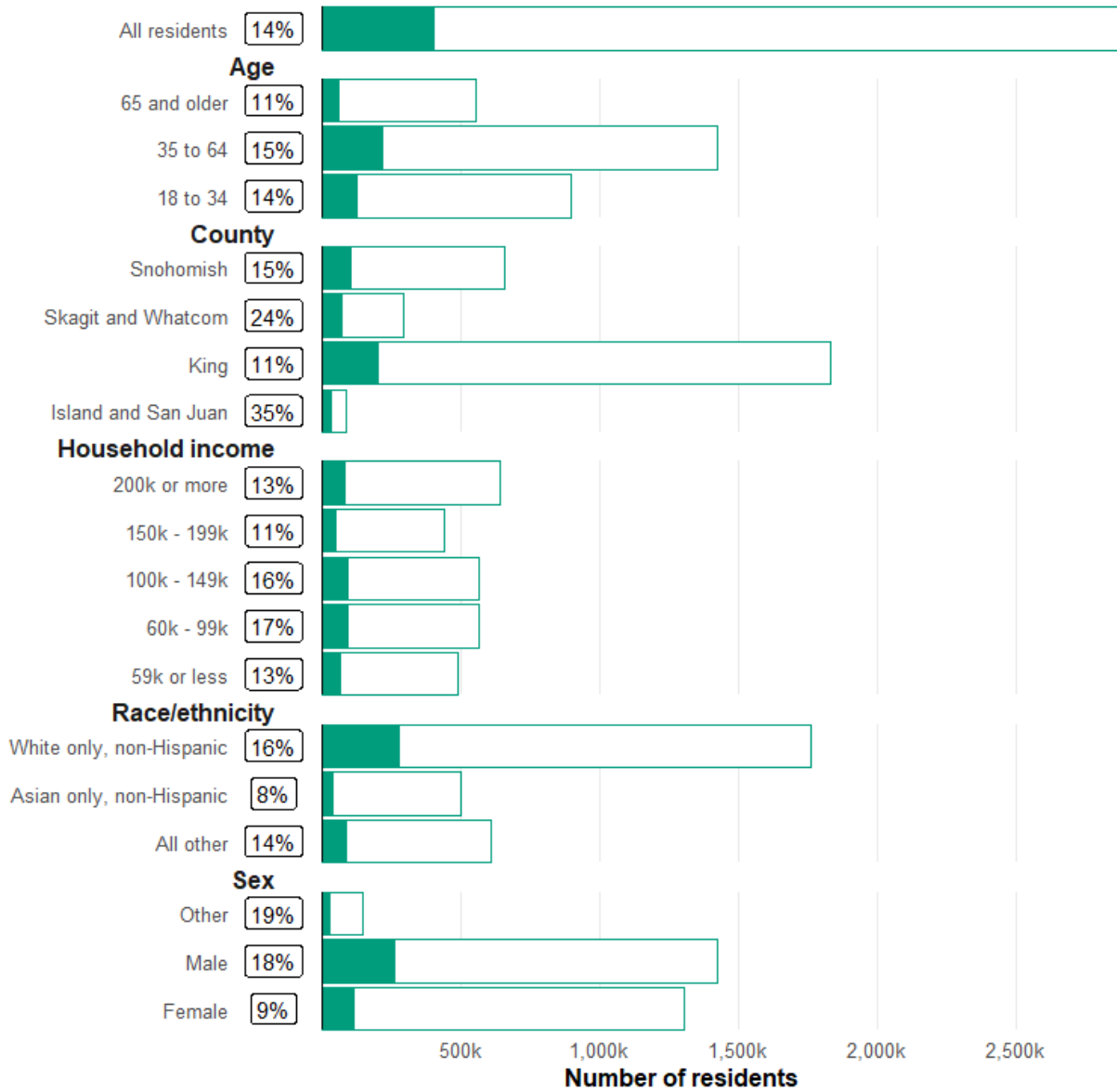


Figure 3.5: Participation in freshwater boat fishing activities in the North Puget Sound region among residents in Summer 2023.

Participation in shore fishing activities

Summer 2023

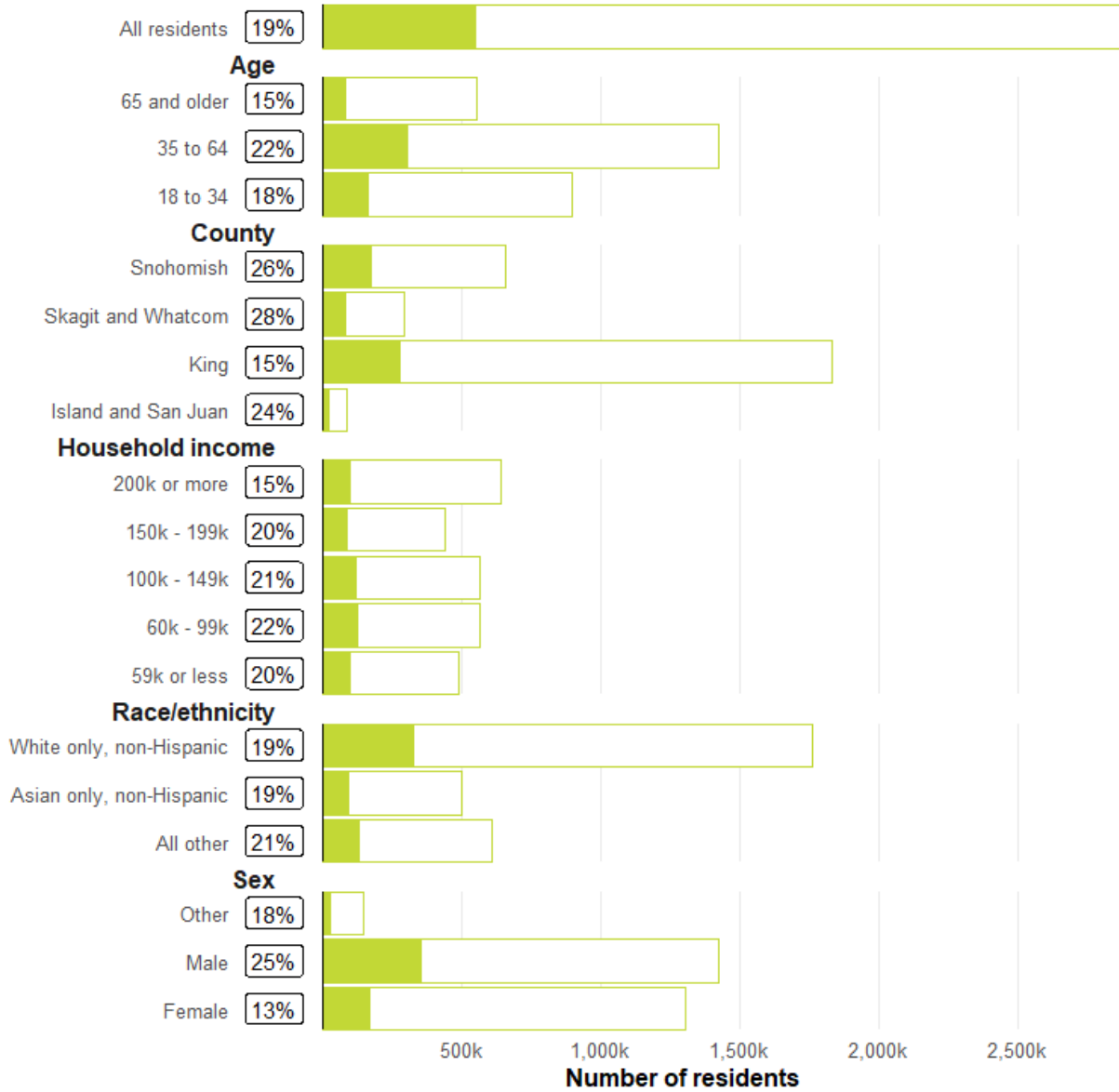


Figure 3.6: Participation in freshwater shore fishing activities in the North Puget Sound region among residents in Summer 2023.

Table 3.1: Participation rates in freshwater activities, conditional on taking a trip.

Activity	Any trip in Summer 2023	Mean rank among participants	Number of participants
Sunbathing and/or relaxing on the shore	81%	3.01	1,841,124
Picnicking, barbequing or cookouts	62%	3.76	1,403,405
Swimming and/or floating	61%	3.14	1,384,597
Motor boating	23%	4.76	510,319
Jetskiing, and/or waterskiing/tubing/wake boarding	9%	4.82	201,279
Sailing and/or windsurfing	6%	4.57	138,041
Kayaking, canoeing, and/or paddleboarding	52%	3.31	1,178,611
Fishing along the shoreline	26%	3.84	598,015
Fishing on a boat	19%	3.82	436,764
Bird and/or wildlife watching	62%	3.80	1,407,752
Photography	57%	4.44	1,292,612
Walking, jogging, and/or hiking	89%	2.71	2,006,943

We also estimated participation rates and volumes across activities and activity groups. Shoreline activities, such as walking, jogging, and/or hiking (89% among all users) and sunbathing and/or relaxing on the shore (81%), were the most popular (Table 3.1). Other shoreline activities including picnicking, barbequing, or cookouts (62%), bird and/or wildlife watching (62%), swimming and/or floating (61%), and photography (57%) were also popular (Table 3.1). Across all residents, we estimate that 75% participated in at least one of these shoreline activities over the course of the summer, or over 99% of all users (Figure 3.4).

Small watercraft activities, which include both the kayaking, canoeing, and/or paddleboarding and sailing and/or windsurfing activity categories, was the next most popular activity group. We estimate that 39% of residents, or approximately 1.1 million people, participated in at least one of these activities (Figure 3.3). An estimated 52% of users participated in kayaking, canoeing, and/or paddleboarding while only 6% participated in sailing and/or windsurfing (Table 3.1). These activities were especially popular with young adults aged 18 to 34 (50%) while participation lagged considerably with seniors (20%) (Figure 3.3).

We estimate that over 510,000 residents participated in motorboating activities, which includes both motorboating and the jetskiing, and/or waterskiing/tubing/wake boarding activity categories (Figure 3.2). This estimate represents 18% of residents, while 23% of users participated in motorboating and 9% participated in jetskiing, and/or waterskiing/tubing/wake boarding (Table 3.1).

For fishing activities, both from a boat and from the shore, participation rates among all residents were 14% (437,000 people and 19% of users) and 19% (598,000 people and 26% of users) respectively (Figure 3.5) (Figure 3.6) (Table 3.1). Male residents were more likely to participate than female and other sex

residents for both forms of fishing, while Snohomish County and Asian residents were more likely to participate in shore fishing when compared to their relative participation rates in other activities (Figure 3.5) (Figure 3.6). Fishing activities also had consistent participation rates across incomes, unlike other activities studied (Figure 3.5) (Figure 3.6).

Coparticipation in freshwater recreation activities, Summer 2023

Rate of participation in Activity B conditional on participating in Activity A

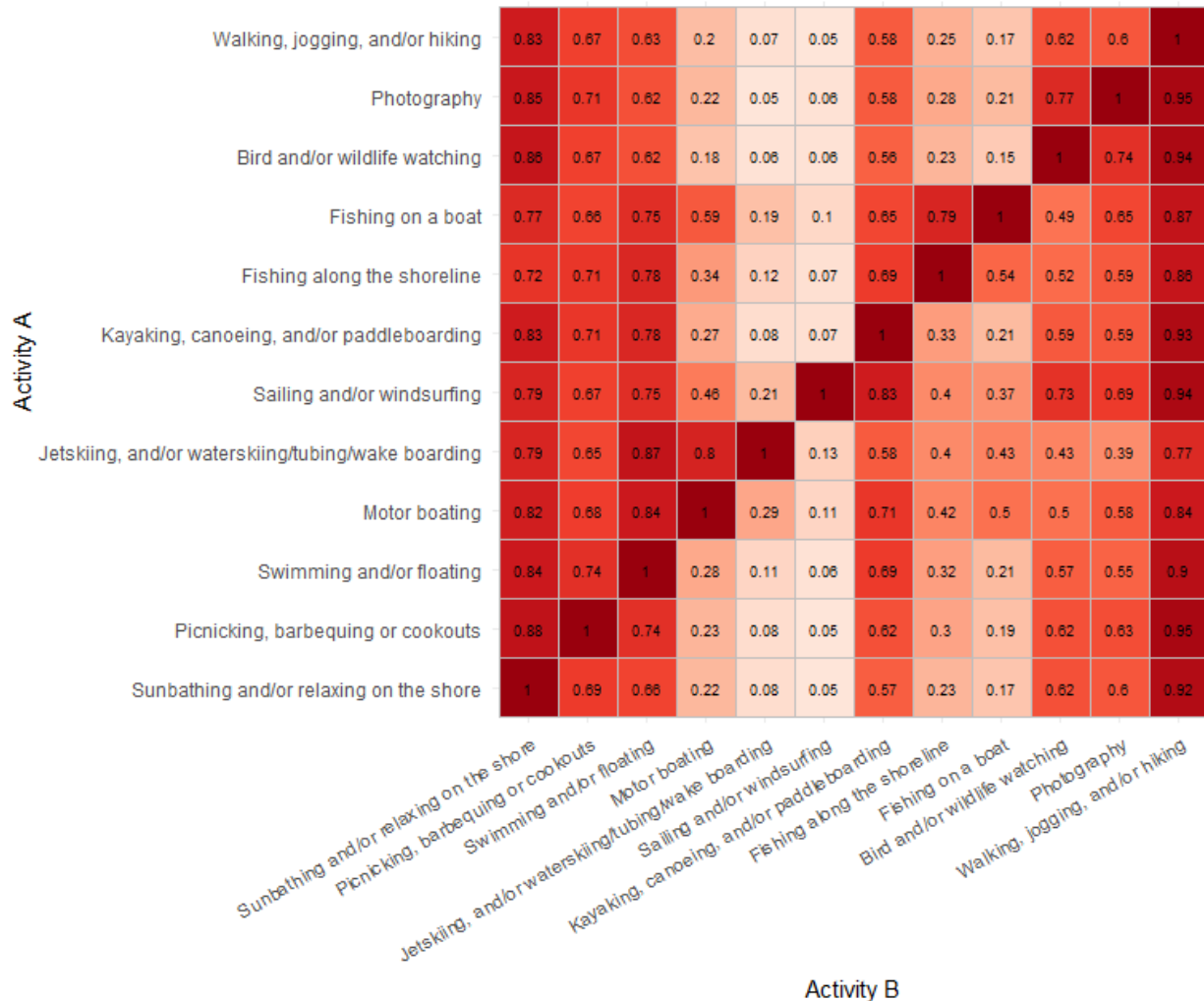


Figure 3.7: Co-participation in freshwater recreation activities in North Puget Sound among residents in Summer 2023.

We calculated coparticipation rates for each activity category, interpreted as the rate at which participants in one activity also participated in another activity over the course of the summer (Figure 3.7). For example, 79% of residents who fished from a boat also fished from the shore, while only 54% of

those who fished from the shore also fished from a boat (Figure 3.7). Similarly, 77% of those who participated in photography also watched birds and/or wildlife and 74% of those who watched birds and/or wildlife also participated in photography, suggesting that these user groups have considerable overlap (Figure 3.7).

3.1.3 Logistic regression

Table 3.2: Odds ratios and robust standard errors (HC3) for logistic regression.

	Participation
Intercept	17.259*** (8.356)
Age	0.972*** (0.005)
Race: All other (baseline)	-
Race: Asian	0.589+ (0.176)
Race: White	1.385 (0.307)
Sex: Female (baseline)	-
Sex: Male	1.118 (0.181)
Sex: Other	0.820 (0.337)
Household income (USD): 59k or less (baseline)	-
Household income (USD): 60k - 99k	1.006 (0.247)
Household income (USD): 150k - 199k	1.244 (0.332)
Household income (USD): 200k or more	1.962** (0.476)
County: Island and San Juan (baseline)	-
County: King	0.530+ (0.175)
County: Skagit and Whatcom	0.945 (0.395)
County: Snohomish	0.573 (0.201)
Num.Obs.	3,410
RMSE	0.44
AIC	3,434.7
BIC	3,520.5

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

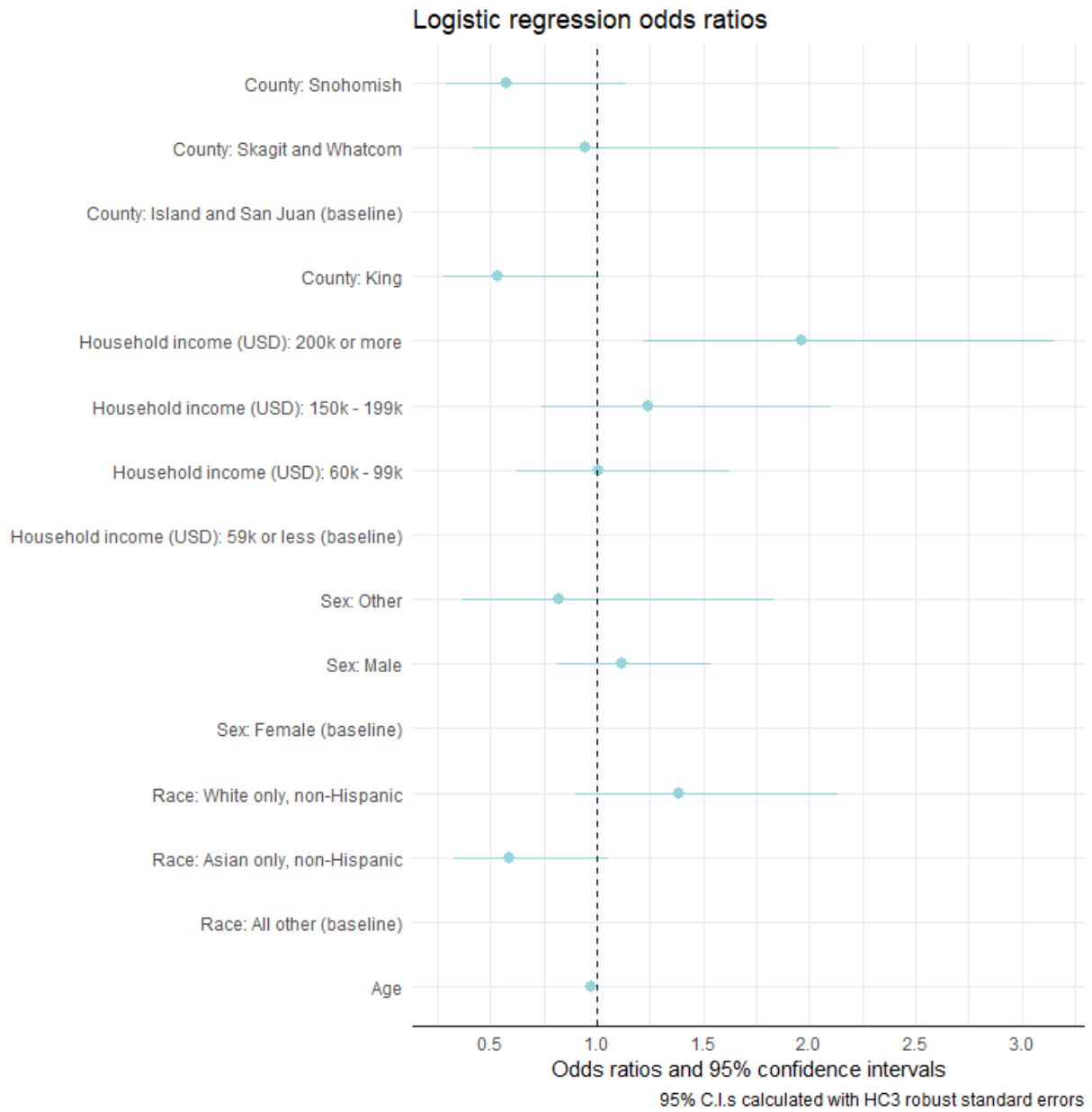


Figure 3.8: Logistic regression odds ratios of demographic characteristics on participation.

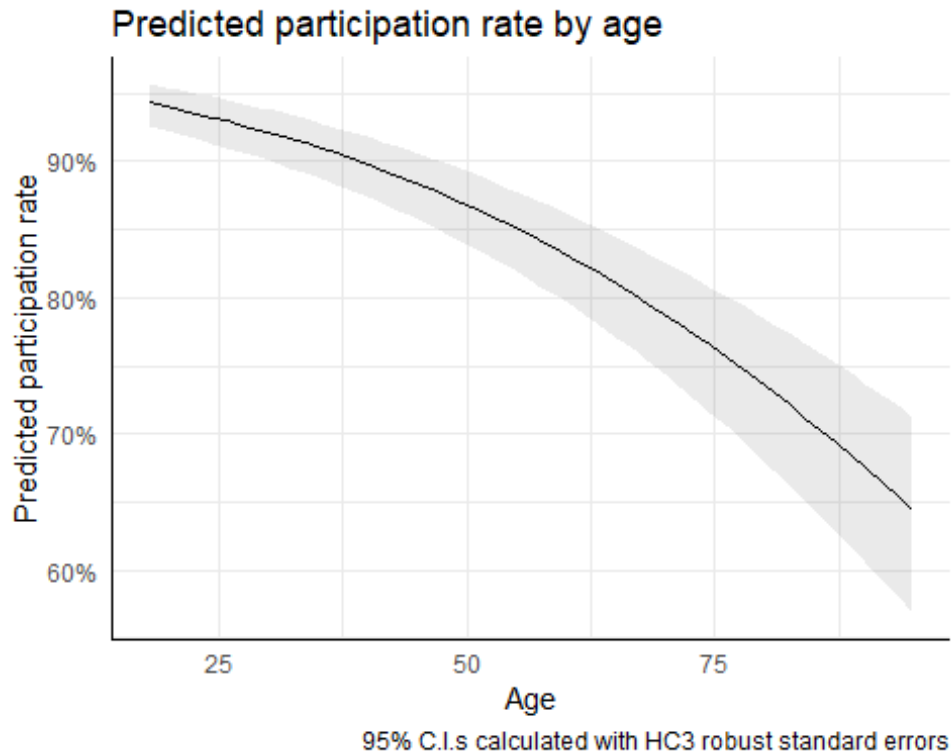


Figure 3.9: Predicted participation in freshwater recreation by age with other covariates held constant.

Logistic regression estimates reveal how participation rates vary across demographic groups when other demographic variables are held constant. These results largely confirm what we observe through participation rates. All else equal, Snohomish County and King County residents are about half as likely to have participated in freshwater recreation during the study period than residents of the other four counties in the study region, though these effects are not precisely estimated (Figure 3.8). Asian residents were also about half as likely to have participated than the baseline race/ethnicity category (all others) (Figure 3.8). Those in the highest household income category were over twice as likely to have participated than those in the lowest income category (Figure 3.8). There was also a strong effect of age on participation, with older residents significantly less likely to have participated than younger residents (Figure 3.9).

3.1.4 Effort

Freshwater recreation trips in the North Puget Sound Region

Summer 2023

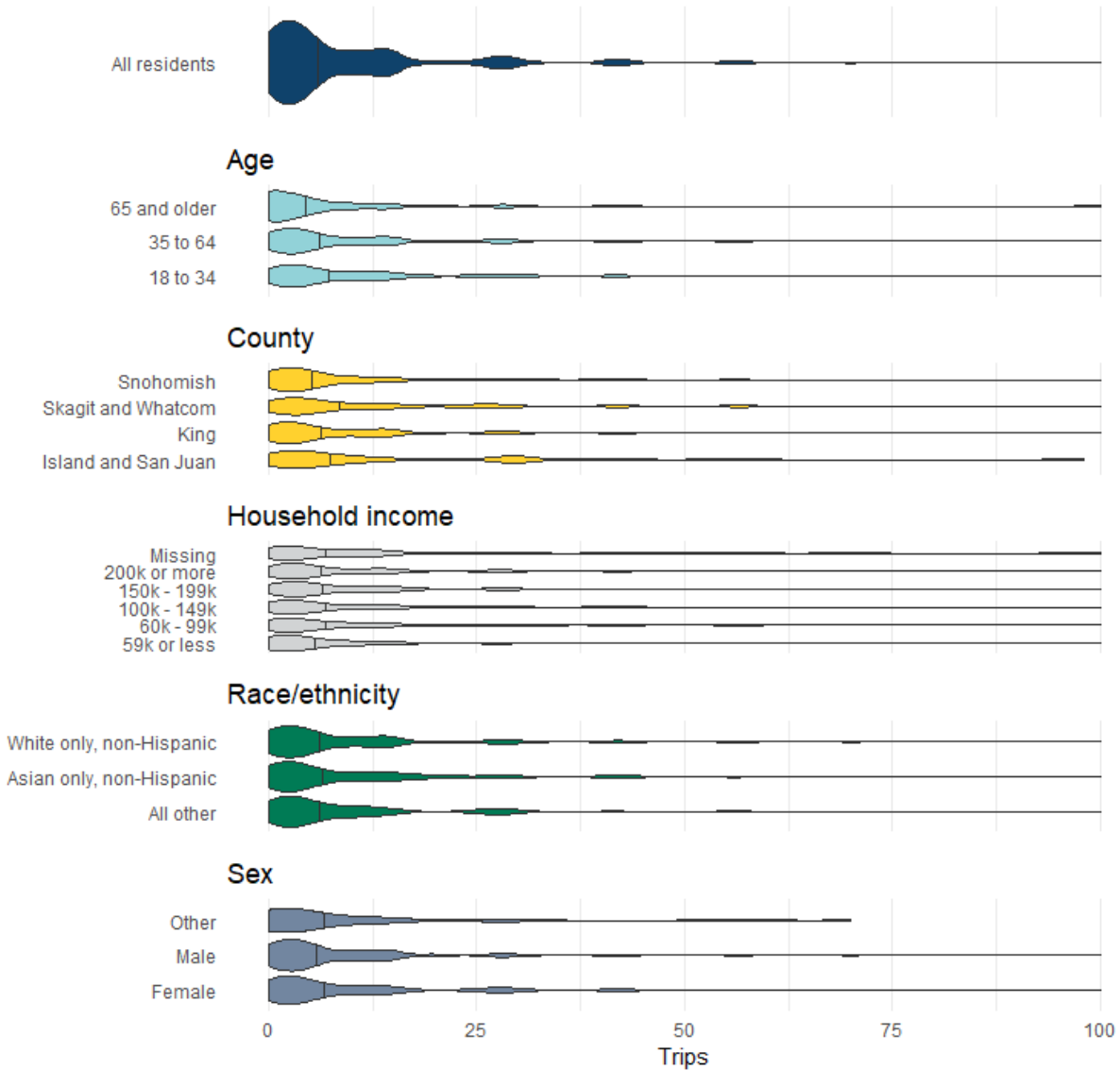


Figure 3.10: Trip effort violin plots for freshwater recreation in the North Puget Sound region among residents in Summer 2023. Bar width is proportional to the number of individuals in each category at each number of trips.

Table 3.3: Freshwater trips in the North Puget Sound Region in Summer 2023, summary statistics.

Group	Mean	SD	Total	Minimum	25%	Median	75%	Maximum
All residents	11.7	14.1	29,275,040	1	3	6.0	14	123.0
Age								
18 to 34	12.2	14.0	10,246,628	1	3	6.0	14	100.0
35 to 64	11.6	13.7	14,815,849	1	3	6.0	14	119.6
65 and older	11.1	15.7	4,212,564	1	3	5.0	14	123.0
County								
Island and San Juan	14.8	17.6	1,202,025	1	4	7.0	28	98.0
King	12.0	14.5	18,834,108	1	3	6.0	14	123.0
Skagit and Whatcom	15.1	16.0	4,162,446	1	4	8.6	25	75.0
Snohomish	8.9	10.5	5,076,461	1	3	5.0	10	69.0
Household income								
59k or less	10.8	13.7	4,251,678	1	3	5.0	14	89.1
60k - 99k	12.8	15.5	6,009,426	1	3	7.0	14	123.0
100k - 149k	13.0	15.3	6,187,906	1	3	6.0	15	102.5
150k - 199k	10.0	10.2	4,005,778	1	4	6.0	14	82.2
200k or more	11.2	13.2	6,942,704	1	3	5.1	14	77.6
Missing	13.7	18.8	1,877,548	1	3	8.0	14	111.9
Race/ethnicity								
All other	10.9	13.1	5,815,841	1	3	5.0	14	85.3
Asian	11.4	13.1	4,276,428	1	3	5.0	14	94.1
White	12.1	14.7	19,182,772	1	3	6.0	14	123.0
Sex								
Female	12.6	14.8	14,102,032	1	3	6.0	14	98.0
Male	10.9	13.3	13,654,440	1	3	6.0	14	123.0
Other	12.3	16.0	1,518,569	1	3	5.0	14	70.0

We estimated average and total trip effort, or the number of trips taken across the summer, both overall and by demographic groups (Figure 3.10) (Table 3.3). In total, residents took an estimated 29.3 million trips to freshwater destinations in the North Puget Sound region over the course of the summer. The mean number of trips per resident was 11.7 while the median was 6 (Table 3.3). Mean effort was fairly consistent across demographic groups, though residents of Snohomish and King counties took fewer trips on average than those in the other four study counties (Table 3.3).

3.1.5 Poisson regression

Table 3.4: Rate ratios and robust standard errors (HC3) for Poisson regression.

	Effort
Intercept	18.276*** (5.643)
Age	0.993* (0.003)
Race: All other (baseline)	-
Race: Asian	0.892 (0.173)
Race: White	1.163 (0.165)
Sex: Female (baseline)	-
Sex: Male	0.891 (0.084)
Sex: Other	0.886 (0.246)
Household income (USD): 59k or less (baseline)	-
Household income (USD): 60k - 99k	0.975 (0.152)
Household income (USD): 150k - 199k	0.818 (0.116)
Household income (USD): 200k or more	1.043 (0.145)
County: Island and San Juan (baseline)	-
County: King	0.723 (0.172)
County: Skagit and Whatcom	1.026 (0.278)
County: Snohomish	0.563* (0.141)
Num.Obs.	3,410
RMSE	14.31
AIC	58,001.9
BIC	58,087.8

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

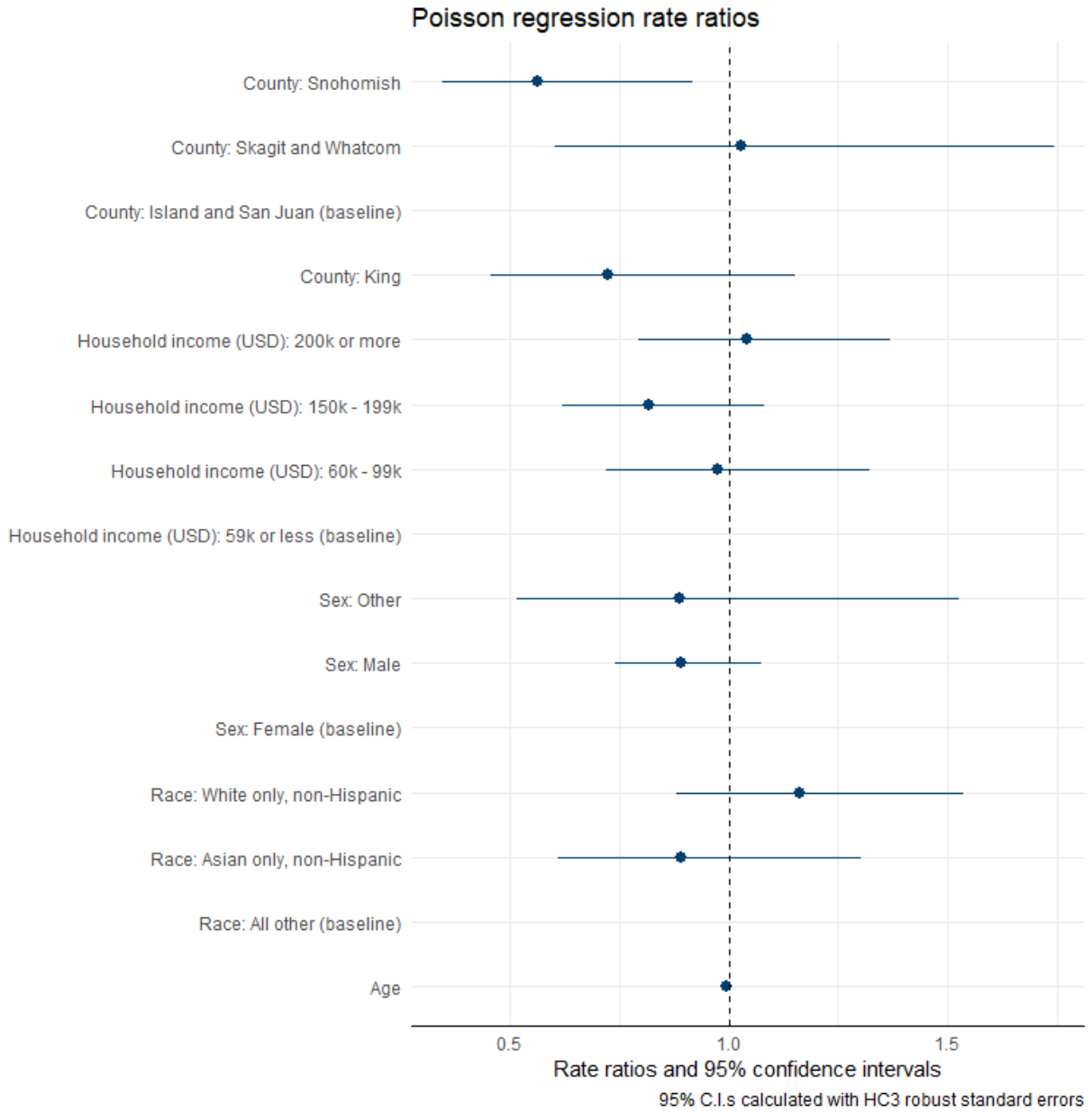


Figure 3.11: Poisson regression rate ratios of demographic characteristics on effort.

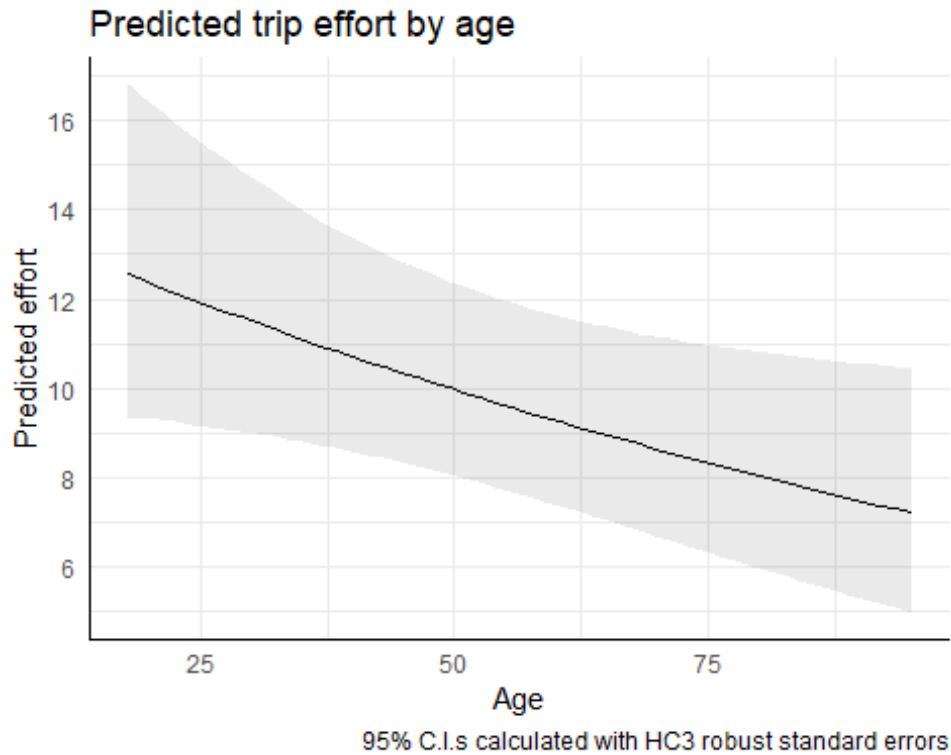


Figure 3.12: Predicted trip effort for freshwater recreation by age with other covariates held constant.

Just as the logistic regression allows us to estimate the relative participation rates among demographic groups while holding other variables constant, we use the Poisson regression estimates to do the same for trip effort (Figure 3.11). We estimate that Snohomish County residents took approximately half as many trips as residents of Island and San Juan counties, the baseline category (Figure 3.11). Residents in the highest-earning income bracket took approximately 39% more trips per person than those in the lowest-earning income bracket (Figure 3.11). Age also had a statistically significant effect on effort at the 5% level, with 25-year-olds taking approximately 50% more trips than 75-year-olds, all else equal (Figure 3.12).

3.2 Most recent trip

3.2.1 Date of most recent trip

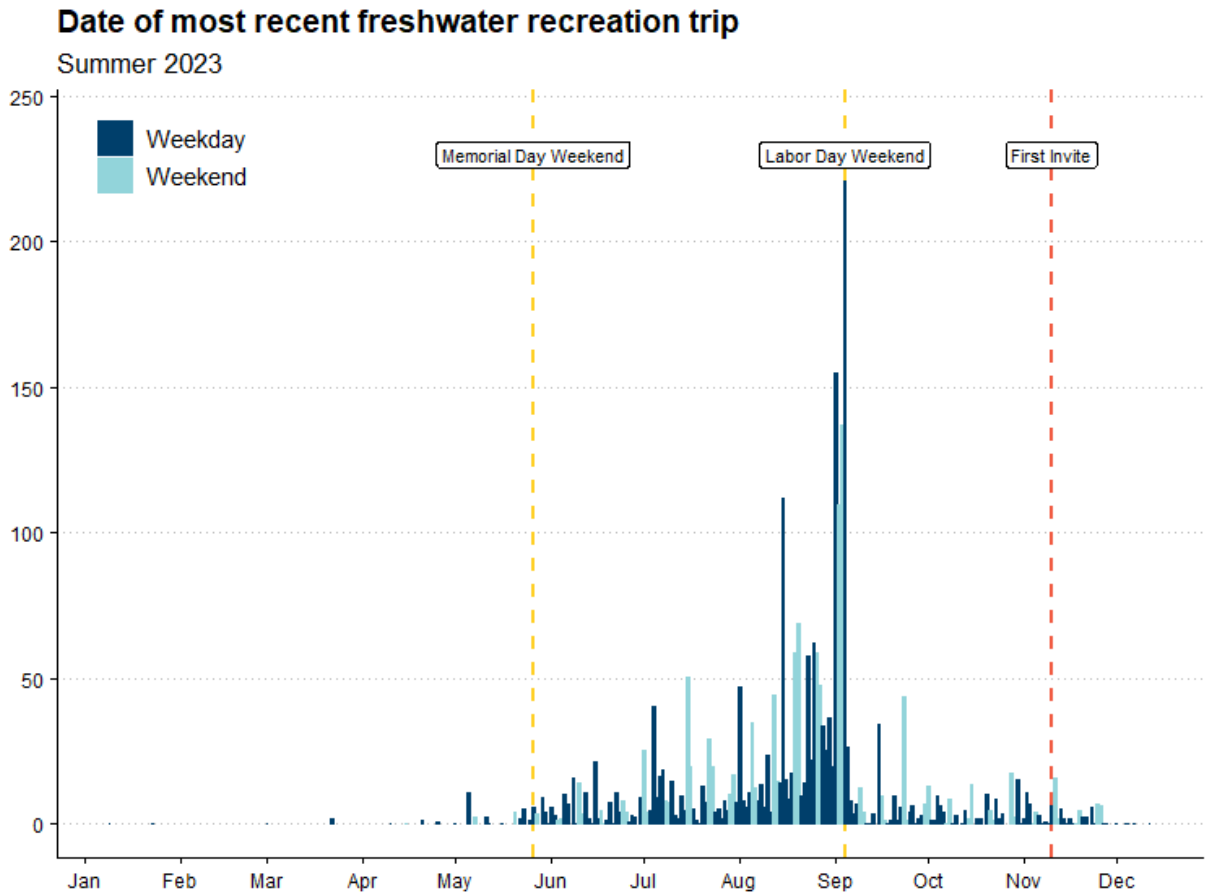


Figure 3.13: Distribution of trips over time.

Eighty three percent of respondents that reported valid dates reported recent trips within the specified time frame (Figure 3.13).² The distribution of trip dates above is presented to inform interpretation of the recent trip data. Results associated with data derived from recent trips are not representative of year-round trips. Rather, these data represent recreational behavior during the mid-to-late summer of 2023.

Just over half of reported trips were on weekends or federal holidays. Labor Day was the most frequently reported date, followed by Friday and the Sunday of Labor Day weekend. August 15 was the fourth most frequently reported day for respondents' most recent trips.

² All trips are included in the analysis that follows, regardless of whether the date of the trip was within the specified period or not.

3.2.2 Trip duration and distance travelled

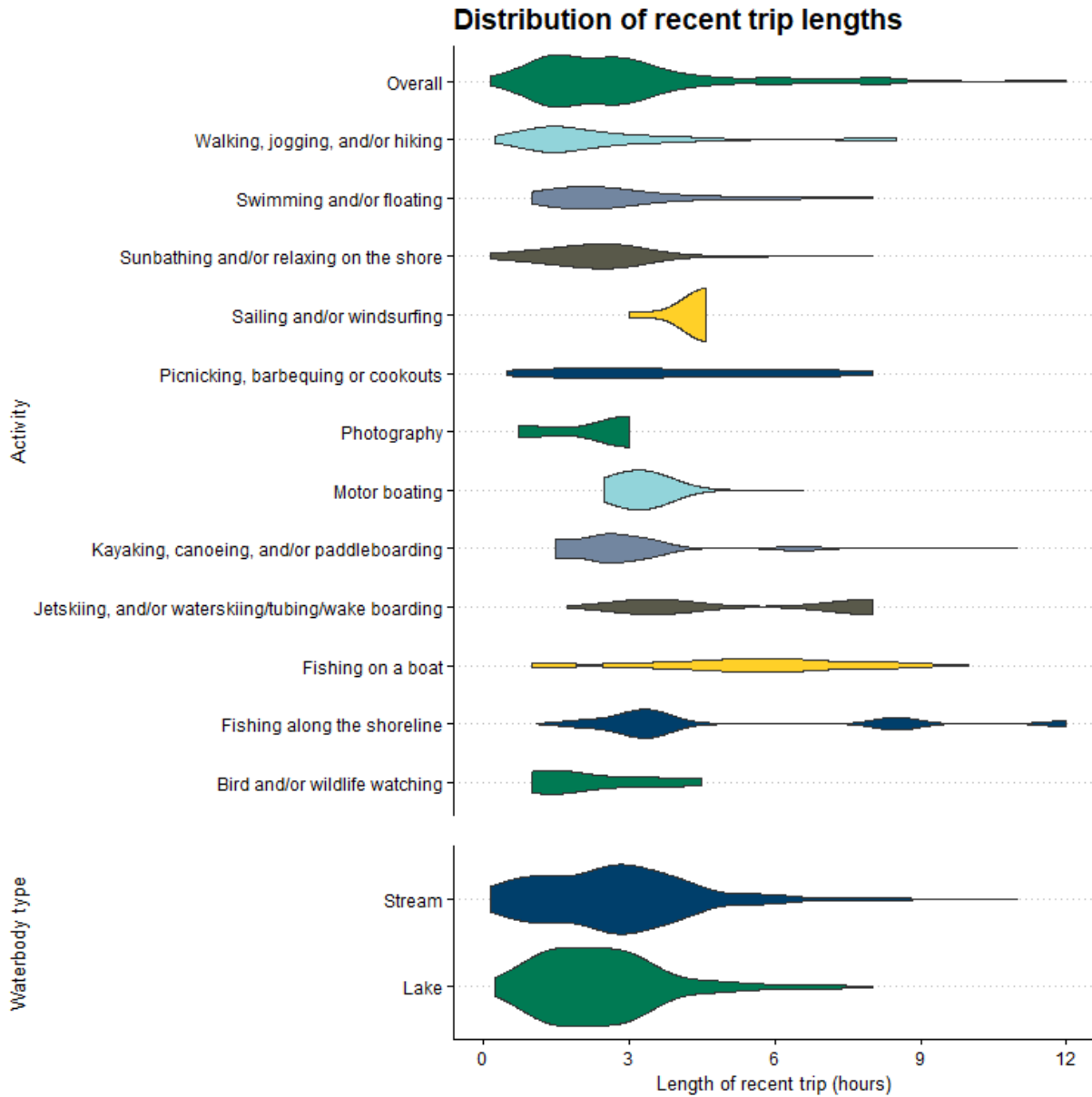


Figure 3.14: Distribution of trip duration by activity and waterbody type. Bar width is proportional to the number of trips in each category at each duration.

Table 3.5: Recent trip duration (hours), summary statistics.

Activity	Mean	SD	Minimum	25%	Median	75%	Maximum
Overall	2.8	1.9	0.2	1.5	2.5	3.5	12.0
Sunbathing and/or relaxing on the shore	2.2	1.0	0.2	1.5	2.5	3.0	6.3
Picnicking, barbequing or cookouts	3.9	2.2	0.5	2.3	3.1	6.0	8.0
Swimming and/or floating	2.8	1.6	1.0	1.5	2.5	3.5	8.0
Motor boating	3.2	0.4	2.5	3.0	3.3	3.5	4.2
Jetskiing, and/or waterskiing/tubing/wake boarding	5.7	2.7	3.5	6.6	8.0	8.0	8.0
Sailing and/or windsurfing	4.4	0.5	4.6	4.6	4.6	4.6	4.6
Kayaking, canoeing, and/or paddleboarding	2.8	1.3	1.5	2.5	2.5	3.2	6.9
Fishing along the shoreline	5.2	3.3	2.0	3.2	3.5	8.5	12.0
Fishing on a boat	5.3	2.3	1.0	5.0	6.0	6.7	9.1
Bird and/or wildlife watching	2.2	1.2	1.0	1.5	1.5	3.0	4.5
Photography	2.4	1.0	0.8	3.0	3.0	3.0	3.0
Walking, jogging, and/or hiking	2.4	1.8	0.3	1.3	1.5	3.0	8.5

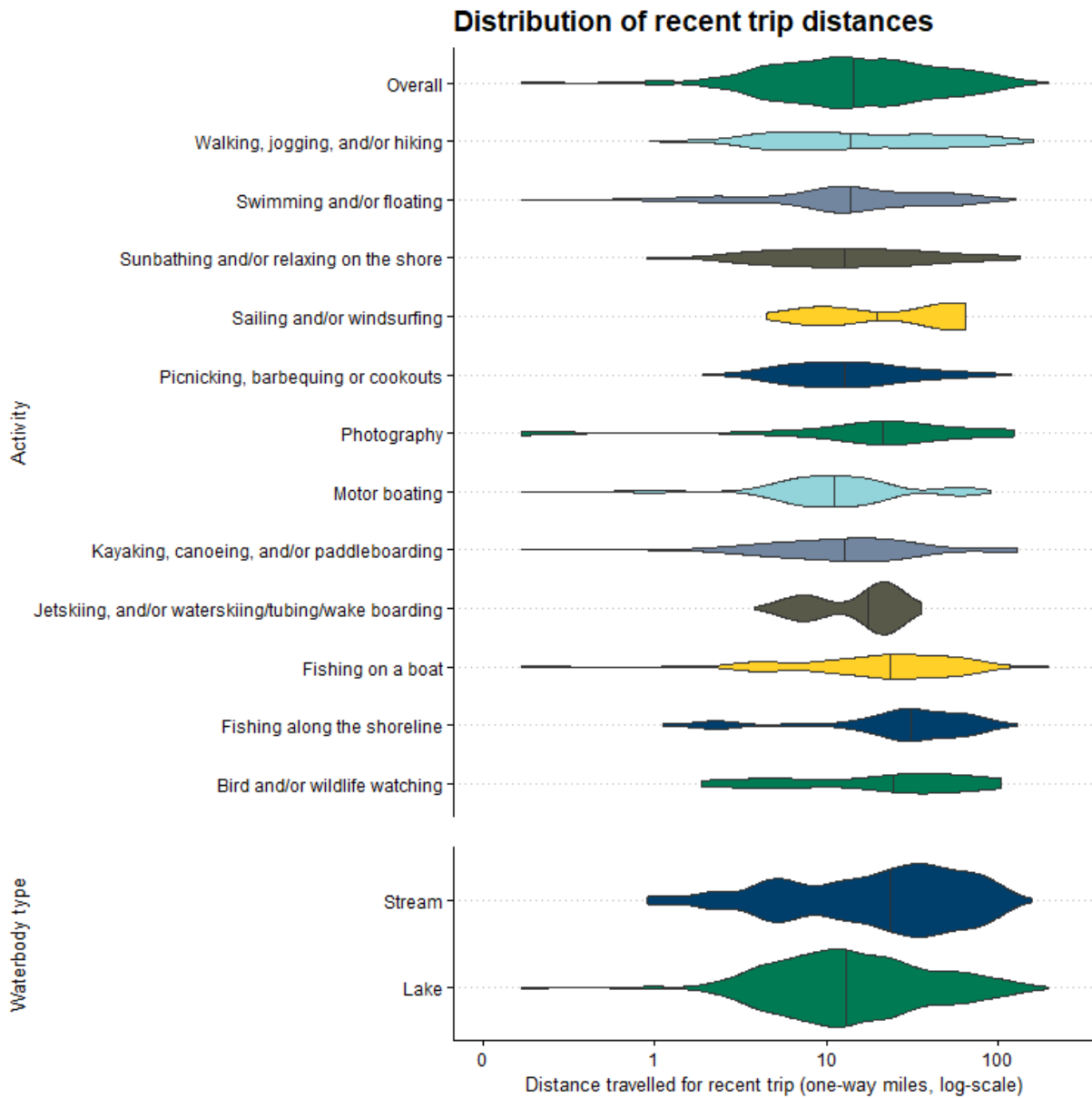


Figure 3.15: Distribution of trip distance by activity and waterbody type. Bar width is proportional to the number of trips in each category at each distance.

Table 3.6: Recent trip distance (one-way miles), summary statistics.

Activity	Mean	SD	Minimum	25%	Median	75%	Maximum
Overall	25.8	27.7	0.2	6.7	14.1	33.9	248.3
Sunbathing and/or relaxing on the shore	22.5	24.9	0.9	6.7	12.0	28.3	120.2
Picnicking, barbequing or cookouts	18.5	17.6	1.9	6.7	13.9	21.3	101.4
Swimming and/or floating	22.0	22.2	0.9	9.8	13.1	31.6	163.0
Motor boating	16.4	16.3	0.9	7.5	11.1	18.6	89.7
Jetskiing, and/or waterskiing/tubing/wake boarding	16.8	7.5	5.7	8.2	21.3	22.0	30.3
Sailing and/or windsurfing	36.0	24.5	6.7	10.9	53.8	53.8	65.1
Kayaking, canoeing, and/or paddleboarding	21.9	27.9	0.9	6.9	13.2	22.1	128.3
Fishing along the shoreline	35.4	24.2	1.1	20.5	30.7	54.1	180.0
Fishing on a boat	29.2	22.0	3.6	11.4	24.2	43.2	164.8
Bird and/or wildlife watching	34.6	31.5	1.9	6.9	27.8	55.0	103.3
Photography	32.0	32.1	0.2	20.7	21.2	33.9	119.0
Walking, jogging, and/or hiking	28.2	31.9	0.9	6.1	12.7	37.5	159.2

Trip duration and distance traveled provide a measure of how much the population is willing to invest, both with their money and their time, in freshwater recreation (Mazzotta, Merrill, and Mulvaney 2022). Longer trip durations can also be associated with increased congestion and increased demand for amenities such as bathrooms, shelters, etc.

The overall mean trip duration, i.e., time spent at the recreation site, was 2.8 hours (Figure 3.14; Table 3.5). Jetskiing, and/or waterskiing/tubing/wake boarding, fishing on a boat, and fishing along the shoreline were activities associated with longer trip durations; the mean duration of trips with each of these activities was over five hours (Figure 3.14). The distributions of trip durations between trips to lakes and trips to streams were similar (Figure 3.14).

The mean one-way distance traveled from the user’s home zip code to their most recent recreation site was 25.8 miles (Figure 3.15; Table 3.6). Users traveled furthest for trips associated with sailing and/or windsurfing (mean trip distance 36 miles) fishing along the shoreline (mean trip distance 35.4 miles), and/or bird and/or wildlife watching (mean trip distance 34.6 miles; Figure 3.15). Trips where users participated in motorboating (mean trip distance 16.4 miles), jetskiing and/or waterskiing/tubing/wake boarding (mean trip distance 16.8 miles), and/or picnicking, barbequing or cookouts (mean trip distance 18.5 miles) were to destinations closest to users’ homes (Figure 3.15). Trips to streams tended to be further from users’ homes (mean trip distance 31.7 miles, median trip distance 24.5 miles) than trips to lakes (mean trip distance 23.5 miles, median trip distance 12.9 miles; Figure 3.15).

3.2.3 Destinations of most recent trips

Table 3.7: Trip destination statistics.

Total trips with destinations	1,977
Trip destinations identified by point	1,180
Trip destinations identified by name	1,532
Trip destinations identified by both name and point	735
Unique lakes identified through points or by name	182
Unique streams identified through points or by name	116
Unique waterbodies	298
Share of trips to lakes	72%
Share of trips to streams	28%
Share of trips to waterbodies with DFW access points	34%

Using the interactive map and searchable waterbody list, respondents provided destination information for 1,977 trips to 182 unique lakes and 116 unique stream segments (Table 3.7). Seventy-two percent of trips were to lakes while 28% of trips were to streams; 34% of trips were to waterbodies where WDFW provides public access (Table 3.7).

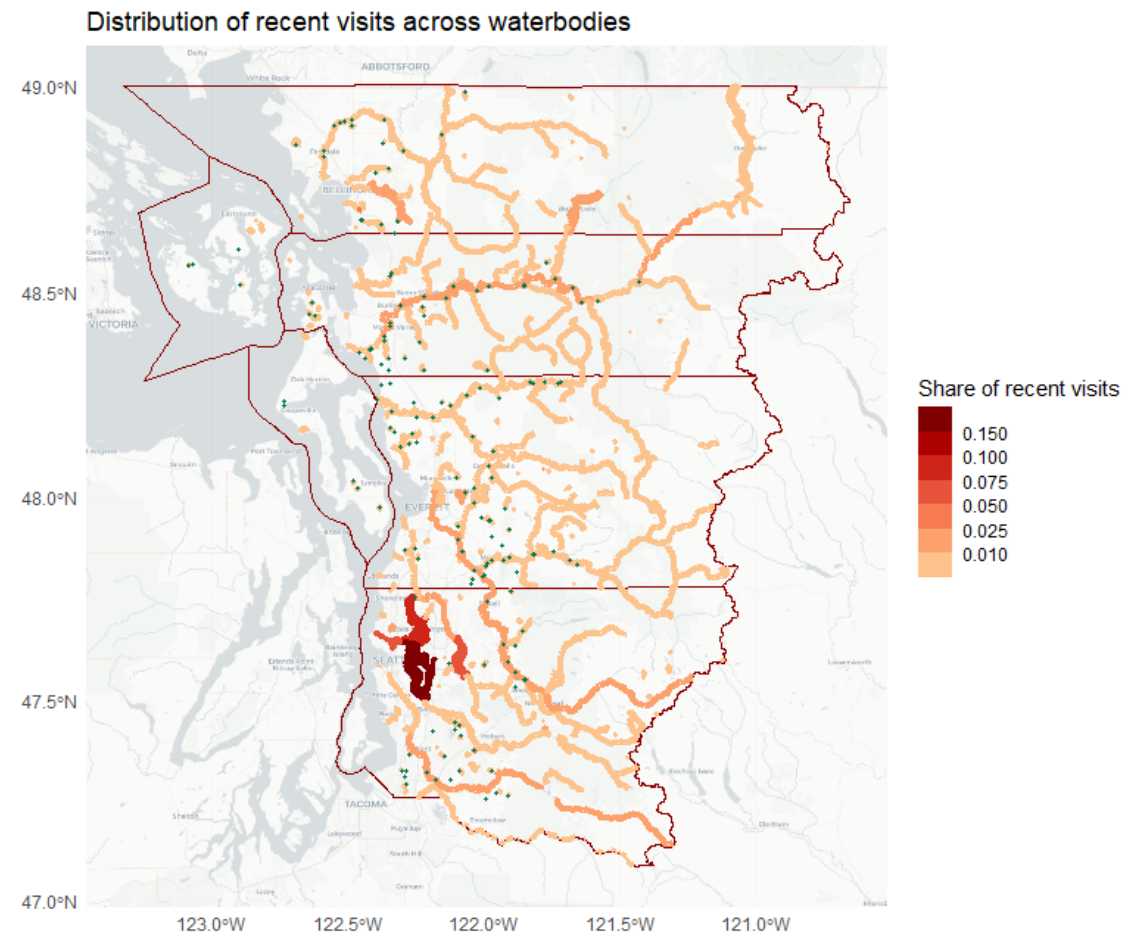


Figure 3.16: Map of recent trip destinations. WDFW access areas in green.

Distribution of recent visits across waterbodies

King County

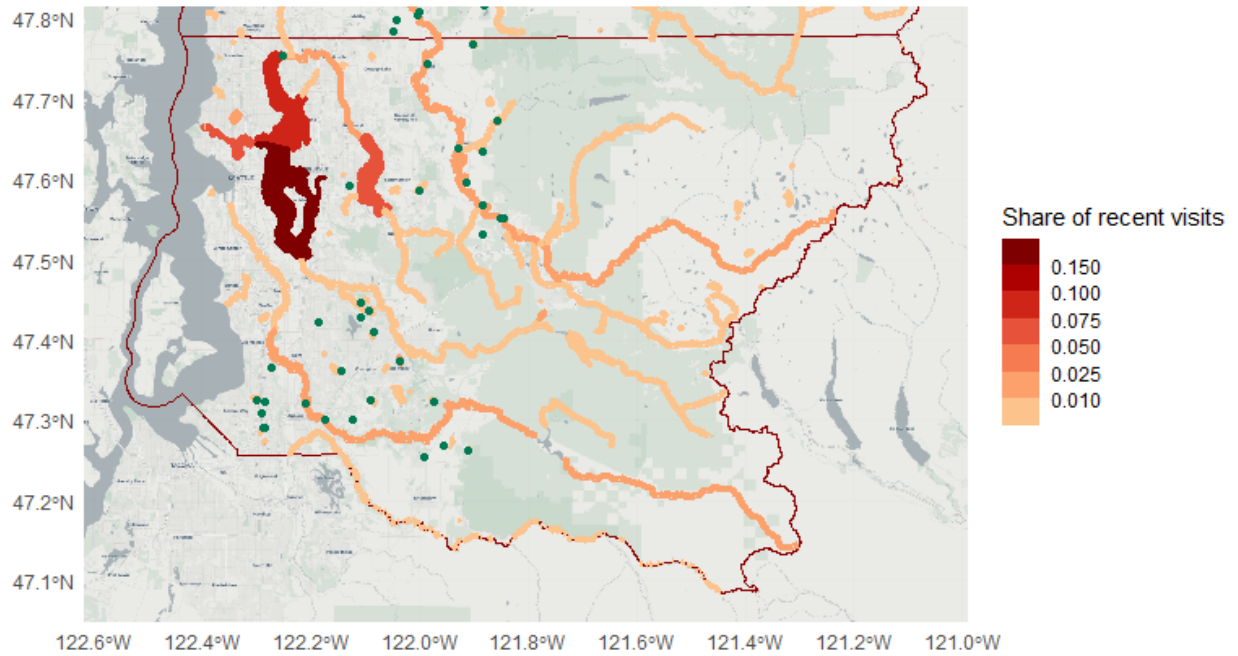


Figure 3.17: Map of recent trip destinations, King County. WDFW access areas in green.

Distribution of recent visits across waterbodies

Snohomish County

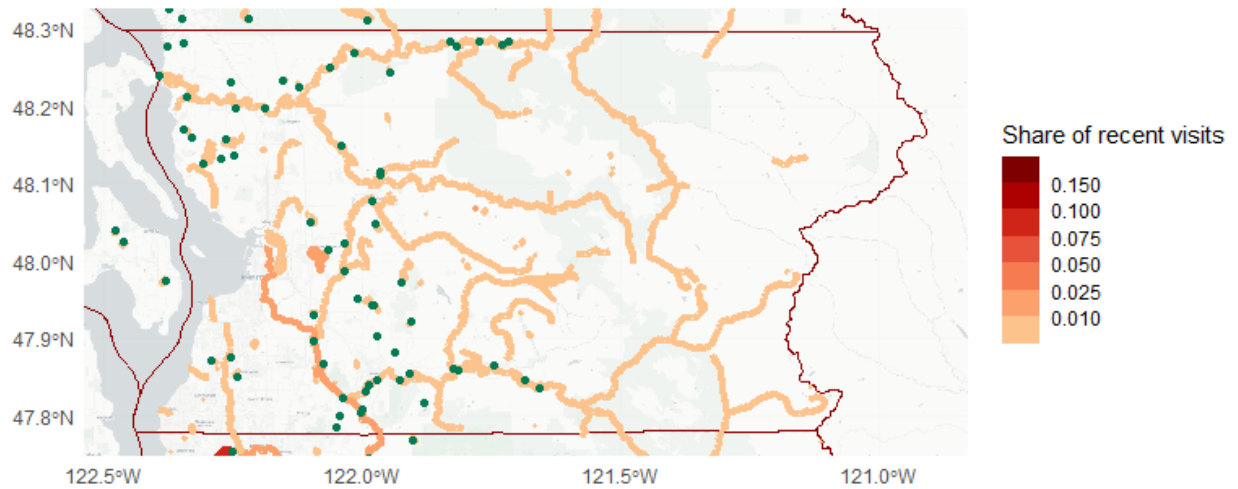


Figure 3.18: Map of recent trip destinations, Snohomish County. WDFW access areas in green.

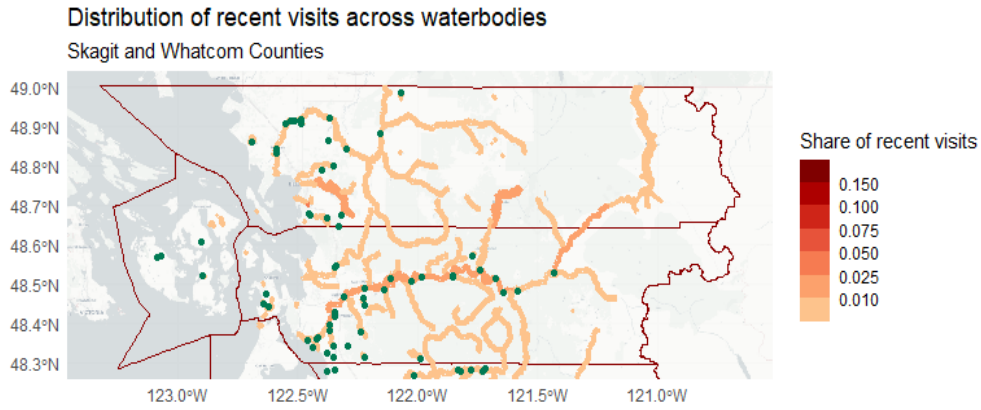


Figure 3.19: Map of recent trip destinations, Skagit and Whatcom Counties. WDFW access areas in green.

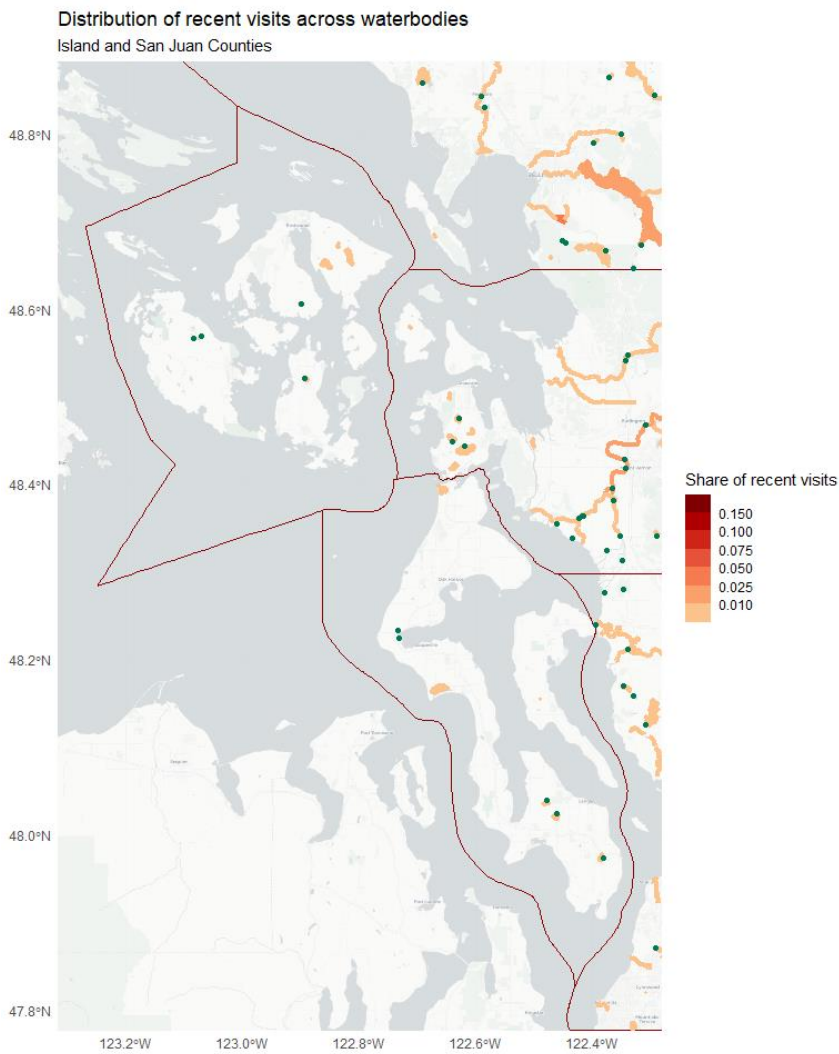


Figure 3.20: Map of recent trip destinations, Island and San Juan Counties. WDFW access areas in green.

Distribution of recent trips by waterbody

Waterbodies with DFW access points in green; dotted line indicates Top 30 destinations

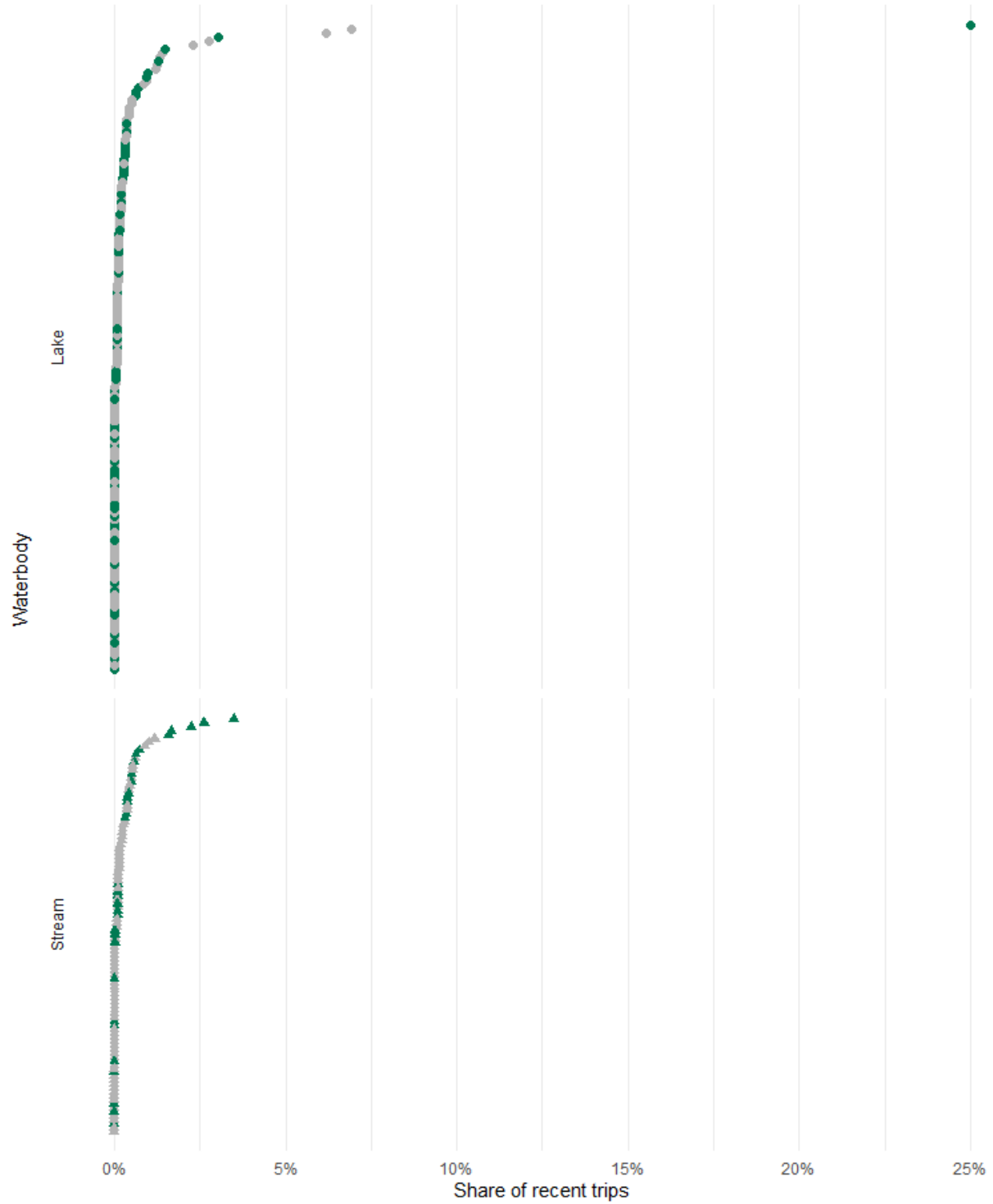


Figure 3.21: Distribution of trips across waterbodies.

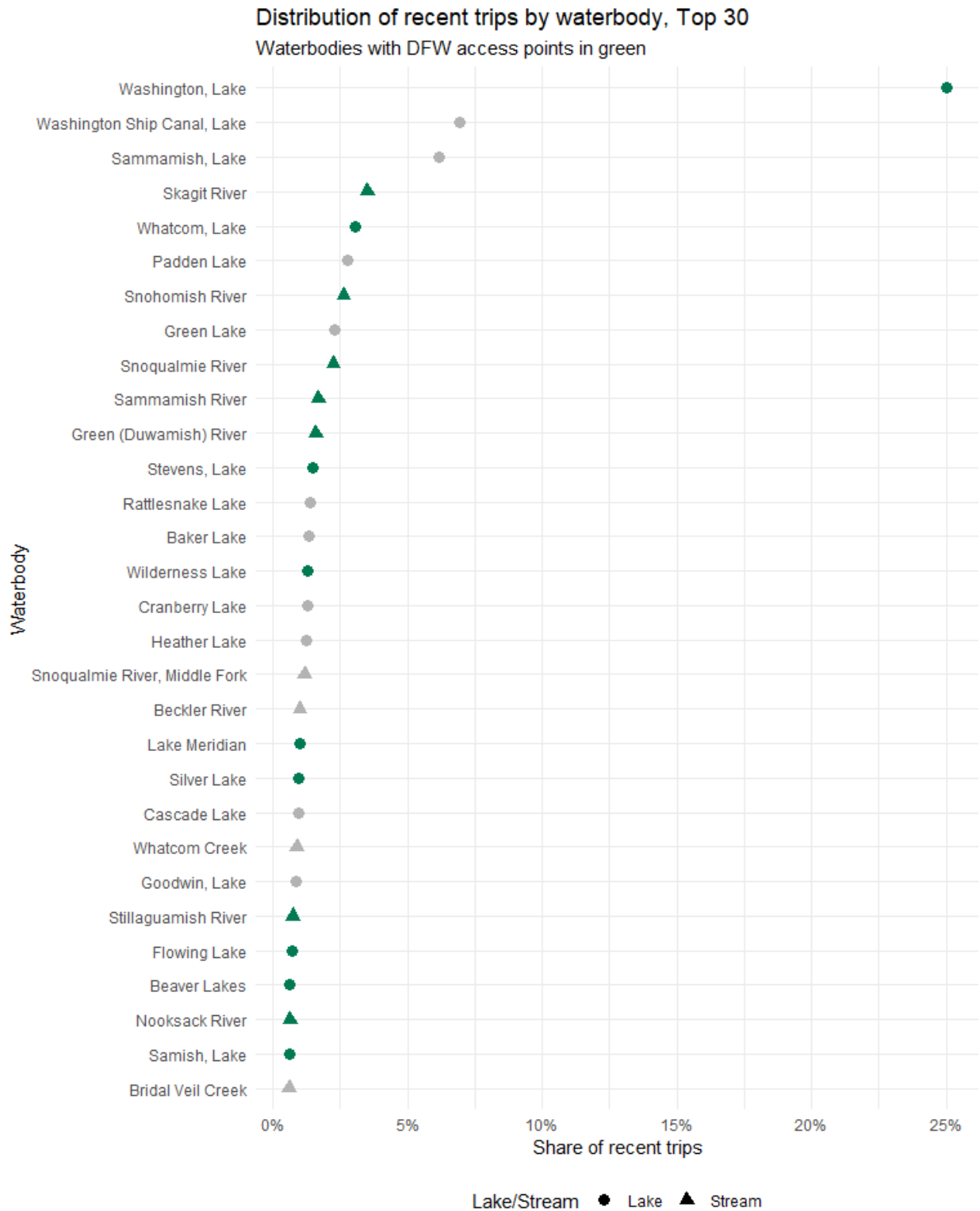


Figure 3.22: Distribution of trips across waterbodies, top 30.

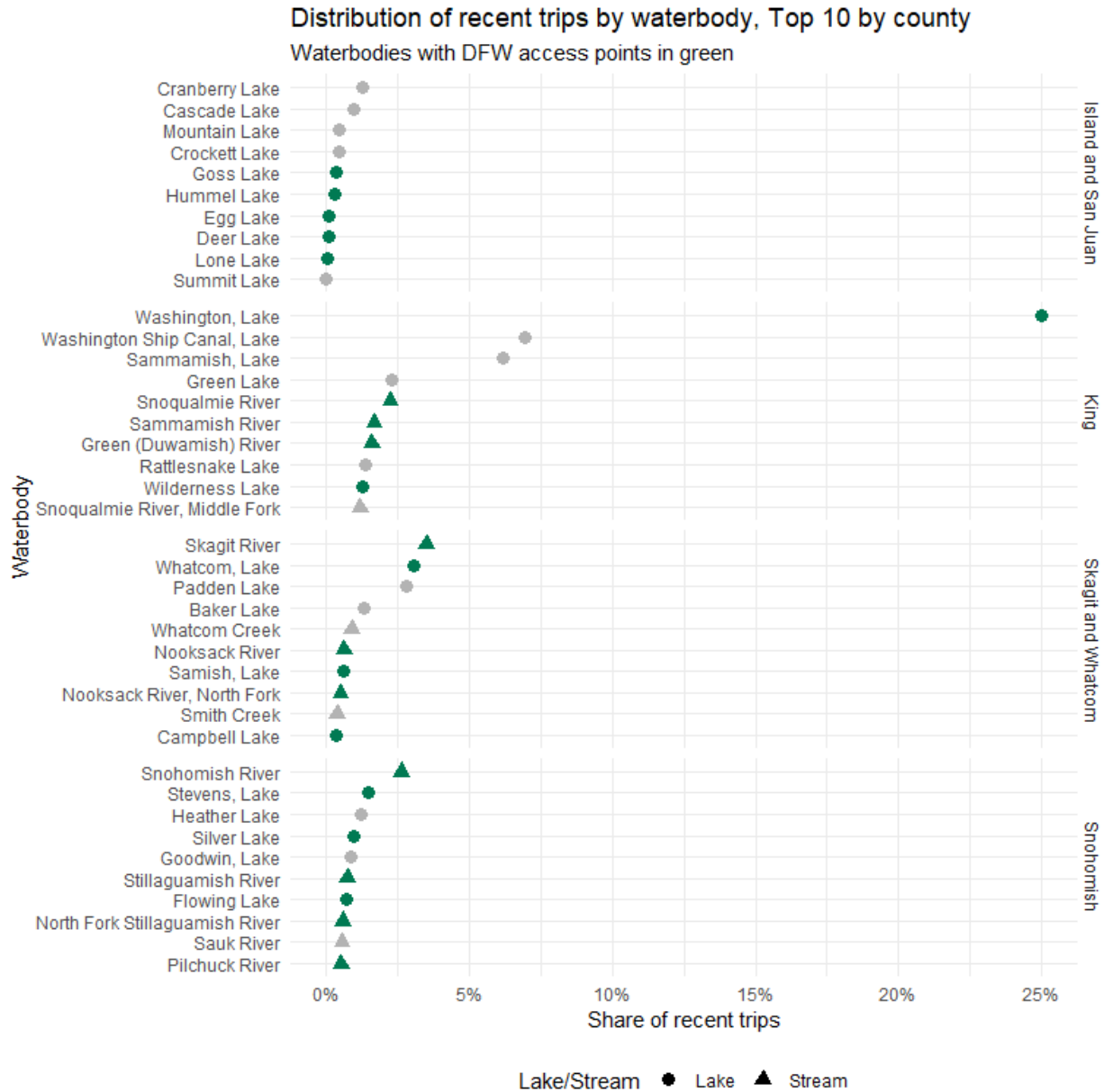


Figure 3.23: Distribution of trips across waterbodies, top 10 by county.

Trip destinations were geographically concentrated primarily around large lakes near the region’s largest population center: Seattle and surrounding cities (Figure 3.16; Figure 3.21). Twenty-five percent of recent trips were to Lake Washington, with more activity in the area south of Union Bay (Figure 3.16; Figure 3.22). Both the Lake Washington Ship Canal (which includes Lake Union in this analysis) and Lake Sammamish were the destinations of over 5% of recent trips (Figure 3.22). Similarly, the large Lake Whatcom and urban Padden Lake in Bellingham also feature in the ten most visited waterbodies during the study period (Figure 3.22).

The Skagit, Snohomish, Snoqualmie, Sammamish, and Green (Duwamish) Rivers represent the five most frequently visited rivers; all five rivers feature WDFW access areas (Figure 3.22). Rivers provide a larger share of trip destinations than lakes in more rural Snohomish, Skagit and Whatcom counties relative to King County; all trips to Island and San Juan counties were to the islands' lakes (Figure 3.23).

3.2.4 Activities during most recent trip

Table 3.8: Participation rates in freshwater activities during most recent trip, by WDFW site and waterbody type.

Activity	Participation rate	With WDFW sites	Without WDFW sites	At lakes	At streams
Sunbathing and/or relaxing on the shore	64%	61%	66%	68%	56%
Picnicking, barbequing or cookouts	39%	37%	43%	40%	34%
Swimming and/or floating	38%	42%	45%	43%	34%
Motor boating	10%	13%	5%	12%	4%
Jetskiing, and/or waterskiing/tubing/wake boarding	4%	5%	4%	6%	1%
Sailing and/or windsurfing	2%	3%	0%	3%	0%
Kayaking, canoeing, and/or paddleboarding	23%	25%	23%	29%	11%
Fishing along the shoreline	12%	13%	9%	9%	15%
Fishing on a boat	7%	7%	7%	7%	4%
Bird and/or wildlife watching	49%	44%	49%	45%	49%
Photography	45%	34%	47%	42%	39%
Walking, jogging, and/or hiking	65%	54%	71%	58%	71%

Table 3.9: Share as main activity in during most recent trip, by WDFW site and waterbody type.

Activity	Main activity	With WDFW sites	Without WDFW sites	At lakes	At streams
Sunbathing and/or relaxing on the shore	12%	11%	14%	14%	11%
Picnicking, barbequing or cookouts	8%	10%	7%	9%	7%
Swimming and/or floating	9%	11%	13%	11%	12%
Motor boating	4%	5%	1%	5%	1%
Jetskiing, and/or waterskiing/tubing/wake boarding	1%	2%	2%	2%	0%
Sailing and/or windsurfing	1%	1%	0%	1%	0%
Kayaking, canoeing, and/or paddleboarding	12%	15%	7%	15%	5%
Fishing along the shoreline	5%	5%	4%	2%	10%
Fishing on a boat	3%	5%	3%	4%	3%
Bird and/or wildlife watching	3%	2%	1%	1%	3%
Photography	2%	1%	0%	2%	1%
Walking, jogging, and/or hiking	33%	28%	40%	29%	41%

Coparticipation in freshwater recreation activities, most recent trip

Rate of participation in Activity B conditional on participating in Activity A

Activity A	Sunbathing and/or relaxing on the shore	Picnicking, barbequing or cookouts	Swimming and/or floating	Motor boating	Jetskiing, and/or waterskiing/tubing/wake boarding	Sailing and/or windsurfing	Fishing along the shoreline	Fishing on a boat	Bird and/or wildlife watching	Photography	Walking, jogging, and/or hiking	
Walking, jogging, and/or hiking	0.61	0.36	0.26	0.02	0.02	0.03	0.09	0.05	0.03	0.55	0.55	1
Photography	0.72	0.42	0.25	0.05	0.04	0.04	0.15	0.07	0.04	0.66	1	0.82
Bird and/or wildlife watching	0.68	0.44	0.27	0.05	0.03	0.04	0.17	0.04	0.02	1	0.64	0.79
Fishing on a boat	0.1	0.18	0.35	0.53	0.04	0.01	0.24	0.29	1	0.16	0.33	0.43
Fishing along the shoreline	0.36	0.34	0.23	0.1	0.01	0.01	0.18	1	0.21	0.31	0.48	0.49
Kayaking, canoeing, and/or paddleboarding	0.71	0.46	0.58	0.08	0.04	0.01	1	0.07	0.06	0.43	0.37	0.35
Sailing and/or windsurfing	0.88	0.25	0.79	0.04	0.46	1	0.11	0.02	0.02	0.9	0.84	0.85
Jetskiing, and/or waterskiing/tubing/wake boarding	0.46	0.1	0.83	0.53	1	0.26	0.2	0.03	0.05	0.38	0.52	0.34
Motor boating	0.31	0.32	0.65	1	0.24	0.01	0.16	0.07	0.3	0.26	0.27	0.19
Swimming and/or floating	0.7	0.48	1	0.15	0.09	0.05	0.29	0.04	0.05	0.34	0.31	0.46
Picnicking, barbequing or cookouts	0.88	1	0.44	0.07	0.01	0.01	0.21	0.06	0.02	0.52	0.48	0.61
Sunbathing and/or relaxing on the shore	1	0.52	0.39	0.04	0.03	0.03	0.19	0.04	0.01	0.48	0.49	0.62

Figure 3.24: Co-participation in activities during most recent trip.

Participation patterns across activities during recent trips were similar to those across the full summer (Table 3.8). Trips to waterbodies with WDFW access areas were less likely to include shoreline activities such as photography, walking jogging and/or hiking, and picnicking, barbequing or cookouts and more likely to include motorized boating and shoreline fishing activities (Table 3.8). Trips to lakes were more likely to feature shoreline activities with the exception of walking, jogging, and/or hiking and fishing from the shoreline (Table 3.9). Boat fishing, small watercraft boating, motorized boating activities were all more common at lakes as well (Table 3.9). Coparticipation patterns between activities during recent trips show that users tended to participate in many shoreline activities together, while those fishing or motorized boating were more likely to participate in fewer activities during their trips (Figure 3.24).

3.3 Site characteristic preferences

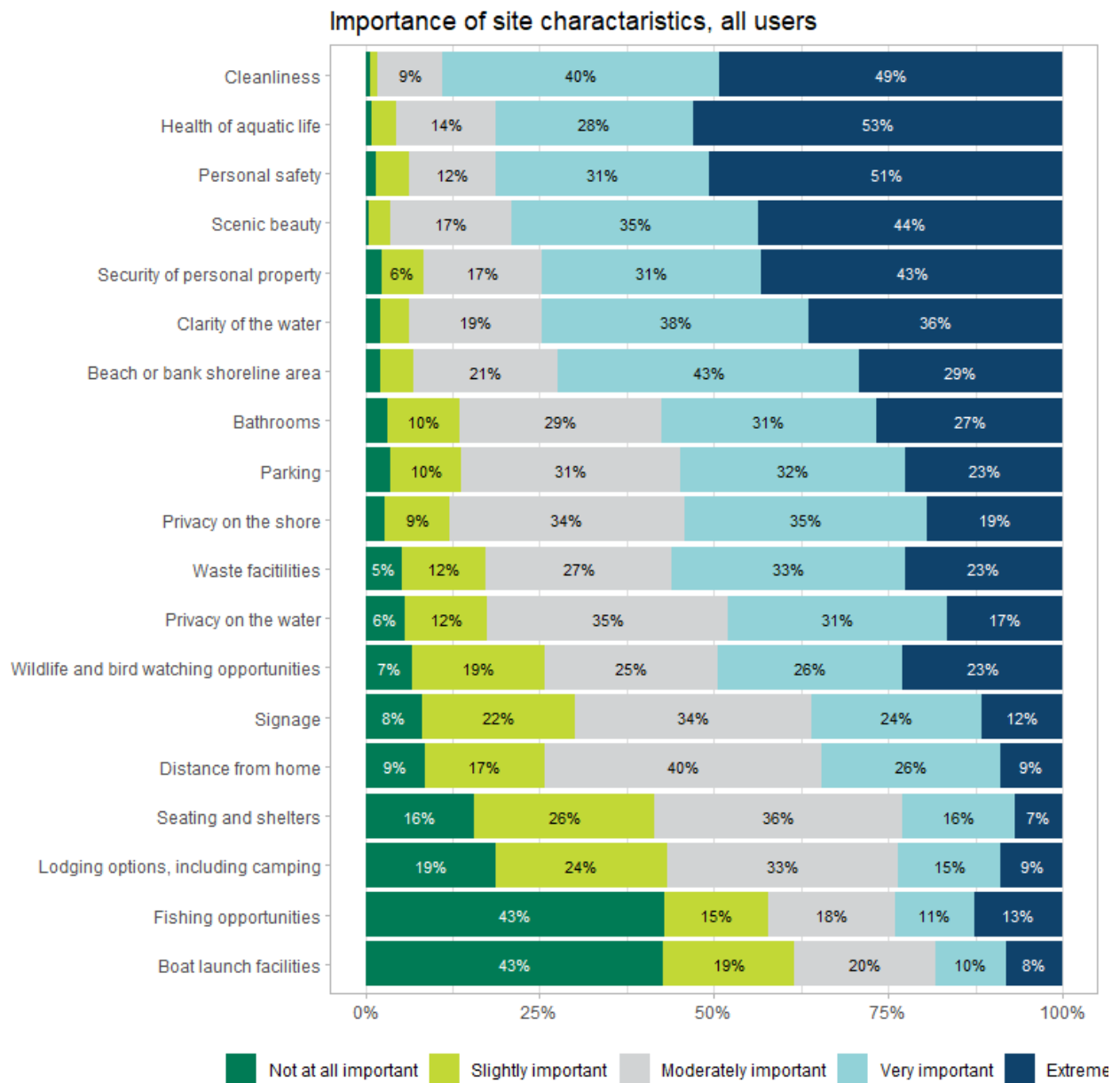


Figure 3.25: Self-reported importance of site characteristics.

Importance of site characteristics

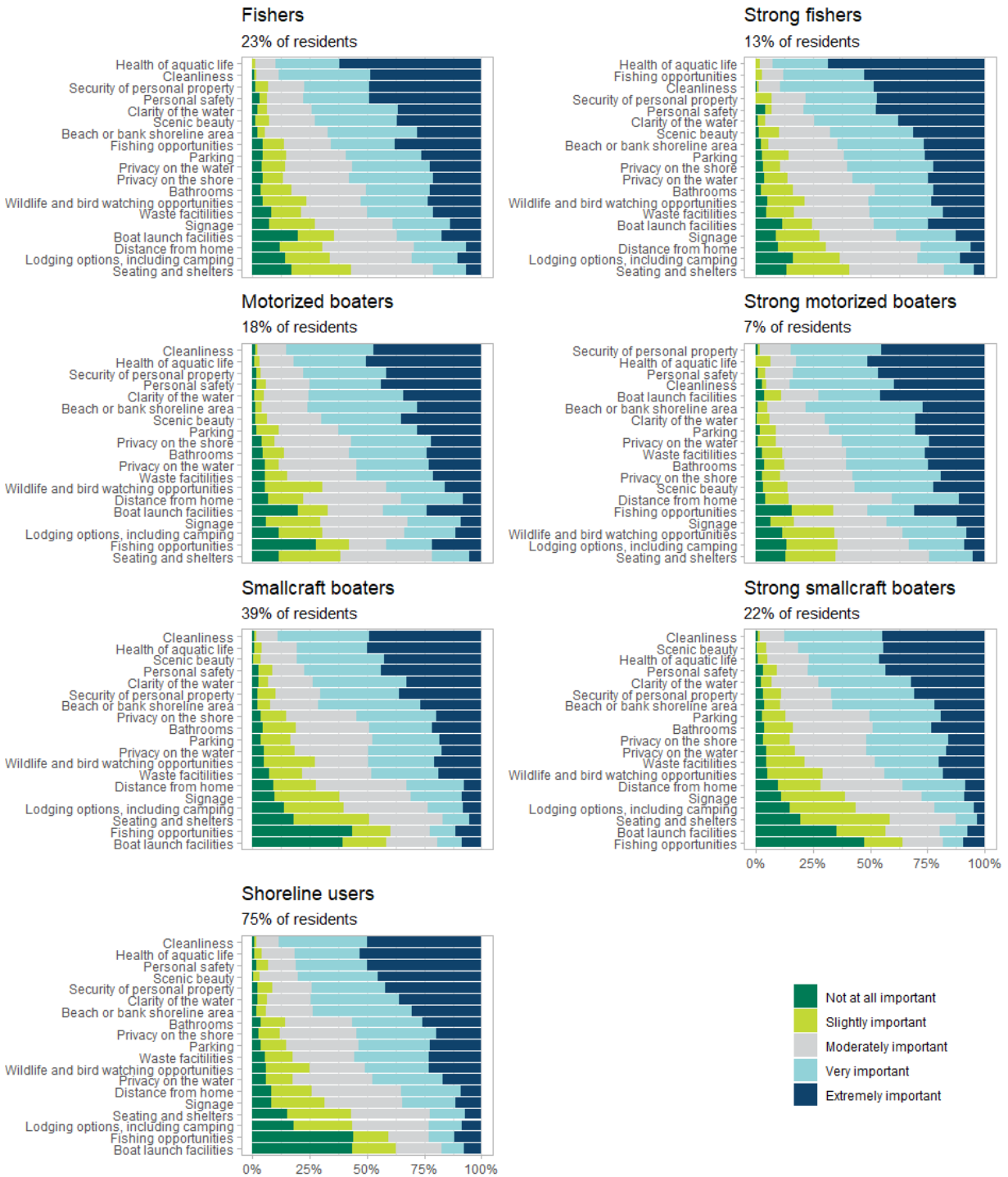


Figure 3.26: Self-reported importance of site characteristics by preferred activity.

Importance of site characteristics

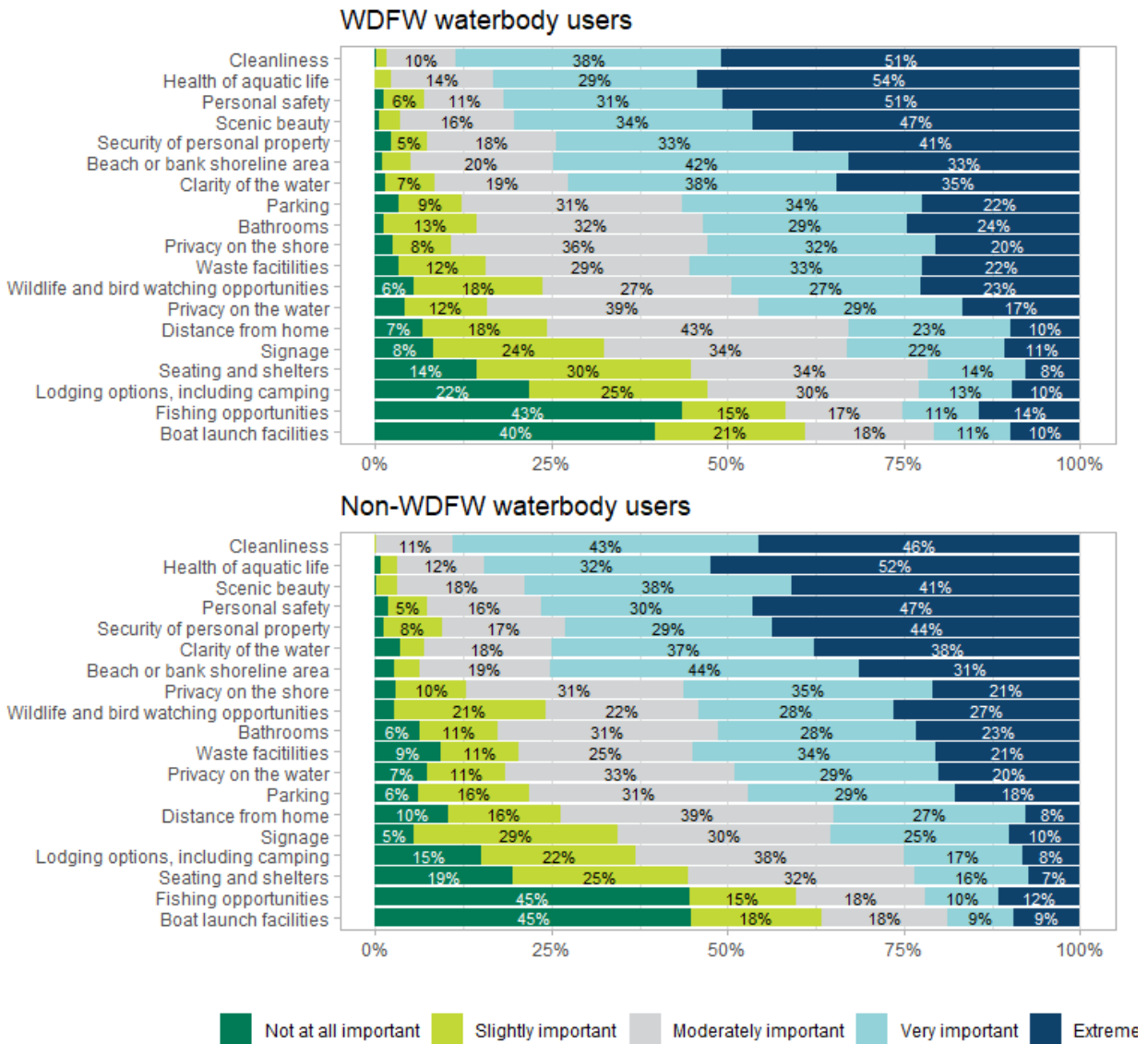


Figure 3.27: Self-reported importance of site characteristics by use of waterbodies with WDFW access.

Respondents were asked to rate a series of site characteristics in terms of importance to their choice of water access point on a five-point scale ranging from “not at all important” to “extremely important”. Eighty nine percent of users reported cleanliness, 82% of users reported personal safety, and 81% of users reported the health of aquatic life as very or extremely important to their decision (Figure 3.25). Access point infrastructure such as bathrooms, waste facilities, and parking were rated very or extremely important by 58%, 56% and 55% of users respectively; users were mostly indifferent to signage and seating and shelters (Figure 3.25). For majorities of users, fishing opportunities (58%) and boat launch facilities (62%) were rated not at all important or slightly important (Figure 3.25).

We also present responses to this question by activity preferences and recent use of waterbodies where WDFW provides water access. We identify “strong” users for different activities, i.e. “strong” fishers, as users who rank these activities among the three most important when deciding to take a trip. Breaking down responses by activity choices and preferences can show which characteristics are important to specific activities or user groups.

Unsurprisingly, fishers are much more likely to rate fishing opportunities highly, with 88% of strong fishers rating this characteristic as very or extremely important (Figure 3.26). strong fishers were also more likely to consider boat launch facilities important (Figure 3.26). Motorized boaters were more likely to value boat launch facilities, though this pattern was mostly driven by strong boaters, with 33% of participants in motorized boating rating boat launch facilities as not at all or slightly important (Figure 3.26). Small watercraft boaters and shoreline activity participants stated preferences were not meaningfully different than those reported overall, and the ratings of users whose most recent trip was to a waterbody with WDFW access were largely similar to those reported by other users (Figure 3.26; Figure 3.27).

3.4 Auxiliary questions

3.4.1 Boat ownership and swimming abilities

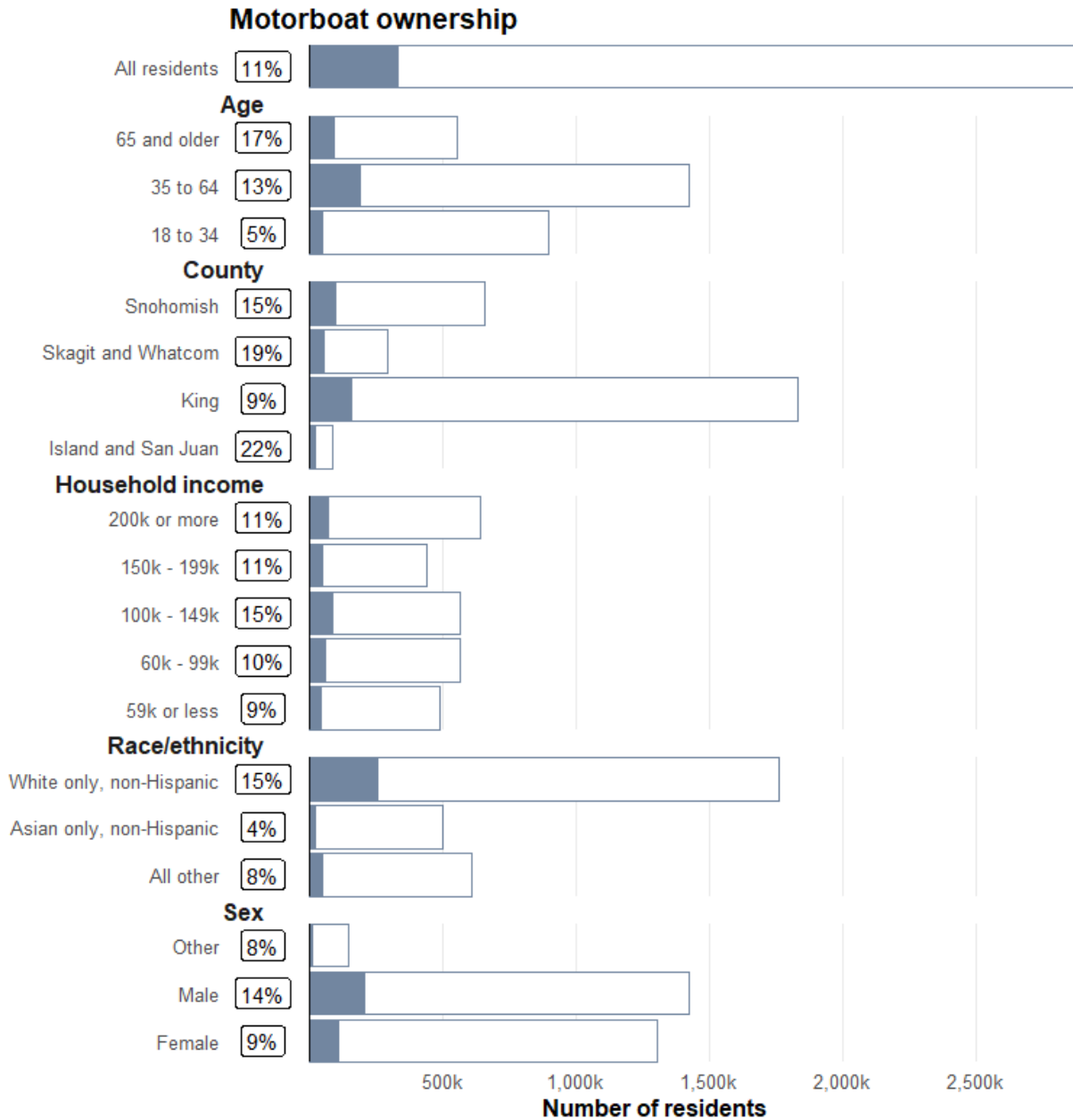


Figure 3.28: Household motorboat access in the North Puget Sound region.

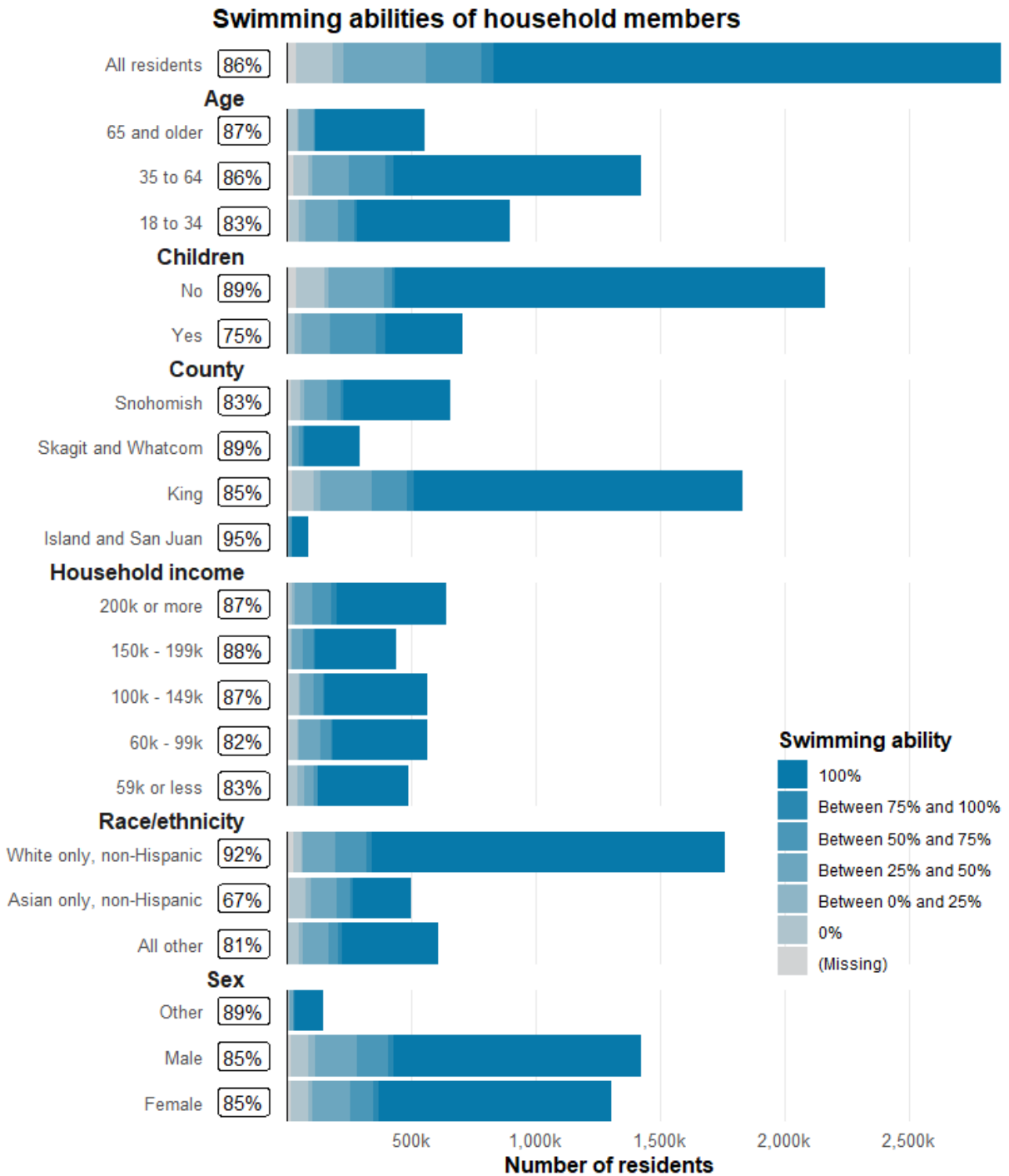


Figure 3.29: Household swimming ability in the North Puget Sound region. Mean percent of household that can swim unassisted given right of labels.

The survey included questions about whether the respondent or a member of their household owned a motorboat and about the swimming abilities of household members, providing insight into resources and skills available to access waterbodies. Overall, 11% of residents reported owning, or living in a household where someone owns, a motorboat, or approximately 315,000 people (Figure 3.28). Older

residents were more likely to own motorboats, while those living in King County and residents had significantly lower motorboat ownership rates (Figure 3.28). Male residents and residents with household incomes between \$100,000 and \$149,000 were more likely to own motorboats as well (Figure 3.28). Swimming abilities were overall quite high: the mean percent of household members that can swim unassisted was 86% (Figure 3.29). Demographic groups with notably weaker household swimming abilities include those with children and Asian residents (Figure 3.29).

3.4.2 Fish targeted

Table 3.10: Fish targeted on most recent trip.

Species	Percent targeted
Other trout	69%
Bass	51%
Crappie, perch, or sunfish	43%
Salmon	42%
Other	39%
Steelhead trout	28%
Bull trout	26%
Carp	12%
Catfish	12%
Sturgeon	5%
Whitefish	2%

The survey asked which species were targeted during recent trips that included fishing activities. Other trout, which includes the popular rainbow trout, was the most frequently targeted species; fishers targeted other trout on over two-thirds of their recent trips (Table 3.10). Bass (51%), perch (43%), and salmon (42%) followed as the most frequently targeted species (Table 3.10). In the “other” category, the most frequent response was “anything” or some variation thereof.

3.4.3 Transportation mode

Table 3.11: Transportation typically used to reach freshwater access areas.

Mode	Overall	Island and San Juan	King	Snohomish	Skagit and Whatcom
Walking or biking	41%	23%	46%	45%	28%
Taking public transportation	11%	0%	16%	0%	5%
Driving/riding in a personal or household vehicle	96%	100%	95%	99%	97%

The survey asked about what mode of transportation respondents typically used to reach freshwater access areas. Respondents could select any response that applied. Ninety-five percent of residents typically drive in a personal vehicle, though nearly half of King and Snohomish County residents also

walk or bike (Table 3.11). Public transportation did not represent a meaningful mode of transport to water recreation sites in Snohomish, Island, or San Juan counties but 16% of King County residents and 5% of Skagit and Whatcom County residents typically rely on public transportation (Table 3.11).

3.4.4 Information

Table 3.12: Information source consulted on most recent trip.

Source	Percent used
Google Maps and/or Apple Maps	47%
Friends and/or family	44%
Government website	22%
Other websites	16%
Other	16%
Travel guide	5%

The survey asked what information sources of information if any respondents consulted prior to their most recent trip. Nearly half, 47%, relied on Google Maps and/or Apple Maps (Table 3.12). Friends and/or family (44%) and government websites (22%) followed as the next two most frequently referenced information sources (Table 3.12).

3.4.5 Smoke impacts

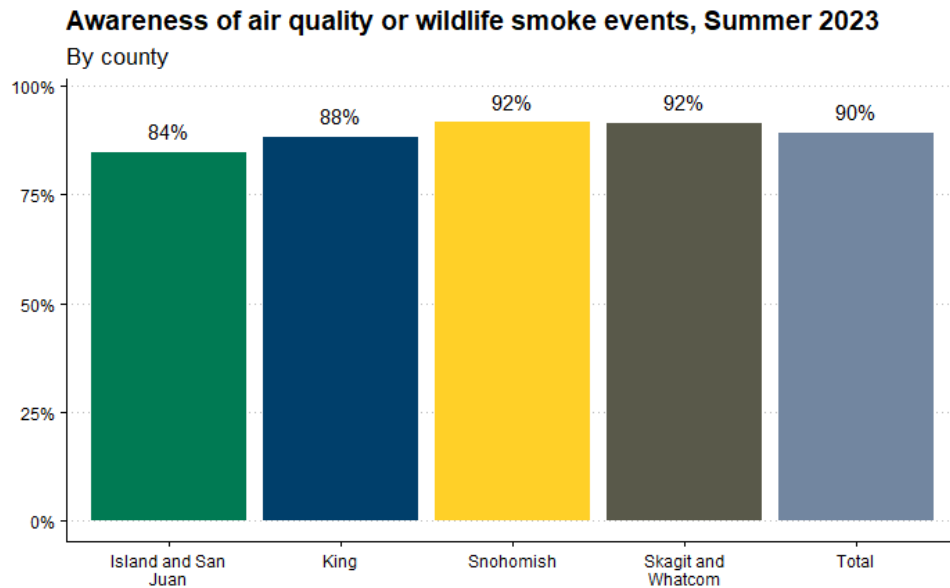


Figure 3.30: Awareness of smoke events by county

Table 3.13: Effects of smoke or air quality on freshwater recreation trips in the North Puget Sound region among residents in Summer 2023.

Effect	Share
Changed location	32%
Changed duration	33%
Changed activities	40%
Other changes	5%
Any change	48%

Respondents were asked whether they were aware of any smoke or air quality events during the summer and, if so, how these events affected their freshwater recreation activities. Ninety percent of participants in freshwater recreation were aware of smoke or air quality warnings in the summer of 2023 (Figure 3.30). Only 83% of Island and San Juan County residents were aware of smoke or air quality warnings (Figure 3.30). Nearly half, 48%, of residents reported smoke or air quality had some effect on their trips, 40% of users changed the activities they participated in during their trips, and approximately a third changed the duration or location of their trips (Table 3.13). The most commonly mentioned change given for “Other” was staying home.

4 Discussion and Conclusions

The results of the survey demonstrate the widespread popularity of freshwater recreation in the North Puget Sound region across demographics. Strong majorities of every demographic group examined participated during the study period. The average resident participated in freshwater recreation activities 11.7 days during the study period, or a little less than once per week, though this average is influenced by many residents who participate much more frequently.

Estimated participation rates in fishing activities (14% participated in boat fishing and 19% in shore fishing) are consistent with recent statewide estimates, which found 17% of the population 16 years and older participated in some fishing in 2022 (Van Deynze 2024). The overall participation rate is also consistent with high participation rates in water recreation in other regions. For example, (Mazzotta, Merrill, and Mulvaney 2022) estimated that 71% of residents of Southern New England participated in coastal recreation in 2018.

The logistic and Poisson regressions largely confirm the differences in participation rates and effort across demographic groups seen in the summary statistics. These parameter estimates can be paired with US Census Bureau demographic estimates to predict participation rates and effort at the ZIP Code Tabulation Area level (Mazzotta, Merrill, and Mulvaney 2022). Future work might consider the effects of proximity to lakes and streams on participation rates and effort, similar to how Mazzotta, Merrill, and Mulvaney (2022) consider proximity to the coast in a saltwater recreation context.

The analysis of recent trips has important implications for planning efforts. Approximately half of recent trip dates were reported on weekends, suggesting weekends are about twice as busy as weekdays in terms of visitation volumes. The most frequently reported weekday, and the fourth most frequently reported date overall, was August 15, which coincides with the hottest day of the year (35°C (95°F) high at SeaTac Airport). This finding suggests that water recreation provides an important role in mitigating the effects of heat events. As climate change leads to more frequent heat events in the Puget Sound region, demand for water recreation is likely to increase, which will put further strain on limited water access management resources.

The trip duration and distance traveled results demonstrate residents' willingness to invest significant time and resources into freshwater recreation. The average hours spent on site for freshwater recreation trips in the region was 2.8, which is significantly lower than the 4.5 hours the average Southern New Englander spent on site during coastal recreation trips in a recent study (Mazzotta, Merrill, and Mulvaney 2022). The average distance traveled is also lower for freshwater recreation trips in the study region when compared to average distance traveled for saltwater trips in Southern New England (Mazzotta, Merrill, and Mulvaney 2022). Note that distance traveled and trip duration are imperfect proxies for trip value. Modern travel cost methods for recreation demand modeling should be used to more precisely measure willingness-to-pay for trips in both settings (Phaneuf and Requate 2017).

Examining relative trip duration and distances traveled between activities can also inform more immediate management decisions. Sites aiming to serve activities with longer trip durations, such as fishing and boating activities or picnicking, are more likely to require amenities like bathrooms and waste facilities. They may also experience more congestion relative to sites of similar capacity as sites serving these activities will experience less user turnover. Activities with shorter distances traveled, such as boating activities and picnicking, have equipment that is often expensive to transport. On the other hand, trips which included enjoying fish and wildlife resources such as fishing or bird and/or wildlife watching had further distance traveled, possibly resulting from relative remoteness of high-quality opportunities and a higher willingness-to-pay for these experiences.

Large urban lakes are by far the most frequently visited waterbodies. Lake Washington alone accounts for a quarter of recent visits during the study period. The next two most frequent destinations, Lake Sammamish and Lake Washington Ship Canal/Lake Union, are large lakes bordered by King County's largest population centers, and Green Lake located in densely populated north Seattle was the eighth most frequently visited waterbody. In Whatcom County, Padden Lake and Lake Whatcom provide urban lake access and are frequent destinations as well, suggesting similar patterns in the Bellingham area.

Meanwhile, Snohomish and Skagit counties are served by large rivers, including the Skagit and Snohomish. Island and San Juan counties are served exclusively by lakes, with Cranberry and Cascade lakes both in the thirty most frequently selected waterbodies region wide. Both Island and San Juan counties have abundant saltwater access which may substitute for freshwater opportunities.

WDFW serves sixteen of the thirty most visited waterbodies. For some of these waterbodies, there is substitute service, i.e., a county or city park or the WDFW site may not be the most used, which is likely the case for e.g. Lake Whatcom where the WDFW site is remote and less developed compared to the city park on the northwestern shore. Sites where WDFW does not currently provide service could be a focus of planning efforts to ensure local, other state, and federal partners are properly equipped to provide high-quality water access experiences, or targets for the agency to invest in new sites. Where WDFW already provides service, these results provide information about where maintenance or capital improvements are likely to affect most users.

Activity shares and coparticipation patterns during respondents' most recent trips largely mirror trends over the full summer. Nearly a quarter of recent trips involved small watercraft activities such as kayaking, canoeing, and/or paddleboarding, including a quarter of trips to waterbodies with WDFW sites. Providing dedicated access amenities for these uses may reduce conflict with motorized boat users, shoreline fishers, and other shoreline and waterbody users.

Trips to WDFW-serviced waterbodies were less likely to include many shoreline activities, particularly walking, jogging, and/or hiking and photography. Fishing from the shoreline and motorized boating were both more likely, reflecting the historical focus of WDFW's management and investments. There were larger differences in activities between lakes and rivers, with more fishing along the shoreline at rivers and relatively more boat participation at lakes. Boating and swimming activities were less frequent at rivers while walking, jogging, and hiking were more frequent. Wildlife and bird watching was more frequent on rivers, indicating opportunities to improve specialized access or interpretive materials at WDFW's river sites.

The site characteristic importance ratings show that, for the majority of residents, fishing opportunities and boat launch facilities were relatively unimportant to their decisions of where to take a freshwater recreation trip. Other amenities water access providers, including WDFW, often provide such as bathrooms, parking, and waste facilities were consistently rated more important, but still rated behind characteristics like general cleanliness, health of the aquatic life, scenic beauty, and water clarity. This suggests that site amenities have relatively little influence on site choices relative to the natural amenities provided by the waterbody and basic maintenance (i.e., cleaning up trash). Among users who strongly prefer fishing and boating, fishing opportunities and boating facilities are much more important respectively. However, these groups represent small shares of the overall population.

There were several important limitations of this study. First, the recent trips analysis primarily covers use during the late summer period, while the full participation and effort analyses only considers summer use. Some sites may have peak demand during other seasons for specialized use, i.e. steelhead fishing in the winter, which would not be captured in this survey. Onsite surveys or traffic counters at sites known to have specialized seasonal visitation would enhance planning in these cases. 2023 was also notable as a "pink" year, meaning a year in which pink salmon return to freshwater in the Puget Sound. Even numbered years when pink salmon are not present may see lower trip shares to rivers particularly for fishing trips.

The survey also had limited coverage of hard-to-reach or small-population demographic groups. We suggest planners complement survey findings with listening sessions, workshops, and town halls with these underrepresented communities. The survey also captures only users who reside in the North Puget Sound region. It is assumed in this analysis that users from outside the region have similar use patterns and represent a small portion of total users of North Puget Sound region freshwater recreation resources, though these assumptions can be tested with on-site surveys designed to measure the share of users who reside out-of-region.

In future volumes of this study, we will use recent trip destinations to estimate recreation demand models using the travel cost method (Lupi, Phaneuf, and Haefen 2020). This analysis will focus on measuring possible conflict or complementarities between uses (e.g., fishing and boating, small watercraft and motorized boating). Recreation demand modeling methods can recover mean willingness-to-pay for trip in the region, variation in willingness-to-pay across demographics and activity preferences, and willingness-to-pay for site features, all of which will provide additional insights into the relative value of sites and their amenities. These models can also be used to simulate the trip share effects and equity impacts (in terms of consumer surplus) of changes in site amenities and access.

Differential participation between demographic groups may be influenced by differential access to freshwater resources and water access infrastructure. Beauvais, Nibbelink, and Byers (2023) found census block groups (i.e., neighborhoods) with lower incomes were more likely to have public water access infrastructure like docks or piers in coastal South Carolina, while census block groups with greater share of white residents contained more private docks. Twichell et al. (2022) found Rhode Island Black and Hispanic populations had longer travel distances to public swimming beaches and coastal recreation sites. A similar analysis conducted in the North Puget Sound region would complement the findings in this report.

Future work should also consider replicating this survey approach statewide or in other regions. These replications can be timed to coincide with regional planning processes. Conducting smaller-scale surveys on a more frequent basis may better capture changes in preferences and uses between seasons and over time.

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