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Economic Survey of Recreational Steelhead Fishers in Washington:
Methodology and Survey Results

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Economic Survey of Recreational Steelhead Fishers in Washington: Methodology and Survey Results

Leif Anderson[1] and Robby Fonner[2]

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[1]Fishery Resource Analysis and Monitoring Division
Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, Washington 98112

[2]Conservation Biology Division
Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, Washington 98112

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Executive Summary

The Northwest Fisheries Science Center recently administered a survey to Washington State steelhead anglers. The Economic Survey of Recreational Steelhead Fishermen in Washington collected data on trip-taking behavior, expenditures, preferences for fishing trip attributes, and demographics of the target population defined to be eligible: adult anglers with a license that allows steelhead targeting or retention, having taken at least one trip in Washington within the previous 24 months.

The primary purpose of this data collection was to enable the estimation of changes in net economic value associated with changes in biological and management-related attributes including catch rates, the percentage of wild steelhead, and season lengths in the primary rivers used to target steelhead in Washington State. In particular, the data collection included a set of stated preference questions including both discrete choice experiment and contingent behavior scenarios.

This technical memorandum describes the methodology used to develop and administer the survey. In particular, the information contained here is intended to provide the detail necessary to evaluate the extent to which this data collection followed the best practices in contemporary stated preference research related to survey design, pre-testing, the choice of elicitation method, the experimental design, human subjects, peer review, the mode of data collection, and sampling strategy (Johnston et al. 2017).

In addition to detailing the survey methodology, we provide a characterization of the anglers in this fishery and their recent steelhead fishing trips. In particular, we present responses to questions about recent trips to the rivers they fish most frequently, including their total number of trips, fishing and travel time, and numbers of hatchery and wild steelhead caught. We also present responses on typical steelhead fishing trip expenditures by category, boat and gear usage, and perceptions of steelhead hatcheries. For respondents who were not eligible, we provide the primary reasons for not taking a trip within the previous 24 months and the factors that might incentivize them to go again. Demographic information is provided for the eligible and ineligible samples.

Introduction

This technical memorandum describes a survey of steelhead anglers in Washington State. The Northwest Fisheries Science Center (NWFSC) conducted the Economic Survey of Recreational Steelhead Fishermen in Washington in 2019. The target population for the project was all adult anglers who had taken at least one steelhead trip in Washington State in the previous 24 months. A total of 8,500 anglers who held fishing licenses and steelhead catch record cards were sampled. We estimate the effective response rate to be 25.2%.

The primary purpose of the data collection was to provide a basis for formally characterizing steelhead angler preferences in the state. In particular, the collected data were designed to allow the estimation of economic demand for steelhead fishing, quantifying the trade-offs anglers are willing to make between fishing trip attributes, including the travel time or cost incurred to reach fishing sites, the catch rate of steelhead, the percentage of steelhead that are wild, and season length. The trade-off between travel cost and all other attributes in the recreational demand model forms the basis for estimating the net economic welfare change to anglers resulting from management or environmental changes.

A demand model estimated using these data can also provide a behaviorally grounded projection of the number of steelhead fishing trips conditional on changes in hatchery and wild steelhead catch rates or changes in season length. These projections, in turn, serve as important inputs to other models with management relevance, such as input–output models that describe changes in regional activity, and bioeconomic models that capture the feedback between changes in wild and hatchery steelhead stocks, angler effort, and economic values.

Survey Design

Survey Instrument Construction and Pre-testing

We conducted a series of focus groups followed by a set of cognitive interviews to inform development of the survey. The focus groups were used primarily to develop and refine the initial survey instrument. We then used the cognitive interviews to further refine and format individual questions prior to survey administration.

Focus Groups

We conducted a set of two focus groups with steelhead anglers to help with the initial design of the survey instruments. One focus group was held in Seattle, the other in Mount Vernon, Washington. These locations were chosen to explore potential differences in behaviors and preferences between those living in urban areas and those living in smaller towns, closer to steelhead opportunities.

Participants for the focus groups were recruited by sampling from annual license holders who also held a steelhead catch record card in the state fishing license database. While this excluded anglers who only purchased daily licenses, we decided it would be beneficial to limit participants to a more avid, and likely more knowledgeable, group of anglers.[1]

Anglers who had fished for steelhead in the previous 12 months were eligible for the focus groups. A determination of eligibility required a brief telephone-based screening survey, since the presence of a (free) steelhead catch record card does not guarantee that an angler targeted or caught steelhead; many anglers reported requesting the catch record card just in case they took a steelhead trip during the year, or receiving the catch record card without asking for it. In addition to asking about past steelhead fishing participation, the focus group screening survey asked a small number of demographic questions. These questions were used to stratify recruitment by avidity as well as by demographic characteristics such as age and gender.

The primary goal of the focus groups was to provide qualitative information to aid the design of the survey instrument, including determining the attributes that are most relevant to fishing trip decision-making, setting an appropriate range for the levels of these attributes, and ensuring that the preference elicitation framework for the stated preference scenarios presented anglers with a choice task that was realistic while not exceedingly complex.

In particular, we explored the degree of heterogeneity in catch rates and river preferences. Vastly different catch rates among anglers, across different rivers, and even within repeated trips by individual anglers to the same river led to a decision to define the catch rate attribute as a stochastic representation of catch on an individual- and river-specific basis, based on individual anglers' reported prior catch rates. Significant preferences for river attributes and differences in the travel time necessary to reach anglers' most often-used fishing sites suggested that using generic rivers was not likely to produce a realistic behavioral model.

[1] Daily license holders who held steelhead catch record cards were included in the full data collection.

Focus groups were also used to test the relative feasibility of the available stated preference elicitation frameworks. In particular, we tested the extent to which steelhead anglers could provide answers to stated preference questions framed at both the choice occasion (i.e., the decision to take a trip or not at a particular point in time) and seasonal level (i.e., an aggregation over trips within a fishing season). Trade-offs at the choice occasion level are elicited using a discrete choice experiment (DCE) and are relatively common in the recreational demand literature. Questions framed at the seasonal level use a method referred to as contingent behavior (CB) to elicit the number of trips an angler would take given attributes that characterize the fishing season. Although CB framing is less common in the literature,[2] these questions allow for a more direct revelation of demand at the intensive margin and can be linked to DCE questions using an integrated approach (Parsons et al. 1999). This testing indicated that participants were able to provide both choice and count data in response to the trip-and season-level attributes, supporting the inclusion of both sets of stated preference framing in the subsequent survey.

Cognitive Interviews

A set of 15 individual cognitive interviews were conducted with steelhead anglers to further test and refine the web survey instrument. These interviews were held in the city of Renton, Washington, at a facility provided by the survey research firm that was contracted to program the web survey instrument, Pacific Market Research. In these one-on-one interviews, recruited anglers proceeded through the web survey page by page while thinking aloud. Observations from this process helped ensure that questions were consistently understood and interpreted, and allowed anglers to provide suggested edits that increased clarity.

Paperwork Reduction Act Approval

After input from the focus groups and cognitive interviews was integrated into a draft survey instrument, we submitted the draft, as well as a rationale for conducting the survey and estimates of public time burden, to the U.S. Office of Management and Budget for their review, in accordance with the Paperwork Reduction Act. We received no public comments in response to our Federal Register Notice.

The Survey Instrument

A web-based approach was chosen based primarily on the decided importance of tailoring sections of the survey to individual anglers' previous responses, to increase the realism of the DCE and CB questions. A paper survey would not effectively allow this level of personalization.

The first section of the survey asked respondents how many steelhead fishing trips they had taken during the previous 12 months. This is considered the first eligibility question. If respondents answer zero, they are asked to provide the number of steelhead trips taken during the previous 24 months. If the answers to either of these questions were positive,

[2] For some recent exceptions, see Anderson and Plummer (2017) and Bertram et al. (2020).

respondents were considered eligible and proceeded to the rest of the survey. Respondents who had not fished for steelhead in the previous 24 months were directed to a set of questions that elicited information about past participation in the fishery and which factors help explain their decision to leave the fishery.

Next, respondents were asked which rivers they used most to fish for steelhead, and to provide travel times and average catch rates for each of their three most-used rivers. The full list of rivers included 43 rivers spread over seven regions (Table 1). These responses are used later in the DCE and CB questions to tailor the questions to an individual angler's actual experiences, with the goal of increasing the realism, and therefore the validity, of the stated preference trade-offs provided.

To help understand other drivers of river usage, respondents were also asked to rate each river on three attributes: natural beauty, ease of accessibility, and level of congestion. These questions were included to control for perceived differences across rivers unrelated to catch or the percentage of wild fish.

Table 1. Rivers included in the survey, by region.

Region, River name	
Coastal	
Chehalis River	Satsop River
Clearwater River	Willapa River
Humptulips River	Wynoochee River
Naselle River	
Lower Columbia River tributaries (confluence below Bonneville Dam)	
Cowlitz River	Kalama River
Elochoman River	Lewis River
Green (Cowlitz) River	Washougal River
Columbia River mainstem	
Lower Columbia River (Buoy 10 to Bonneville Dam)	
Middle Columbia River (Bonneville Dam to Highway 395 at Pasco, Idaho)	
Upper Columbia River (above Highway 395)	
Upper Columbia River tributaries (confluence above Bonneville Dam)	
Klickitat River	Wenatchee River
Methow River	White Salmon River
Okanogan River	Wind River
Walla Walla River	
Snake River	
Grande Ronde River	Snake River
Olympic Peninsula	
Bogachiel River	Queets River
Calawah River	Quinault River
Hoh River	Sol Duc River
Puget Sound	
Cascade River	Skagit River
Green (Duwamish) River	Skykomish River
Nooksack River	Snohomish River
Puyallup River	Snoqualmie River
Sauk River	Stillaguamish River

Eligible respondents were presented with a series of questions that allowed classification into different angler types. First, respondents listed the the types of gear they used to target steelhead, along with the most commonly used gear type. Next, questions asked whether anglers usually fished from a boat or from shore, and whether most trips were made alone or with other anglers.

A series of expenditure questions provided the trip-level costs associated with a typical steelhead fishing trip, as broken out by categories: fishing tackle, lodging, food and drink, auto fuel, boat fuel, public transportation, and parking or access fees. These expenditures are useful to calculate travel costs for economic valuation, as well as to inform potential input–output modeling describing the impact of changes in steelhead trips on regional economies.

Recreational demand models commonly exclude respondents who state that the recreational activity was not the primary purpose of the trip, or model their behavior in a different manner (Parsons and Wilson 1997, Loomis et al. 2000, Parsons 2003). To allow this, we asked respondents who took overnight trips if steelhead fishing was the primary purpose of the trips.

The next section was composed of a set of DCE and CB scenario questions. The DCE questions were framed to capture the decision of an angler deciding whether to take a fishing trip and, if so, which site to use (a choice occasion). The CB questions provide the basis for estimating how respondents expect to adjust the number of trips they take over the course of a season in response to changes in catch rates, the percentage of wild fish, and season length.

Each DCE question was composed of steelhead fishing trip options and one option that represented doing anything other than steelhead fishing in the state, the latter often referred to as an opt-out in DCE research. The number of trip options presented on the survey instrument was conditional on the number of rivers that the respondent had used for steelhead fishing in the past two years. For example, anglers who had used three or more fishing sites to target steelhead were presented with three steelhead trip options representing their most-used rivers, whereas anglers who had used fewer than three steelhead fishing sites were presented with the one or two fishing sites they had used. All steelhead fishing trip options were described using the river names that were provided earlier in the survey by each respondent.

The steelhead fishing trip options were characterized by site-specific trip attributes, including a probabilistic description of catch rates, the percentage of steelhead of wild origin, and a reminder of the travel time required to reach each site. River-specific travel times were provided to each respondent in the DCE questions as a reminder of the travel cost associated with each trip, based on answers to earlier questions in the survey.

Each DCE question was immediately followed by a CB question framed to capture the decision of how many trips to take over the course of a season. In this manner, the paired DCE and CB scenarios elicit behavior at both the extensive margin (whether to take a trip) and intensive margin (how many trips to take) of recreational demand. These CB questions provided a reminder of last season's conditions—as described by the opening and closing dates and the number of trips taken by the respondent, for each river—before asking how the number of trips would change under new conditions—as described by a change in the length of the season. In these CB questions, respondents were again presented with the catch rates and percentage of wild fish from the paired DCE question.

After the CB scenarios, the survey provided a set of attitudinal questions related to wild and hatchery steelhead. The first of these asked whether anglers preferred to catch hatchery or wild steelhead, or if they were indifferent. This was followed by a set of three questions asking the level of agreement with three statements related to the potentially multifaceted effect of hatcheries in providing steelhead angling opportunities.

The last section of the survey instrument was a set of demographic questions. A standard set of questions asked respondents to provide their age, gender, household size, and level of education. In addition, this section asked respondents to provide the number of years they had fished in Washington State. Travel cost demand modeling typically uses some measure of the wage rate, whether fixed or variable, to assign a price to the time component of travel cost (Cesario 1976, Layman et al. 1996, Larson and Lew 2014). To allow these calculations, we elicited household income, personal wage rate, and a question asking how frequently respondents took paid or unpaid time off work for steelhead fishing trips.

Experimental Design

The final design characterized up to three choice profiles for six pairs of DCE and CB questions. We next describe the process used to select choice profiles and the methods used to group these together to form the resulting DCE and CB questions.

As discussed above, focus groups were first used to help determine which attributes to include in the DCE and CB questions as well as to help set the range of the attribute levels.

An important goal of the design was to customize the DCE and CB questions to individual respondents. This added realism was intended to increase the validity of the stated preference trade-offs we seek to measure, and is rarely found in stated preference survey research.

As mentioned above, the attribute levels presented to individual respondents in the DCE and CB questions of the survey were conditioned on answers to preceding questions. Specifically, the survey elicited baseline levels of catch on prior trips in each river. The baseline catch levels were used to assign anglers to one of five classifications of catch rate, which we refer to as skill. Then, in the subsequent DCE and CB questions, the attribute levels presented to individual respondents were calculated conditional on skill: anglers classified in the same skill category received the same potential catch levels.

The full set of attributes and levels was described by the steelhead catch rate, the proportion of wild steelhead, and season length. Fishing costs associated with the steelhead fishing options were described only by individual-specific travel times to the fishing sites, and were therefore not a component of the design.

The levels of the catch rate attribute were described in a stochastic manner as the number of fish that were expected to be caught by an individual angler over a number of trips. As outlined above, the depiction of catch rates on the survey instrument provided implicit probabilities associated with each of these levels for a given steelhead trip option by including the number of steelhead that would be caught over a specified number of trips. Importantly, this also allowed us to characterize average daily catch rates between zero and one—a common occurrence in this fishery. Expressing catch rates in a probabilistic manner, and the ability to characterize low levels of catch, increases the realism of the presented stated preference scenarios.

In the combined DCE–CB scenarios, there were three levels of daily catch rates, five levels of the percentage of wild-origin fish in the river, and four levels of season length (Table 2).

Table 2. Attributes and levels.

Attribute	Levels	DCE or CB question
Daily catch	low, medium, high*	DCE, CB
Percentage wild-origin	0, 25%, 50%, 75%, 100%	DCE, CB
Season length	Closed, -1 month, no change, +1 month	CB

* Numeric levels were conditional on individual reported catch rates; see Table 4.

The three levels of daily catch rate presented to respondents in the DCE were determined, in part, by reported average catch rates of the individual angler. We first used past catch averaged over the river-specific catch rates reported earlier in the survey to assign anglers to one of five levels of skill. The numeric levels of catch seen in the DCE and CB tables are conditioned on this skill level. For example, if an angler reported daily catch less than 0.2, they would receive levels of 0.05, 0.1, and 0.33 in the DCE scenarios. On the other end of the distribution, if an angler reported average daily catch equal to 2 or more, they would receive levels of 1.5, 3, and 5 in the DCE scenarios (Table 3).

Pretesting suggested that anglers could relate more to whole fish in a depiction of catch rates, so we described catch rates using the number of fish caught over the lowest number of days that would result in a whole number. For example, a numeric catch rate of 0.1 was represented as 1 fish every 10 days fished. Across the five levels of assigned skill, we created seven levels of daily catch (Table 4).

Table 3. Catch attribute level assignment.

Angler-reported daily catch	Assigned skill	DCE/CB daily catch levels
<0.20	1	0.05, 0.10, 0.33
0.20–0.49	2	0.10, 0.33, 0.66
0.50–0.99	3	0.33, 0.66, 1.50
1.00–1.99	4	0.66, 1.50, 3.00
2.00+	5	1.50, 3.00, 5.00

Table 4. Catch attribute level descriptions.

Numeric daily catch	DCE/CB table description
0.05	<1 fish per 10 days fished
0.10	1 fish per 10 days fished
0.33	1 fish per 3 days fished
0.66	2 fish per 3 days fished
1.50	3 fish per 2 days fished
3.00	3 fish per day fished
5.00	5 fish per day fished

The season length attribute included in the CB tables was linked directly to the season length of the river as set in the prior season's regulations by the Washington Department of Fish and Wildlife. Specifically, the CB scenarios used the same opening date, and set the closing date by shifting it one month earlier, holding it the same, or increasing it by one month. In addition, a full season closure was also included as a level. In the CB scenarios, respondents were first provided with a reminder of the season opening and closing dates from the prior season and the number of trips reported by the angler for each river, then provided with the changed season length and asked to provide the number of trips they would expect to take for each river.

The overall design for the DCE and CB scenarios was created in a combined manner using standard experimental design algorithms for choice models.

The full factorial design was too large to administer all possible combinations to a single respondent. We therefore used fractional design methods to select a subset of potential combinations while still allowing efficient estimation of the utility function parameters related to the design attributes.

The first step in our fractional factorial design method was to create a candidate set. We accomplished this by first creating the full factorial design and then eliminating the combinations of attributes that we did not want to appear in the scenarios: scenarios for which all rivers were closed. Next, we used a computerized search algorithm to determine the fraction of the full factorial design to include on the survey, grouping members of this candidate set based on maximizing the D-efficiency of a choice model (Zwerina et al. 2010) using the `%choiceff` macro program in the SAS software.

D-efficiency was used to quantify candidate experimental designs in terms of the size of the covariance matrix, with a lower set of variances resulting in higher values. Specifically,

$$\text{D-efficiency} = [|\Omega|^{1/K}]^{-1},$$

where K is the number of parameters and the covariance matrix , Ω, is given by

$$\Omega = \sigma^2(X'X)^{-1}.$$

Standard discrete choice models, such as the conditional logit and more complex variants, require knowledge of parameter values to assess the D-efficiency of a candidate design (Anderson and Lee 2013). The algorithm therefore requires an explicit specification of utility as well as a set of expected values for the parameters of the utility function that vary in the design. The utility specification and parameter values are, of course, not known with certainty at the point of design creation.

We used qualitative input from anglers collected during survey pre-testing activities to inform the relative magnitudes of parameter values in the utility function we specified for this algorithm. The functional form of utility we used for the purposes of this design algorithm was intended to serve only as a baseline. While this specification of utility will be estimated for evaluation of the data and design, it is likely to be more simplistic than the final specification of utility that we will estimate econometrically. Nonetheless, the functional form used here provides a robust baseline and framework with which to estimate many different functional forms of utility.

Overall, we created a set of 300 different survey versions, compiled using multiple experimental designs and tailoring the DCE and CB questions to respondents' past experiences. For each of five different values of angler skill level, as defined by previous catch rates, a set of 20 different versions of the survey instrument were generated, to ensure sufficient variation across attributes. This entire process was repeated to provide different designs for anglers who reported using three or more rivers, two rivers, or only a single river. Each survey version had six paired DCE and CB questions, resulting in a potential total of 1,800 DCE–CB question pairs.

Randomized blocking was then used to combine these 1,800 questions into 300 sets of six. We chose six paired questions per survey version based on input from focus groups, our experience with past DCE survey efforts, target survey length, the desired ability to explore preference heterogeneity across respondents, and completion rate concerns.

We created a blocking factor, held orthogonal to the design variables describing catch rates, the percentages of wild fish, and season lengths, using the SAS macro program `%mktblock`. This helped ensure that each respondent was presented with trips representing as many trade-offs as possible in the six DCE and CB question pairs.

Administration of the Survey

The research and analysis firm Pacific Market Research was contracted for the web programming and administration of the survey. Descriptions of the survey implementation contact protocol, advance letter, reminder postcard, and email reminder are presented below.

Survey implementation contact protocol

The full survey implementation protocol consisted of three distinct contacts: an advance letter, a reminder postcard, and a set of email reminders. In total, 8,500 license holders from the Washington Department of Fish and Wildlife license database were sampled. We provide a description of each contact as well as the timing of their administration, in Table 5. In addition, Appendix A contains all of the contacts.

Table 5. Timing of survey contacts.

Contact name	Time between contacts
Advance letter	n/a
Reminder postcard	14 days after advance letter postmarked
Email reminders*	14 days after reminder postcard 28 days after 42 days after

* Sent only to records with email addresses in sample.

Advance letter

The advance letter introduced the survey, explained how the data would be used, and encouraged respondent participation in the study. The advance letters were sent through first class mail, using an envelope addressed to the license holder. To further encourage participation in the study, a $2 bill was included in the envelope as incentive. The letter also included the web address of the survey and a unique passcode for respondents to access the survey. Email and telephone contact information for both NMFS researchers and PMR was provided in the letter in case respondents had questions. Signatures of the NMFS researchers printed in contrasting ink were included to provide a sense of personalization.

Reminder postcard

A reminder postcard was mailed to all nonrespondents to the advance letter approximately 14 days after the advance letters were mailed. Respondents who had completed the survey, refused the survey, or had completed the screening portion of the survey and were determined not to fish for steelhead (ineligible) were removed from the mailing list. The reminder postcard described the purpose of the survey, how the data would be used, reinforced the importance of participation, and “pushed” respondents to the web survey by including a web address and a unique passcode to access the survey. The postcards included a NOAA logo, a signature in contrasting ink, and contact information for both NMFS and PMR.

Email reminder

An email reminder was sent to all nonrespondents who had an email address in the licensing databases 14 days after the reminder postcard was sent. The email invitation again explained the purpose of the survey, how the data would be used, and encouraged participation in the survey. An embedded link to the online survey provided direct access to the survey, without the need for respondents to enter a unique passcode. This process was repeated up to two more times for nonrespondents, with 14 days between each reminder.

Results

In this section, responses to the questionnaire section of the Economic Survey of Recreational Steelhead Fishermen in Washington are described and visualized. Responses to the DCE and CB section of the survey will be used for modeling in future research products.

Eligibility

As described previously, eligibility was determined based on answers to one of two questions. First, respondents were asked how many steelhead fishing trips they had taken in Washington in the past 12 months. Respondents who responded zero to this first question were asked to expand the range to 24 months in a second question. Eligible respondents were defined by having affirmative answers to either of these trip questions (Figure 1). The eligibility rate as calculated from the completed surveys was 26.9%.

These questions, along with a follow-up question asking how many of these trips were targeting winter steelhead—defined as trips taken from November through April—provide some insight related to the general avidity of steelhead anglers in the state (Figures 2a and 2b).

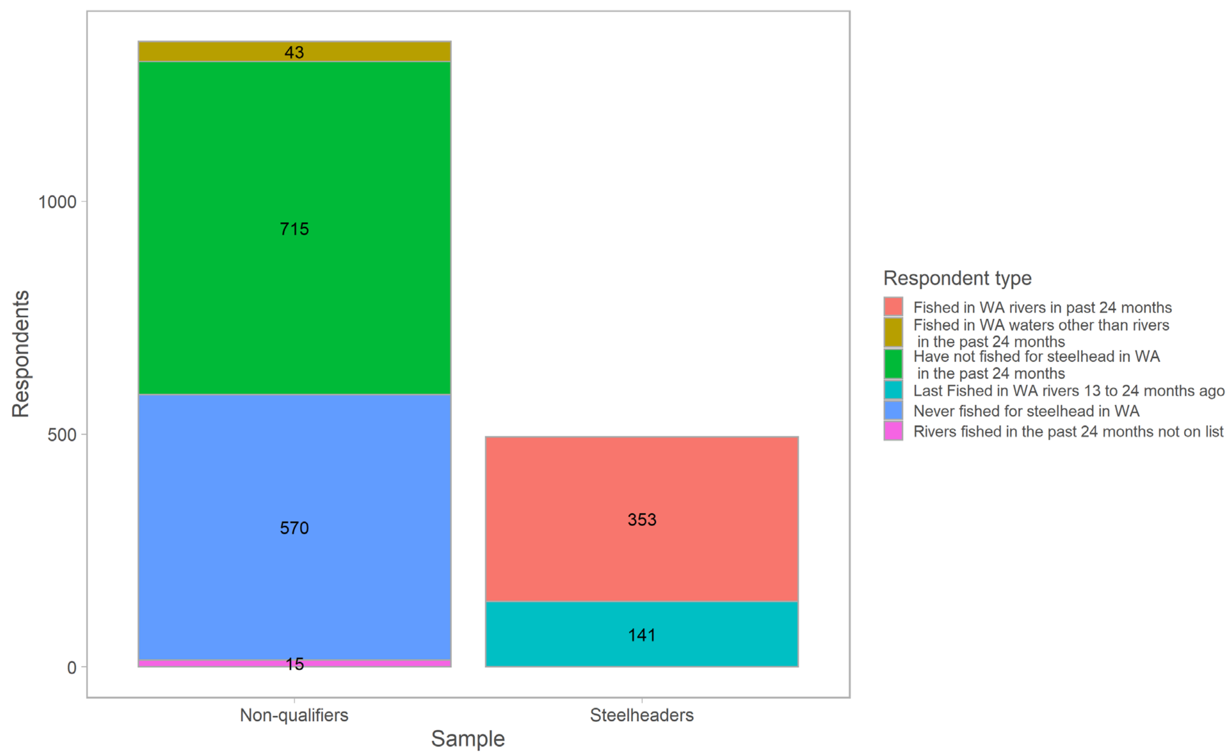

Figure 1. Number of eligible and ineligible respondents, by length of time since last steelhead fishing trip.

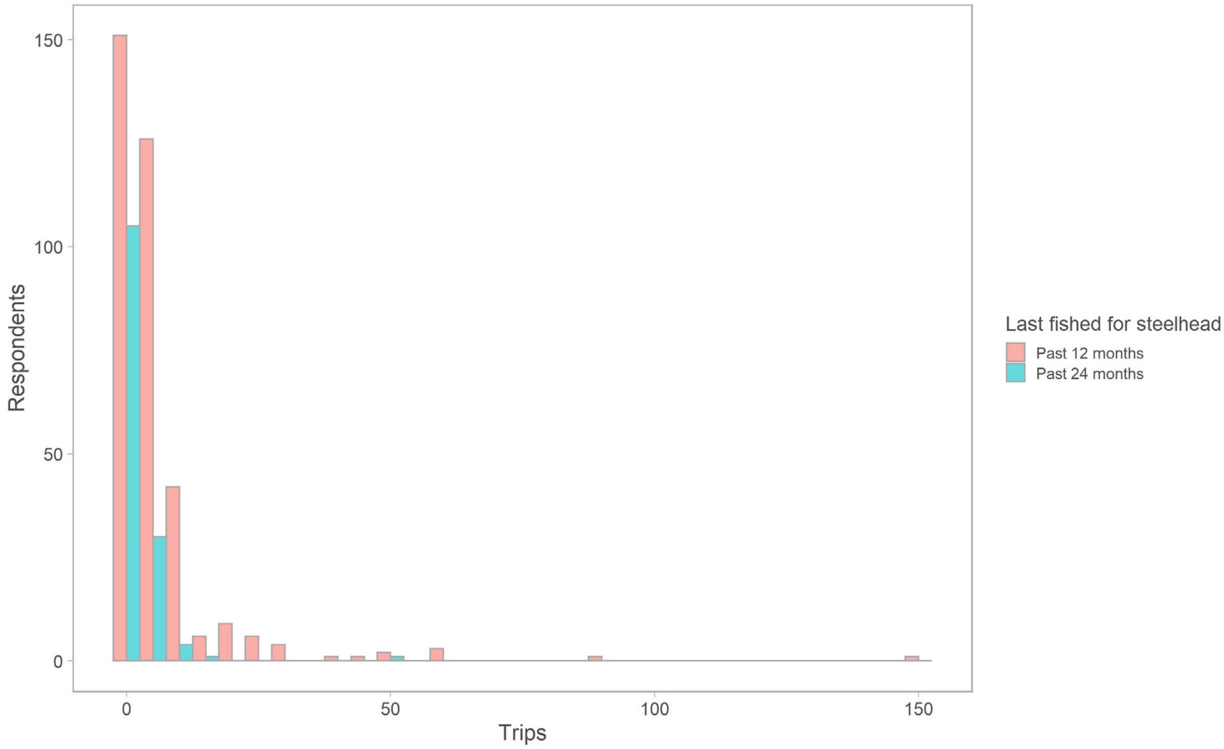

Figure 2a. Number of steelhead fishing trips taken.

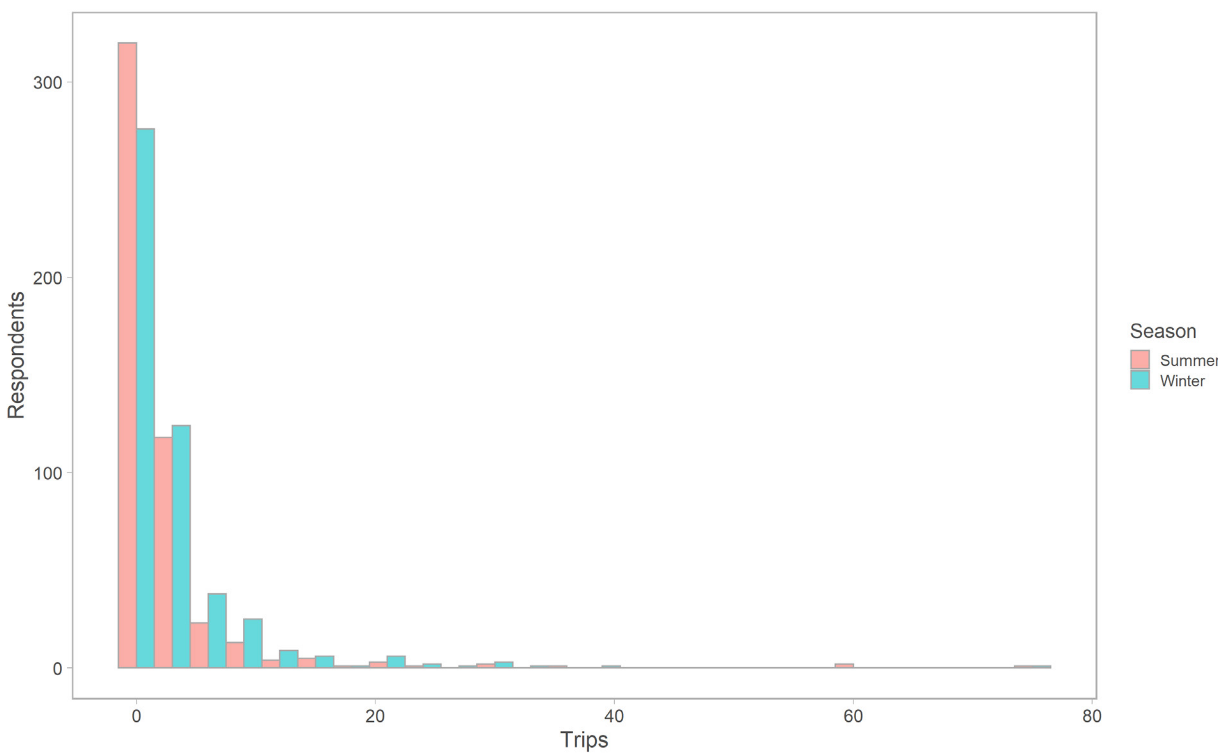

Figure 2b. Number of summer and winter steelhead fishing trips.

Response Rates

The response rate is the most common measure used to provide a broad assessment of the quality of a data collection. Although response rates can be a signal of more important metrics such as nonresponse bias, they are at best a measure of potential bias (Groves 2006, Meterko et al. 2015).

The extent of any nonresponse bias for a particular variable of interest depends on the degree of correlation between the variable and the propensity to respond. The importance of response rates therefore depends on the specific variable of interest. Indeed, nonresponse bias has been shown to vary substantially across different questions within the same data collection (Groves 2006). In the context of recreational surveys such as this, a common concern is that respondents are more avid participants than nonrespondents. Differences in avidity that are correlated with the propensity to respond would be likely to yield biased measures of aggregate expenditures and net economic values without the proper corrections (Thomson 1991).

An incentive ($2) was included as part of the survey protocol to help decrease the unit nonresponse overall, and also to decrease the correlation between the propensity to respond and measures like willingness-to-pay for steelhead fishing trip characteristics by increasing the response rates among less avid anglers. The decrease in unit nonresponse has been shown to be statistically and practically significant in a recent experiment conducted within a similar angling population (Anderson and Hilger 2020). Although response rates are clearly an imperfect measure of the quality of a data collection, we include them in this report as they remain a customary output among survey researchers.

Estimated response rate

In the context of this study, there are multiple formulas that can be used to calculate response rates. We provide a set of two response rates that vary whether undeliverable surveys are removed from the calculations.

First, we define the following components of response rate calculations: S = sampled, C_e = completed surveys from eligible respondents, C_i = completed surveys from ineligible respondents, U = undeliverable. These components are quantified, in more detail, in Figure 1.

The raw response rate is calculated as $(C_e + C_i) \div S = 21.6\%$. This does not account for undeliverable respondents. Adjusting this calculation to account for undeliverable respondents, the response rate becomes $(C_e + C_i) \div (S - U) = 25.2\%$.

River Usage and Trip Characteristics

The vast majority of respondents indicated that they used three or fewer rivers to target steelhead (Figure 3a). This lends support for including the three most-used rivers as the context for each individual's stated preference questions.

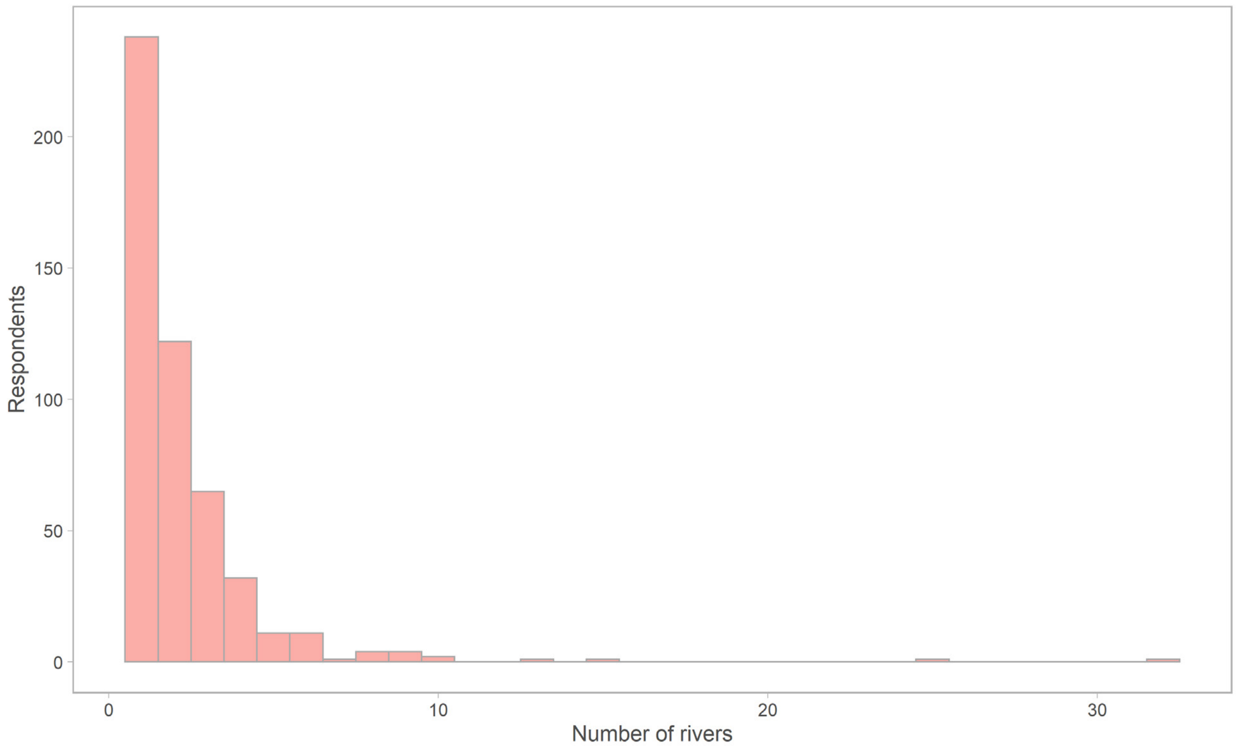

Figure 3a. Number of rivers used to target steelhead.

Summarizing data from each respondent's three most-used rivers helps provide some relative measure of the overall number of trips taken by steelhead anglers to each of the rivers in our study (Figure 3b). The Cowlitz River was included by the largest number of anglers, followed by the Snake River and then the lower Columbia River.

For each of up to three rivers that a respondent reported using most, we provide a summary of the total number of trips, the number of steelhead caught (both hatchery- and wild-origin), the angler's estimate of the proportion of wild steelhead in the river, the travel time to reach the fishing site, and the time spent at the site (Table 6). These data show that there are large differences in average catch rates across different rivers, as well as large differences in the average travel times to reach different sites. Relatively large differences in catch rates and travel times, across anglers for the same river, can be seen by noting the magnitude of the corresponding standard deviations. This heterogeneity in average trip characteristics across rivers, particularly in catch and travel times, highlights the importance for using angler- and river-specific attribute levels in the stated preference questions to provide contextual realism.

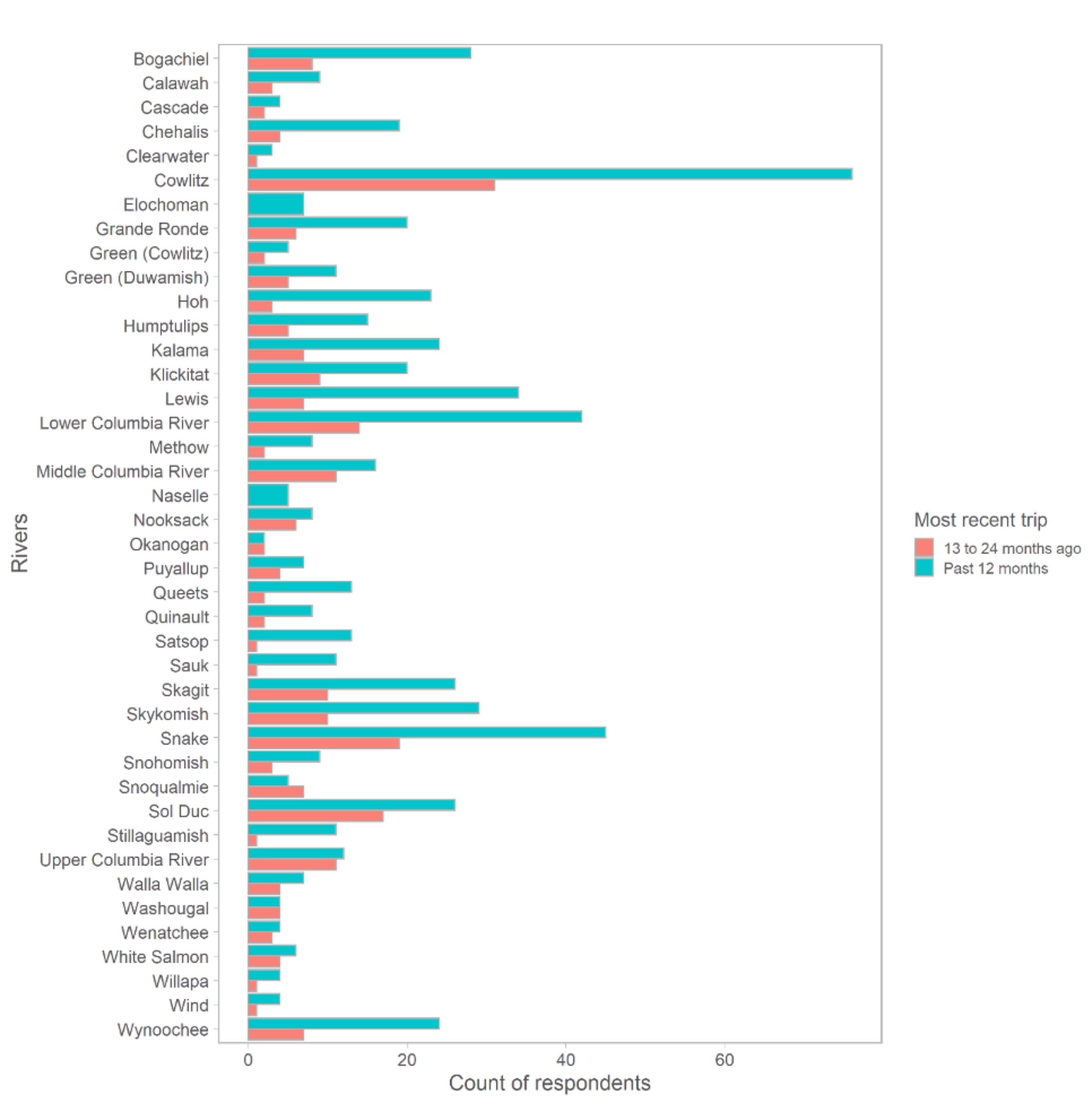

Figure 3b. Number of respondents targeting steelhead, by river.

Table 6. Trip characteristics reported by respondents who fished for steelhead in the past 24 months. *CR* = Columbia River.

		Steelhead/day*		Hours fished/day		Days fished/yr		Perceived % wild steelhead		Wild steelhead caught/yr		Hatchery steelhead caught/yr		Trips/yr		Travel time (hr)	
River	***n***	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Bogachiel	36	0.83	1.24	6.75	2.23	2.86	2.73	32.50	25.68	0.61	0.90	0.92	1.40	2.53	2.74	3.28	1.83
Calawah	12	1.52	2.53	5.50	2.61	5.00	8.36	43.33	38.22	1.50	1.98	1.25	1.96	3.75	4.52	1.76	1.20
Cascade	5	0.20	0.45	5.20	3.27	3.40	3.78	20.00	29.15	0.00	0.00	0.20	0.45	3.20	3.90	1.37	1.04
Chehalis	23	0.22	0.42	5.00	2.04	3.65	5.04	28.70	25.64	0.17	0.49	0.70	2.12	3.35	4.38	1.76	1.45
Clearwater	3	0.50	0.87	7.67	2.52	3.33	3.21	83.33	20.82	1.00	1.73	0.00	0.00	1.67	1.15	4.33	1.53
Cowlitz	103	0.33	0.58	5.82	2.19	5.71	11.08	20.68	22.76	0.38	1.35	1.22	3.13	5.26	10.82	1.74	1.42
Elochoman	7	0.90	2.05	6.14	1.68	6.29	7.83	31.43	29.11	0.86	1.86	3.00	5.74	6.29	7.83	1.67	1.59
Grande Ronde	26	0.87	1.29	6.88	2.76	5.38	6.81	34.23	17.48	1.92	5.31	2.46	4.78	3.27	5.27	2.82	1.37
Green (Cowlitz)	7	0.29	0.49	4.86	2.04	1.43	0.79	28.57	33.38	0.14	0.38	0.29	0.76	1.43	0.79	2.17	0.94
Green (Duwamish)	15	0.05	0.14	3.93	2.28	3.60	3.44	20.67	27.89	0.13	0.52	0.07	0.26	3.47	3.42	4.46	13.73
Hoh	26	0.60	0.96	6.31	1.98	3.62	7.48	50.38	37.79	0.77	1.31	0.65	2.04	3.23	7.53	4.05	2.28
Humptulips	20	0.54	0.66	6.10	2.51	2.80	2.33	34.00	28.17	0.85	1.69	1.05	1.61	2.60	2.39	2.41	1.36
Kalama	31	0.35	0.65	5.06	1.98	3.39	3.35	25.48	22.04	0.19	0.54	0.65	1.31	3.35	3.35	1.83	1.41
Klickitat	27	0.20	0.33	5.78	2.31	4.56	5.57	40.00	22.70	0.59	0.93	0.41	0.89	4.04	5.61	2.16	1.66
Lewis	41	0.22	0.46	4.95	2.31	5.90	7.50	30.00	26.27	0.32	0.96	2.24	6.24	5.80	7.54	1.77	6.17
Lower CR	56	0.35	0.63	5.84	2.28	5.52	5.68	24.64	21.74	0.52	1.08	1.20	2.23	5.20	5.55	1.14	1.20
Methow	10	0.55	0.96	5.90	3.48	1.70	1.06	24.00	16.47	0.10	0.32	1.20	2.82	1.30	0.48	2.80	1.90
Middle CR	25	0.43	0.68	5.12	1.94	5.00	6.42	44.00	26.77	1.04	2.47	0.64	1.25	4.60	5.35	0.93	0.75
Naselle	5	0.70	1.10	6.20	1.30	5.00	8.40	30.00	21.21	0.60	1.34	0.60	0.89	5.00	8.40	2.82	1.59
Nooksack	14	0.32	0.82	5.29	1.73	2.71	2.16	24.29	25.63	0.36	1.08	0.29	0.83	2.21	2.19	3.73	7.80
Okanogan	3	0.00	0.00	3.00	2.65	1.00	0.00	26.67	25.17	0.00	0.00	0.00	0.00	1.00	0.00	2.17	1.04
Puyallup	9	0.07	0.22	4.00	2.00	4.56	3.97	23.33	22.91	0.00	0.00	0.22	0.67	4.44	4.03	0.60	0.41
Queets	15	1.38	2.83	6.67	2.13	3.40	2.20	53.33	29.20	2.93	6.31	2.07	5.32	2.40	1.55	3.70	1.33
Quinault	10	1.30	1.84	6.30	1.77	2.40	1.35	41.00	34.46	2.10	3.73	1.80	3.29	2.00	1.05	3.65	0.91
Satsop	14	0.49	0.83	6.21	2.08	4.86	7.44	32.14	32.62	1.21	2.36	0.93	1.49	4.21	7.56	2.49	2.03
Sauk	12	0.55	0.86	6.17	2.41	4.67	8.07	64.17	35.79	1.67	2.81	0.25	0.87	3.58	5.28	2.21	1.55

* Data represent averages of responses taken over a 12-month period to a particular river. If they had fished at the river in the past 12 months, they provided data on that period. If not, they provided information on trips taken to that river in the period from 13 to 24 months ago.

Table 6 (continued). Trip characteristics reported by respondents who fished for steelhead in the past 24 months.

		Steelhead/day*		Hours fished/day		Days fished/yr		Perceived % wild steelhead		Wild steelhead caught/yr		Hatchery steelhead caught/yr		Trips/yr		Travel time (hr)	
River	***n***	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Skagit	35	0.39	1.16	5.37	2.31	3.60	7.22	37.43	32.84	0.69	1.47	0.74	2.15	2.97	4.57	2.03	1.73
Skykomish	38	0.23	0.54	5.32	1.85	3.82	4.48	20.53	21.30	0.05	0.23	0.79	1.91	3.53	4.10	1.16	0.83
Snake	61	0.54	1.01	6.28	2.24	7.00	8.65	35.57	20.29	1.67	4.33	1.15	2.62	5.10	6.19	1.56	1.51
Snohomish	10	0.23	0.63	4.40	1.96	1.90	0.99	7.00	12.52	0.10	0.32	0.20	0.42	1.70	0.95	1.65	2.29
Snoqualmie	11	0.32	0.56	5.00	1.48	1.36	0.67	19.09	16.40	0.36	0.92	0.09	0.30	1.36	0.67	1.07	0.93
Sol Duc	43	0.86	1.66	5.91	2.33	3.91	5.54	49.30	36.93	1.53	3.01	0.33	1.19	3.33	4.59	3.28	2.12
Stillaguamish	12	0.17	0.33	4.42	1.83	2.25	1.06	27.50	27.68	0.17	0.58	0.25	0.62	2.08	0.90	1.57	1.05
Upper CR	21	0.54	0.74	5.71	1.87	4.14	4.94	32.86	26.10	0.57	1.16	0.62	1.02	2.19	1.75	1.28	1.32
Walla Walla	10	0.67	0.93	3.90	1.97	5.70	5.25	40.00	30.91	1.20	2.10	1.10	2.13	5.70	5.25	0.60	0.35
Washougal	8	0.08	0.21	3.88	1.64	14.88	34.42	36.25	35.83	0.13	0.35	0.38	1.06	14.63	34.53	0.88	1.09
Wenatchee	5	0.47	1.04	4.80	1.79	4.20	3.56	18.00	20.49	0.40	0.89	1.00	2.24	3.40	2.07	2.00	1.36
White Salmon	36	0.83	1.24	6.75	2.23	2.86	2.73	32.50	25.68	0.61	0.90	0.92	1.40	2.53	2.74	3.28	1.83
Willapa	12	1.52	2.53	5.50	2.61	5.00	8.36	43.33	38.22	1.50	1.98	1.25	1.96	3.75	4.52	1.76	1.20
Wind	5	0.20	0.45	5.20	3.27	3.40	3.78	20.00	29.15	0.00	0.00	0.20	0.45	3.20	3.90	1.37	1.04
Wynoochee	23	0.22	0.42	5.00	2.04	3.65	5.04	28.70	25.64	0.17	0.49	0.70	2.12	3.35	4.38	1.76	1.45

* Data represent averages of responses taken over a 12-month period to a particular river. If they had fished at the river in the past 12 months, they provided data on that period. If not, they provided information on trips taken to that river in the period from 13 to 24 months ago.

Respondents provided ratings of natural beauty, ease of access, and level of congestion for each of their most-used rivers, creating measures of site attributes that can affect behavior but are not directly related to steelhead catch (Figures 4a, 4b, and 4c).

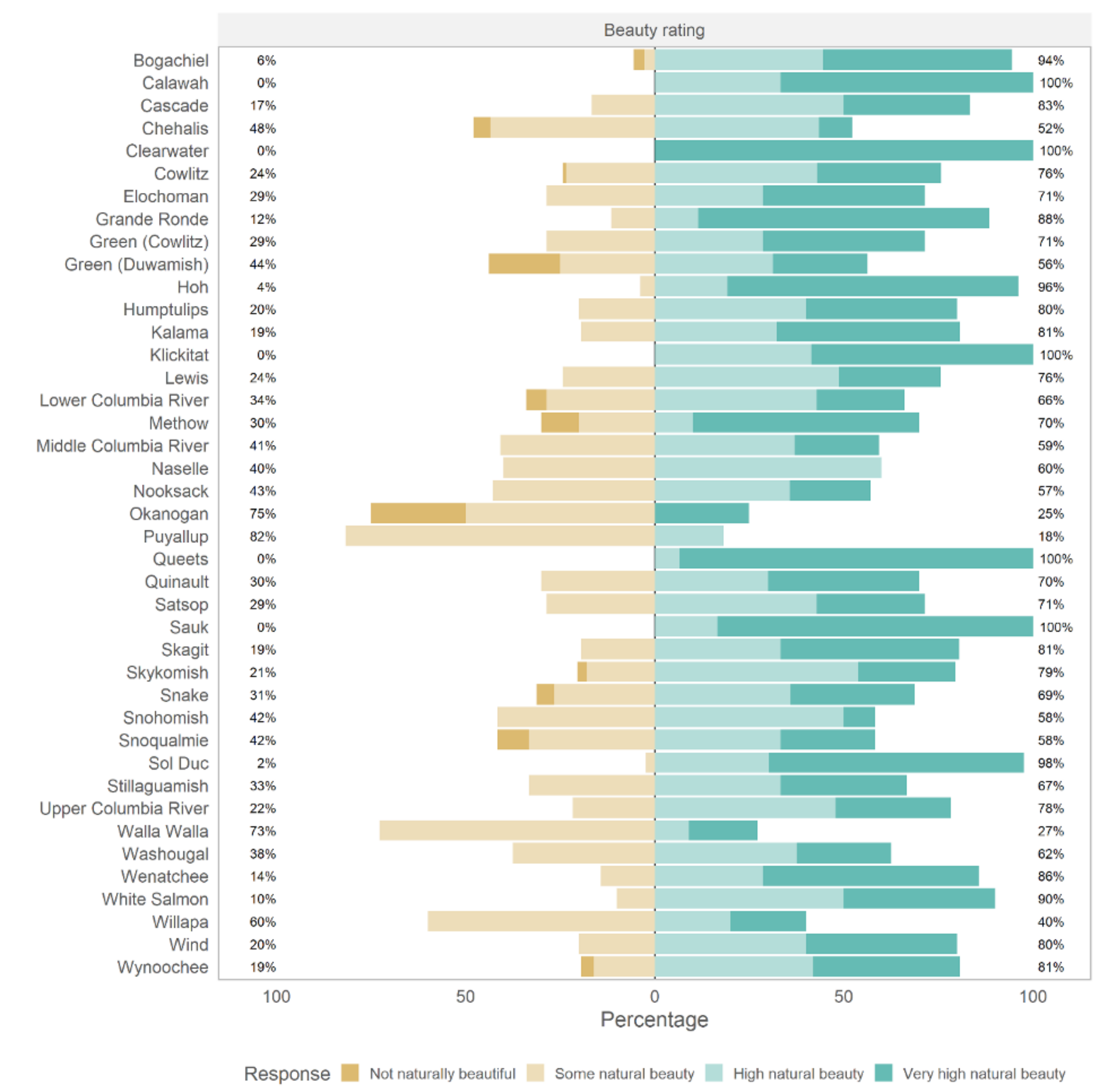

Figure 4a. Natural beauty ratings, by river.

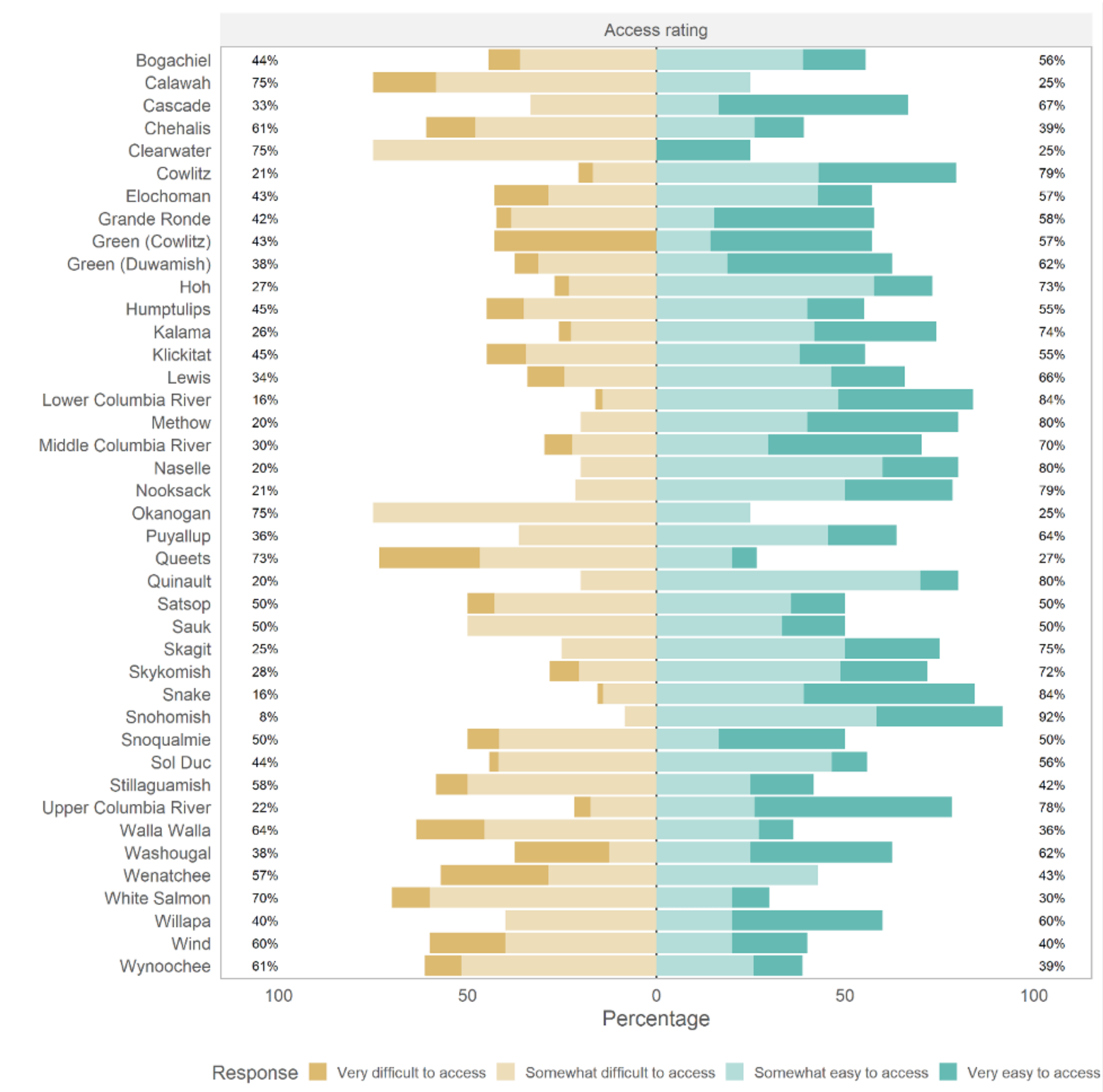

Figure 4b. Ease of access ratings, by river.

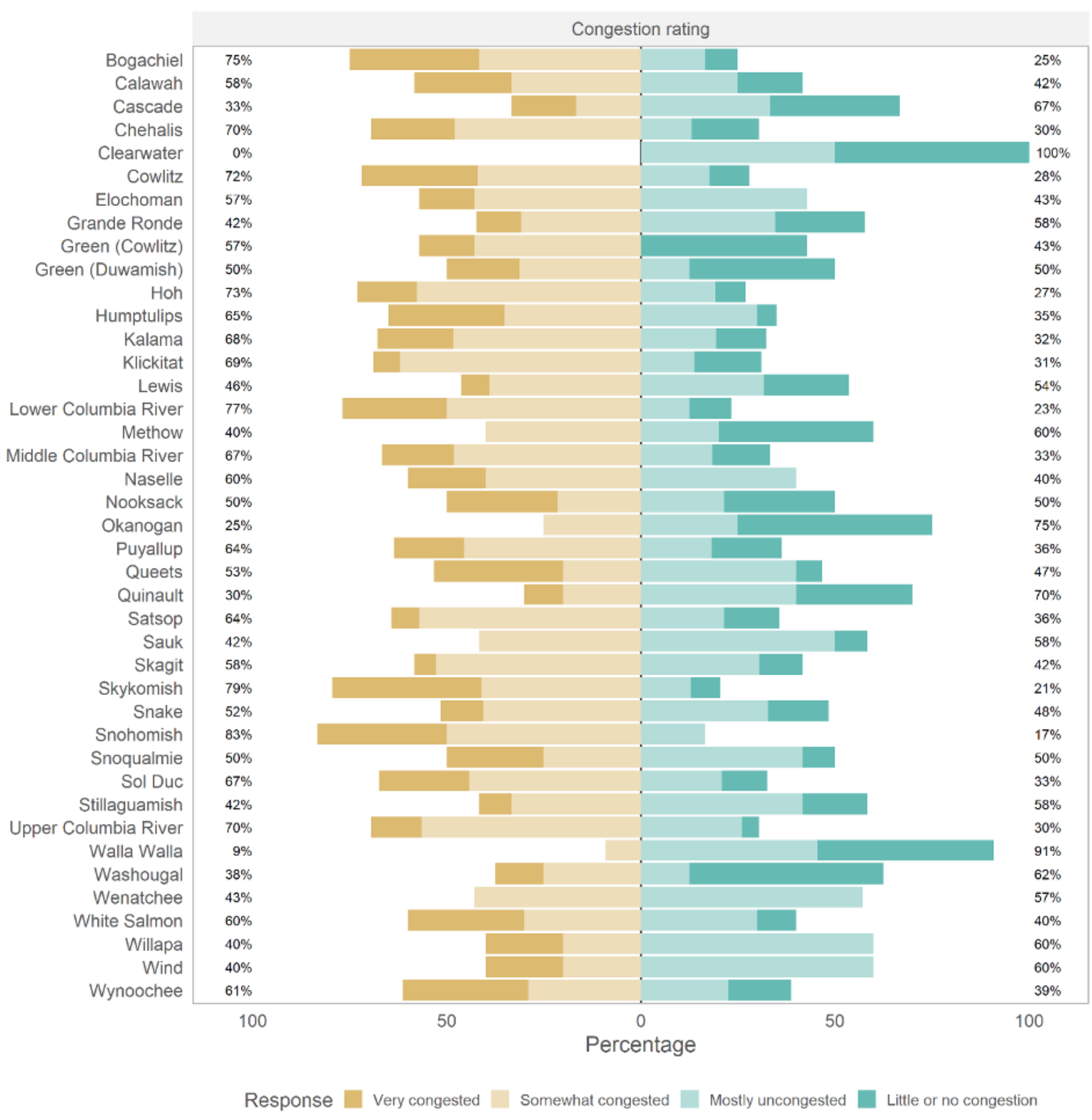

Figure 4c. Congestion ratings, by river.

Anglers use different methods of fishing to target steelhead. Classifying anglers by the gear type they use (Figure 5) shows that lures and bait are the two gear types used most often, each used by more than twice as many anglers as fly gear. More anglers reported fishing from shore than from a boat. Among boat anglers, most stated using a motorized boat (Figure 6a) that they owned (Figure 6b).

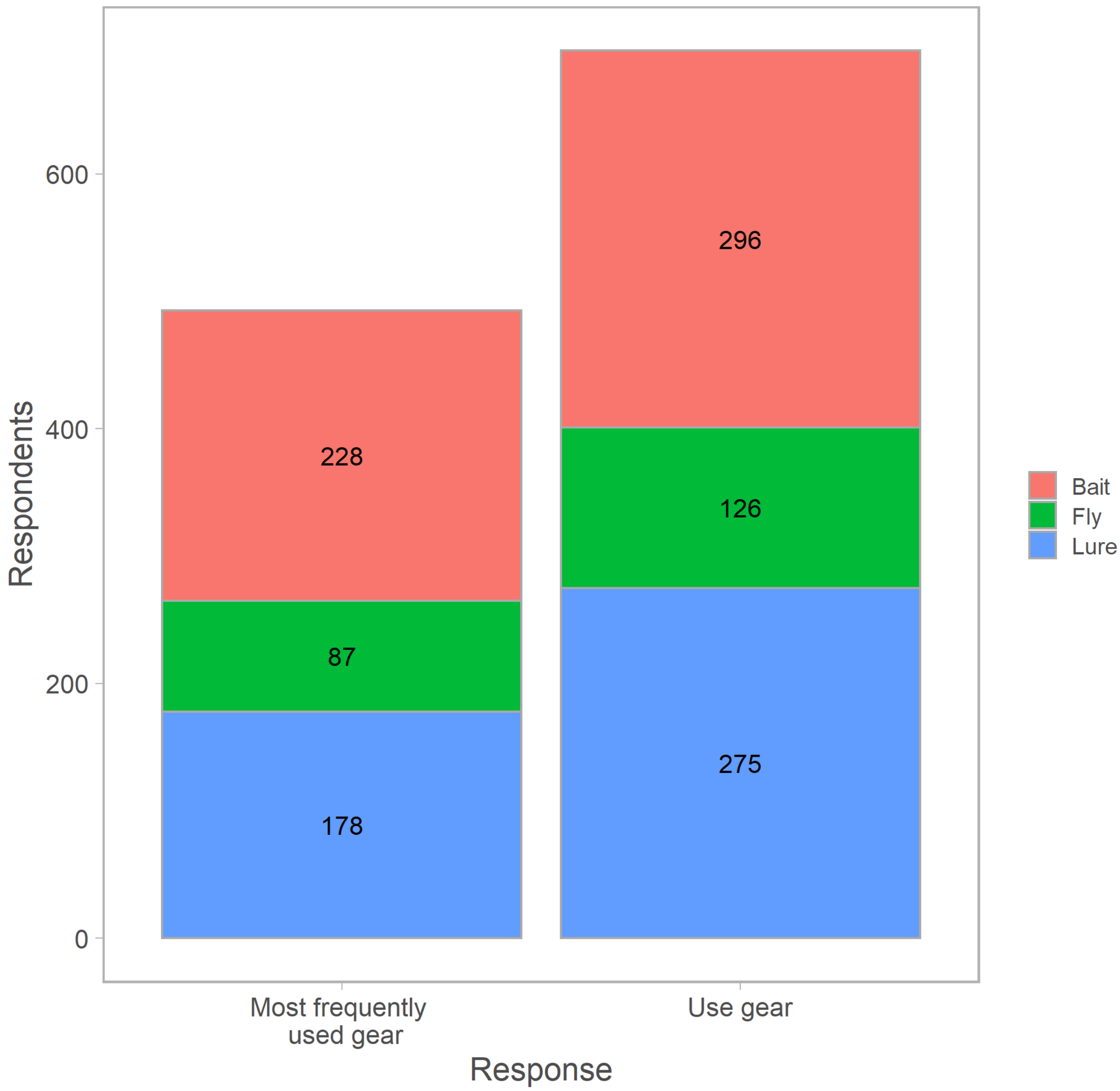

Figure 5. Gear type used most frequently to target steelhead.

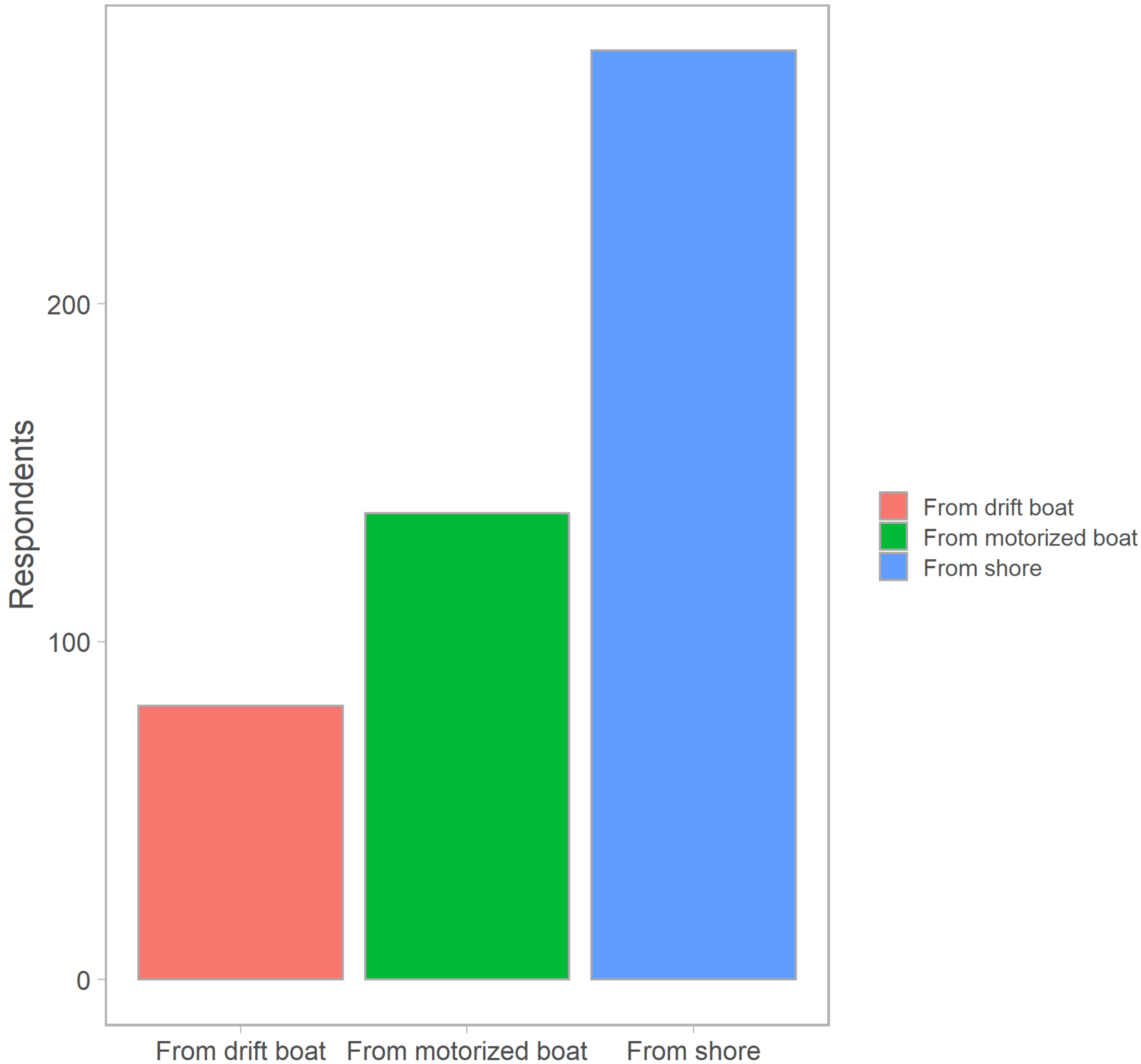

Figure 6a. Fishing mode used most often to target steelhead.

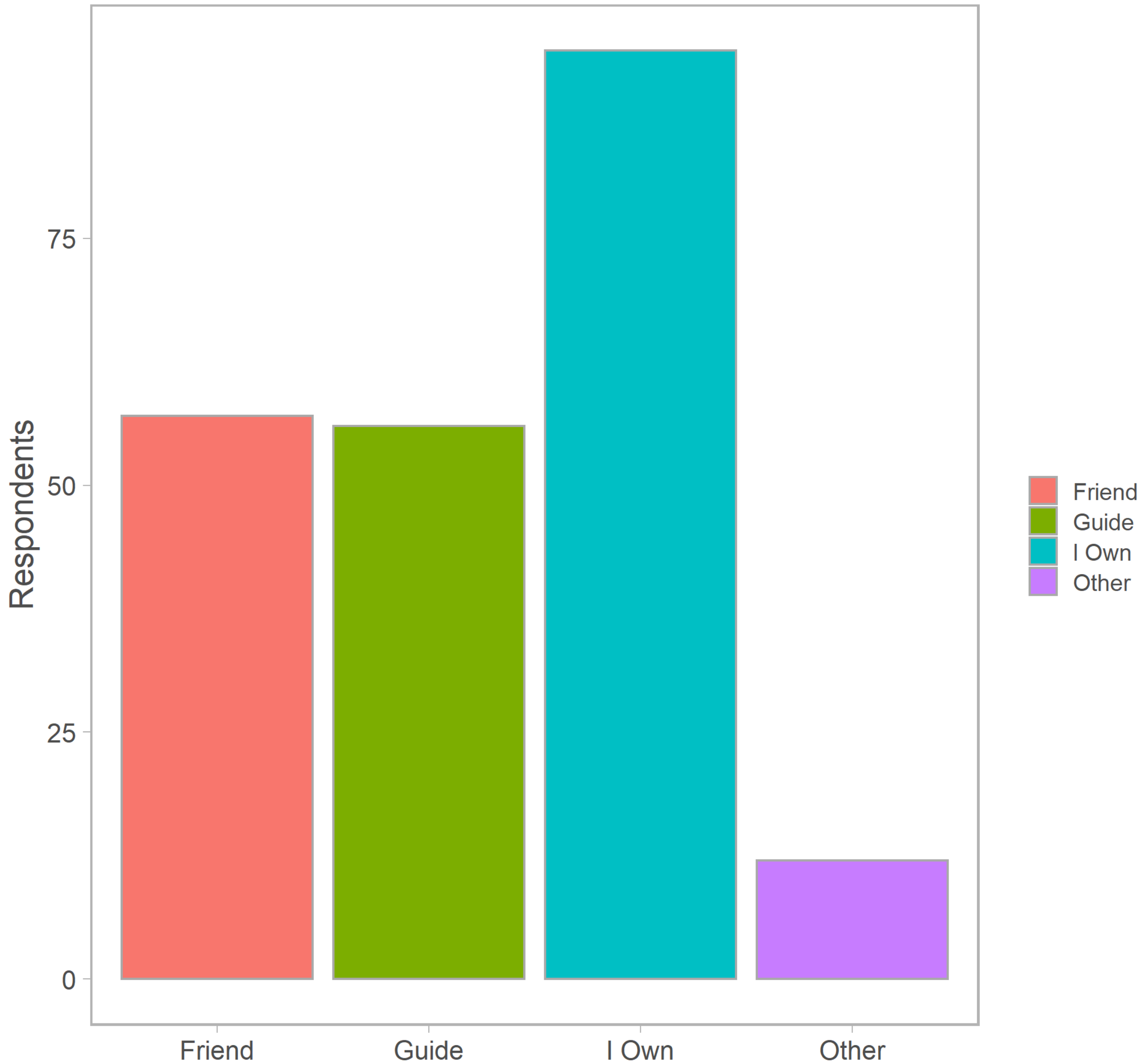

Figure 6b. Boat ownership among anglers using a boat most often to target steelhead.

Trip Expenditures

Expenditures from anglers' typical steelhead fishing trips provide the data necessary to produce economic contributions or impacts, when used in an input–output model. These data also provide angler-specific measures of travel costs associated with steelhead trips that are used in models of economic demand. The largest expenditures are for lodging (conditional on taking an overnight trip), followed by fishing tackle, gear, or bait, and then fuel (Table 7).

Table 7. Typical steelhead trip expenditures, 2019 USD. $N = 494$. Note that trips can last for several days.

Expenditure	Mean	Median	SD	Min	Max
Fishing tackle, gear, and bait	52.61	25	111.97	0	1,500
Parking, access, boat launch, or shuttle fees	9.65	0	27.20	0	300
Fuel for boat	12.26	0	32.33	0	300
Fuel for car	48.24	35	50.47	0	400
Food, drink, and refreshments	43.33	20	58.01	0	500
Lodging at motels, cabins, or campgrounds (for overnight trips only)	41.31	0	85.61	0	500
Public transportation	2.72	0	13.02	0	150

Hatchery Preferences and Opinions

A series of questions about hatchery and wild steelhead provided general preferences and opinions related to catching and managing wild and hatchery steelhead populations. First, the general preferences for catching wild or hatchery steelhead show that most anglers are indifferent, followed by a preference for catching hatchery steelhead (Figure 7a). Among those who stated a preference for catching hatchery steelhead, the most often-cited reason was that harvest is allowed. Another common response was that anglers preferred to catch hatchery steelhead because they did not want to disturb wild fish (Figure 7b). Related to hatchery management, respondent agreement with a set of three statements about steelhead hatcheries indicated that most anglers feel that steelhead hatcheries provide important opportunities that would not otherwise exist. A majority of anglers indicated they would take additional trips if opportunities for catching and harvesting hatchery steelhead increased, and strongly agreed that hatcheries are necessary to provide adequate steelhead angling opportunities in the state. Opinions were more heterogeneous with respect to the relationship between wild steelhead opportunities and hatchery production (Figure 8).

Years Since Last Steelhead Trip Within Ineligible Sample

Respondents who had not taken a steelhead fishing trip in Washington in the past 24 months, and were therefore not eligible for the full study, were asked if they had ever been steelhead fishing, and, if so, how many years it had been since their last trip. The responses show that a large number of respondents stated that they had never fished for steelhead. Among those who had fished for steelhead in the past, a majority of anglers had taken a steelhead trip within the past eight years (Figure 9).

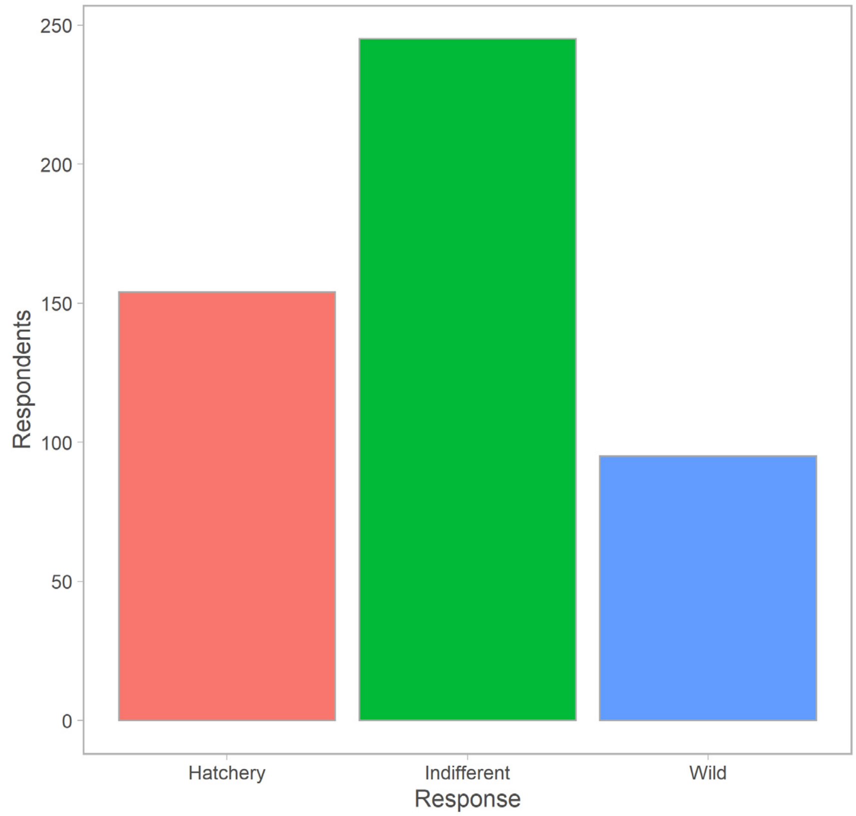

Figure 7a. Preference for catching wild or hatchery steelhead.

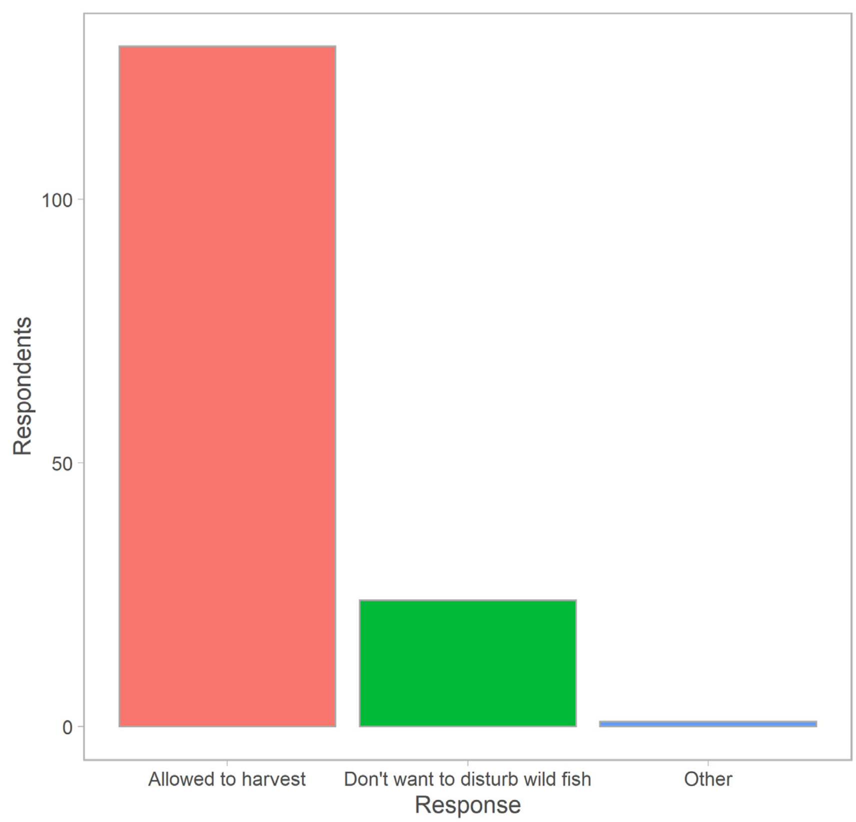

Figure 7b. Reasons for preference among anglers preferring to catch hatchery steelhead.

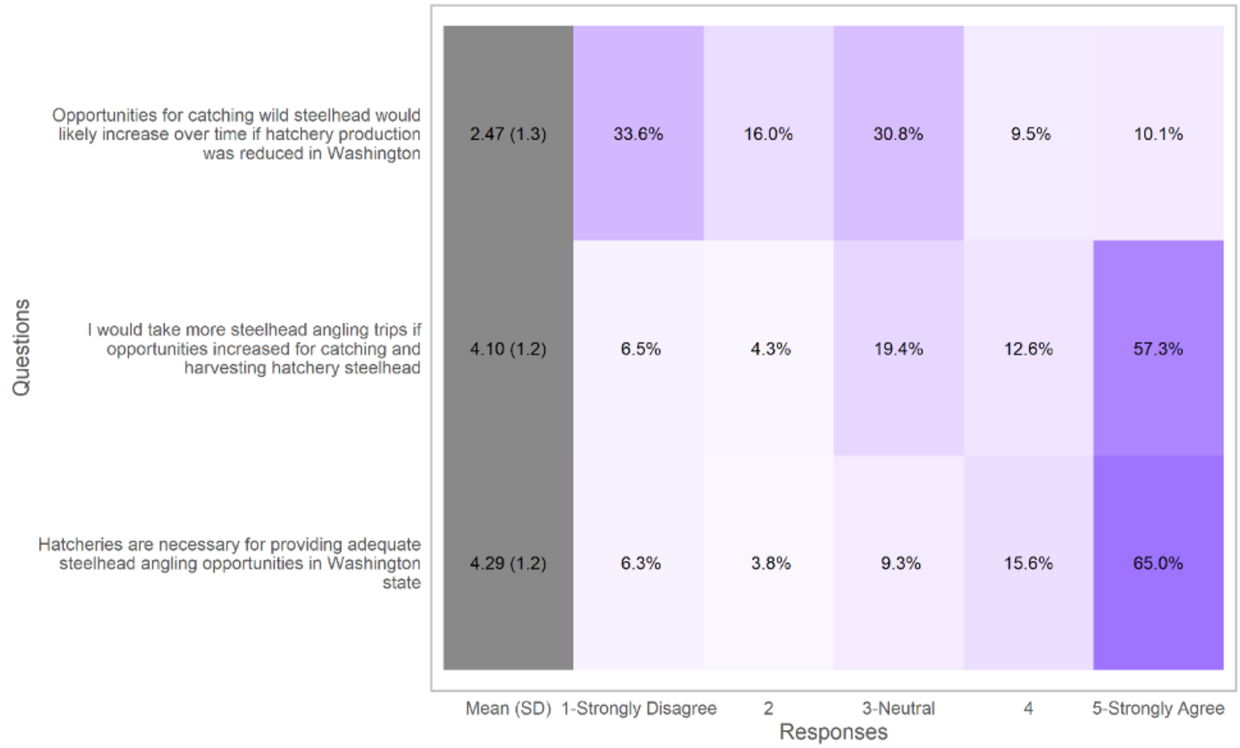

Figure 8. Opinions related to hatchery management and fishing opportunities.

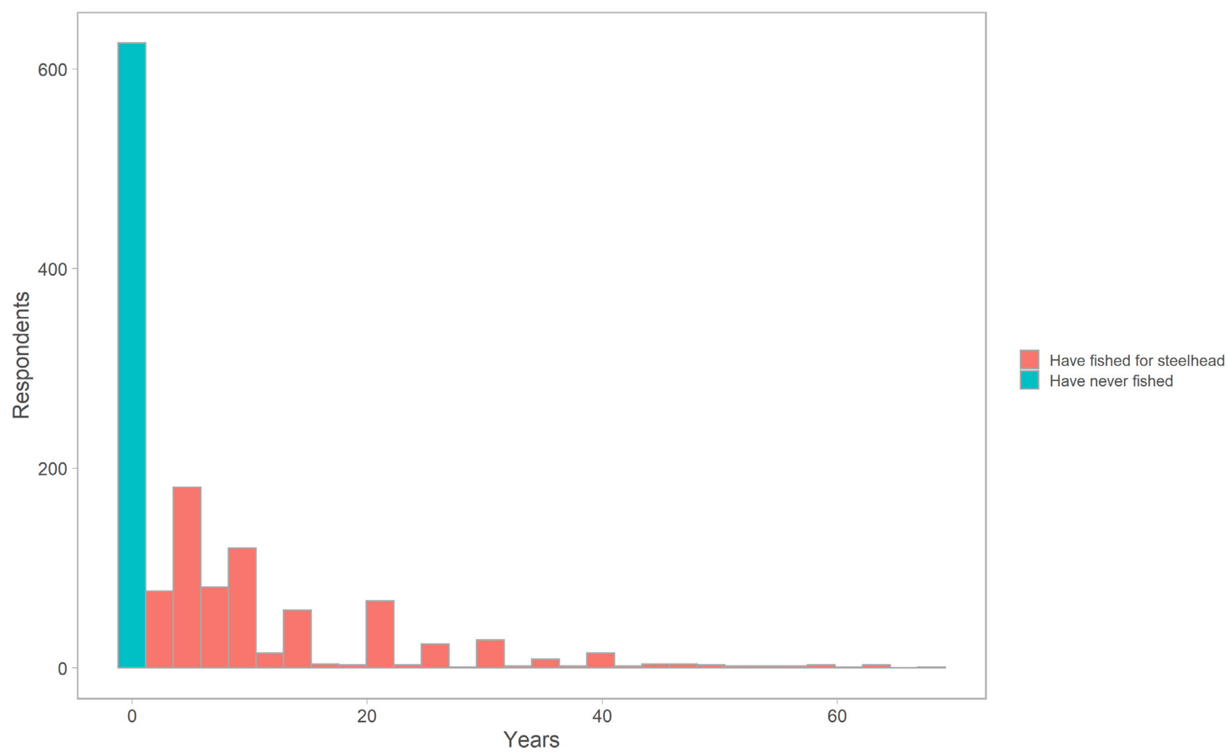

Figure 9. Number of years since most recent steelhead trip among ineligible anglers.

Factors Influencing Fishery Exit and Potential Reentry

Anglers who were ineligible for the full study but had taken a steelhead trip at least once in the past were asked two follow-up questions. First, these respondents selected the three most important reasons why they had not been steelhead fishing recently from a list of possible reasons (Figure 10a). The most often-cited reason for not taking a steelhead trip was other constraints on time, followed by fewer steelhead opportunities. Second, anglers provided the three most important changes that would motivate them to go steelhead fishing within the next 12 months (Figure 10b). The change most commonly cited as being most important was increasing the number of steelhead present at sites where they fish.

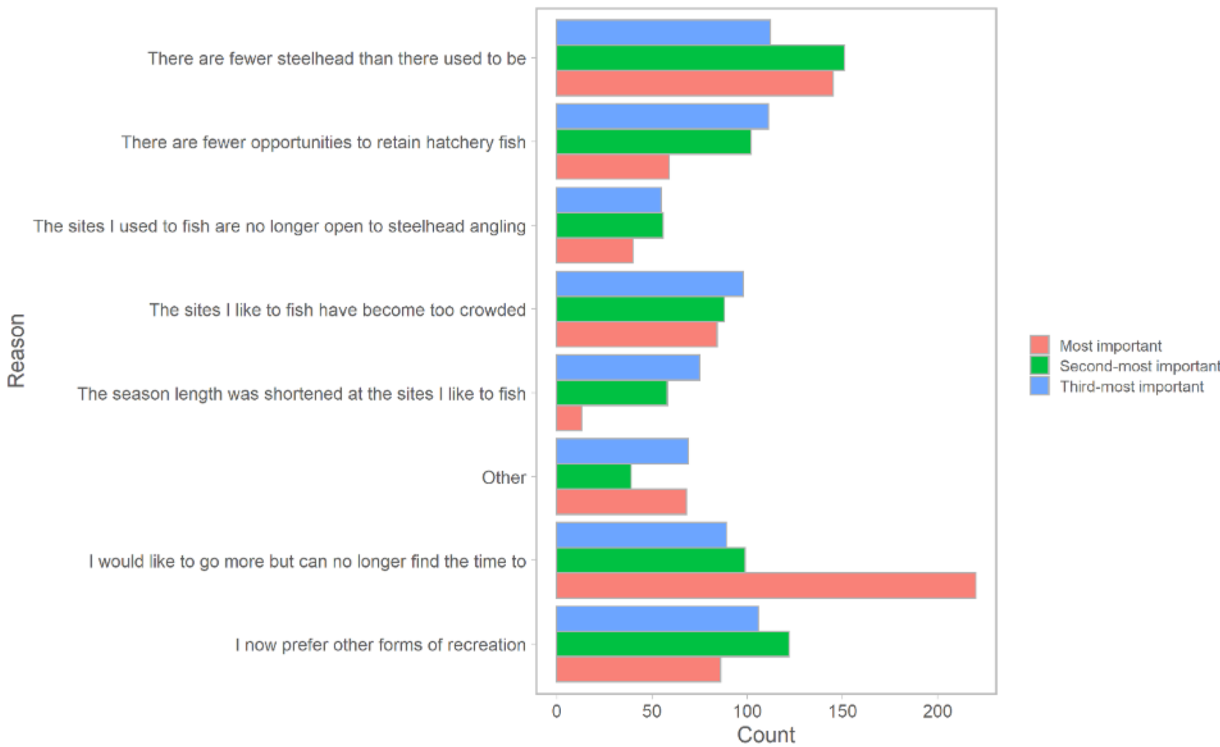

Figure 10a. Reasons cited for not targeting steelhead.

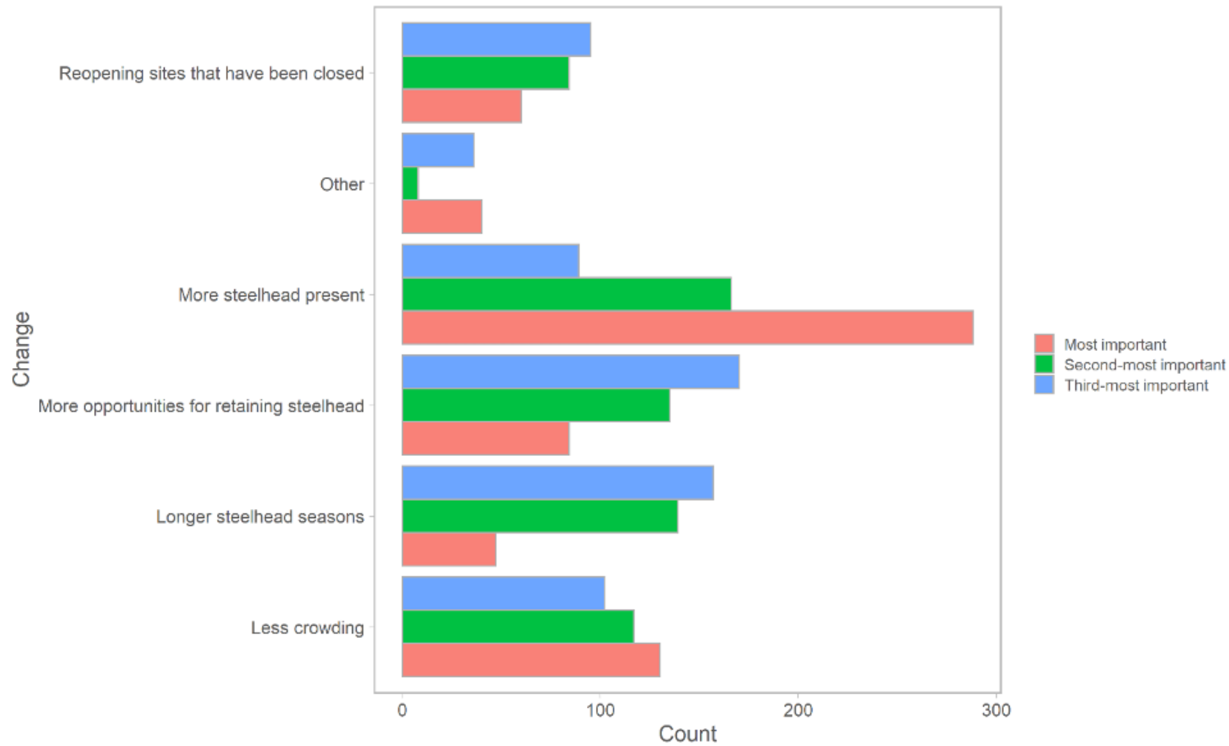

Figure 10b. Factors that would most encourage participation in the steelhead fishery.

Demographics of Eligible and Ineligible Sample

Comparisons between the eligible and ineligible portion of the overall sample can determine whether there are any significant differences between anglers who take steelhead fishing trips and those who receive the catch record card but do not take any trips (Tables 8 and 9). There are no notable differences, which is perhaps unsurprising as both groups are licensed anglers with steelhead catch record cards.

Table 8. Demographics in eligible sample. $N = 494$.

Variable	Mean	SD	Min	Max
Age (years)	52.73	15.23	18	87
Male	0.86	0.34	0	1
Number of adults in household	2.05	1.48	1	30
Number of people under 18 years of age in household	0.47	1.04	0	10
Married	0.71	0.45	0	1
Hispanic	0.02	0.15	0	1
Years fished in Washington	32.15	19.50	0	75
Race				
Asian	0.03	0.17	0	1
Black	0.01	0.11	0	1
Indigenous	0.03	0.18	0	1
White	0.91	0.28	0	1
Other	0.05	0.22	0	1
Education				
Some high school	0.01	0.12	0	1
High school	0.17	0.37	0	1
Some college	0.26	0.44	0	1
Associate's degree	0.12	0.33	0	1
Bachelor's degree	0.25	0.43	0	1
Graduate or professional school	0.19	0.39	0	1
Household income				
\$0–\$25,000	0.07	0.25	0	1
\$25,001–\$50,000	0.11	0.31	0	1
\$50,001–\$75,000	0.18	0.39	0	1
\$75,001–\$100,000	0.19	0.39	0	1
\$100,001–\$125,000	0.14	0.35	0	1
\$125,001–\$150,000	0.10	0.30	0	1
\$150,001–\$175,000	0.07	0.26	0	1
\$175,001–\$200,000	0.05	0.21	0	1
More than \$200,000	0.09	0.28	0	1

Table 9. Demographics in ineligible sample. $N = 1{,}343$.

Variable	**Mean**	**SD**	**Min**	**Max**
Age (years)	53.91	15.70	18	99
Male	0.82	0.38	0	1
Number of adults in household	2.08	1.06	1	20
Number of people under 18 years of age in household	0.48	0.94	0	7
Married	0.74	0.44	0	1
Hispanic	0.03	0.18	0	1
Years fished in Washington	30.43	20.80	0	85
Race				
Asian	0.05	0.22	0	1
Black	0.01	0.12	0	1
Indigenous	0.02	0.14	0	1
White	0.90	0.30	0	1
Other	0.05	0.22	0	1
Education				
Some high school	0.03	0.18	0	1
High school	0.15	0.36	0	1
Some college	0.26	0.44	0	1
Associate's degree	0.13	0.33	0	1
Bachelor's degree	0.23	0.42	0	1
Graduate or professional school	0.20	0.40	0	1
Household income				
$0–$25,000	0.08	0.27	0	1
$25,001–$50,000	0.13	0.33	0	1
$50,001–$75,000	0.09	0.29	0	1
$75,001–$100,000	0.05	0.22	0	1
$100,001–$125,000	0.05	0.22	0	1
$125,001–$150,000	0.14	0.35	0	1
$150,001–$175,000	0.15	0.36	0	1
$175,001–$200,000	0.19	0.39	0	1
More than $200,000	0.11	0.31	0	1

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Appendix A: Survey Materials

This appendix provides the contacts that were used for the final survey, including: a) advance letter/survey invitation, b) reminder postcard, c) email reminder, and d) full questionnaire.

Advance Letter / Survey Invitation

NOAA FISHERIES | Northwest Fisheries Science Center

License holder first and last name

Address line 1

Address line 2

City, State zip

Dear License holder first name,

The Northwest Fisheries Science Center (NWFSC) is conducting a survey of anglers in Washington State to better understand how management actions affect recreational fisheries. We are kindly requesting your participation in the survey to help increase understanding of what anglers like and dislike, enhance your fishing experience, and improve overall fishery management. It is important to hear your opinions, no matter how often you have fished, to ensure the results are truly representative of all anglers.

Participation in the survey is voluntary. Survey responses are confidential and only aggregate data will be reported. This research is for scientific purposes, and you will **not** be contacted to purchase any products or services. If you have any questions about the survey please call me at (206) 302-2469. If you need assistance completing the survey, please contact Pacific Market Research, an independent research firm hired to conduct this study, at (XXX) XXX-XXXX or via email at PMRemail.

Thank you in advance for your participation.

Sincerely,
Robby Fonner
Project Director
NOAA Fisheries | Northwest Fisheries Science Center

P.S. We have enclosed a small token of our appreciation as a way of saying thanks for completing the survey

Reminder Postcard

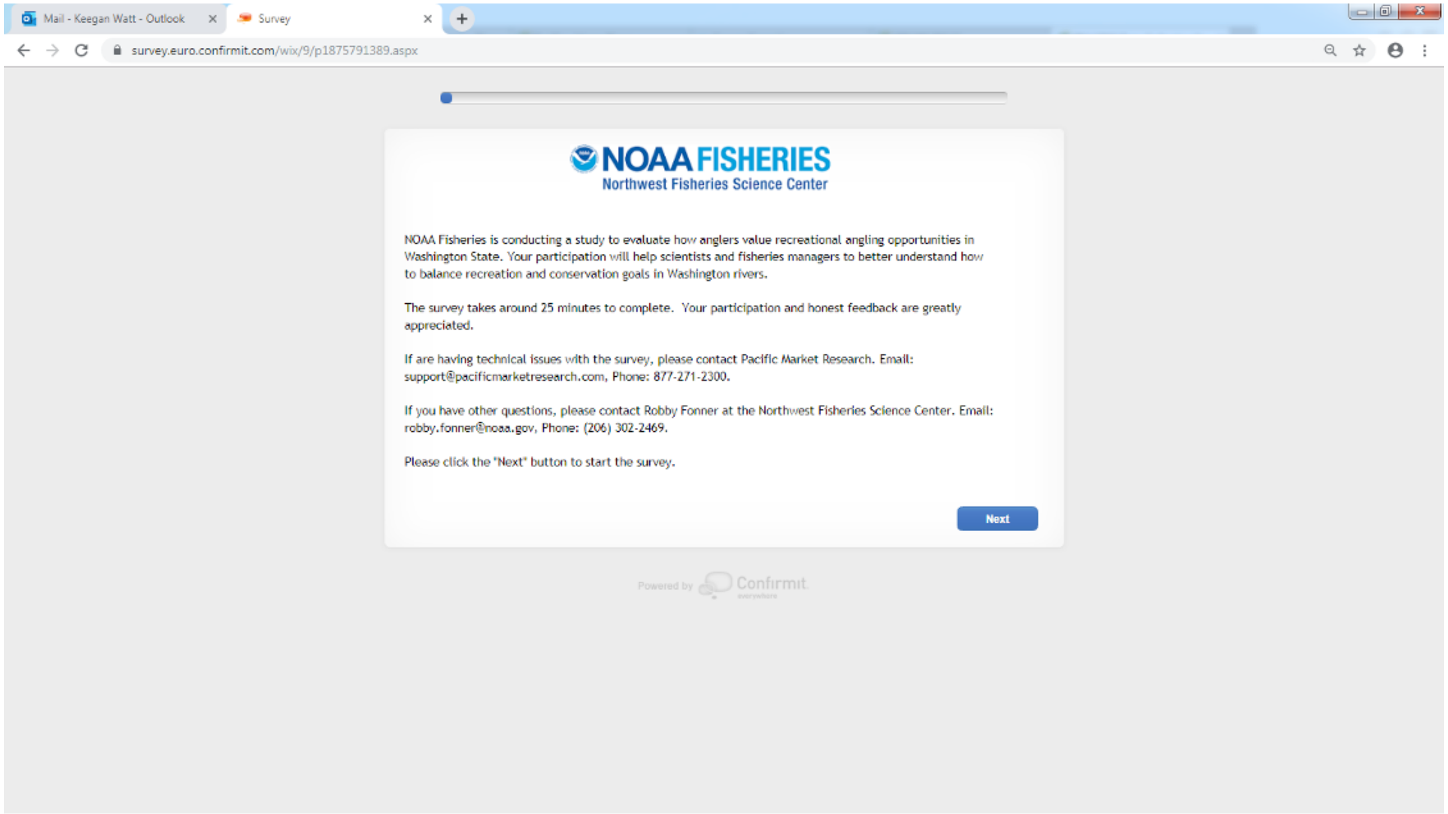
REMINDER: WASHINGTON ANGLER SURVEY

About a week ago, we sent you a letter asking you to participate in a survey of Washington anglers conducted by the Northwest Fisheries Science Center. As of June 25, 2019 we have not received a response. You have been selected to represent others who fish in Washington and your answers will help improve overall fishery management.

Participation is quick and easy. You can access the survey by going to www.XXXXX.com and entering the following passcode: XXXXXXXX

Please contact Pacific Market Research if you require assistance with completing the survey
Phone | Email

Full Questionnaire



NOAA Fisheries is conducting a study to evaluate how anglers value recreational angling opportunities in Washington State. Your participation will help scientists and fisheries managers to better understand how to balance recreation and conservation goals in Washington rivers.

The survey takes around 25 minutes to complete. Your participation and honest feedback are greatly appreciated.

If are having technical issues with the survey, please contact Pacific Market Research. Email: support@pacificmarketresearch.com, Phone: 877-271-2300.

If you have other questions, please contact Robby Fonner at the Northwest Fisheries Science Center. Email: robby.fonner@noaa.gov, Phone: (206) 302-2469.

Please click the "Next" button to start the survey.

Next

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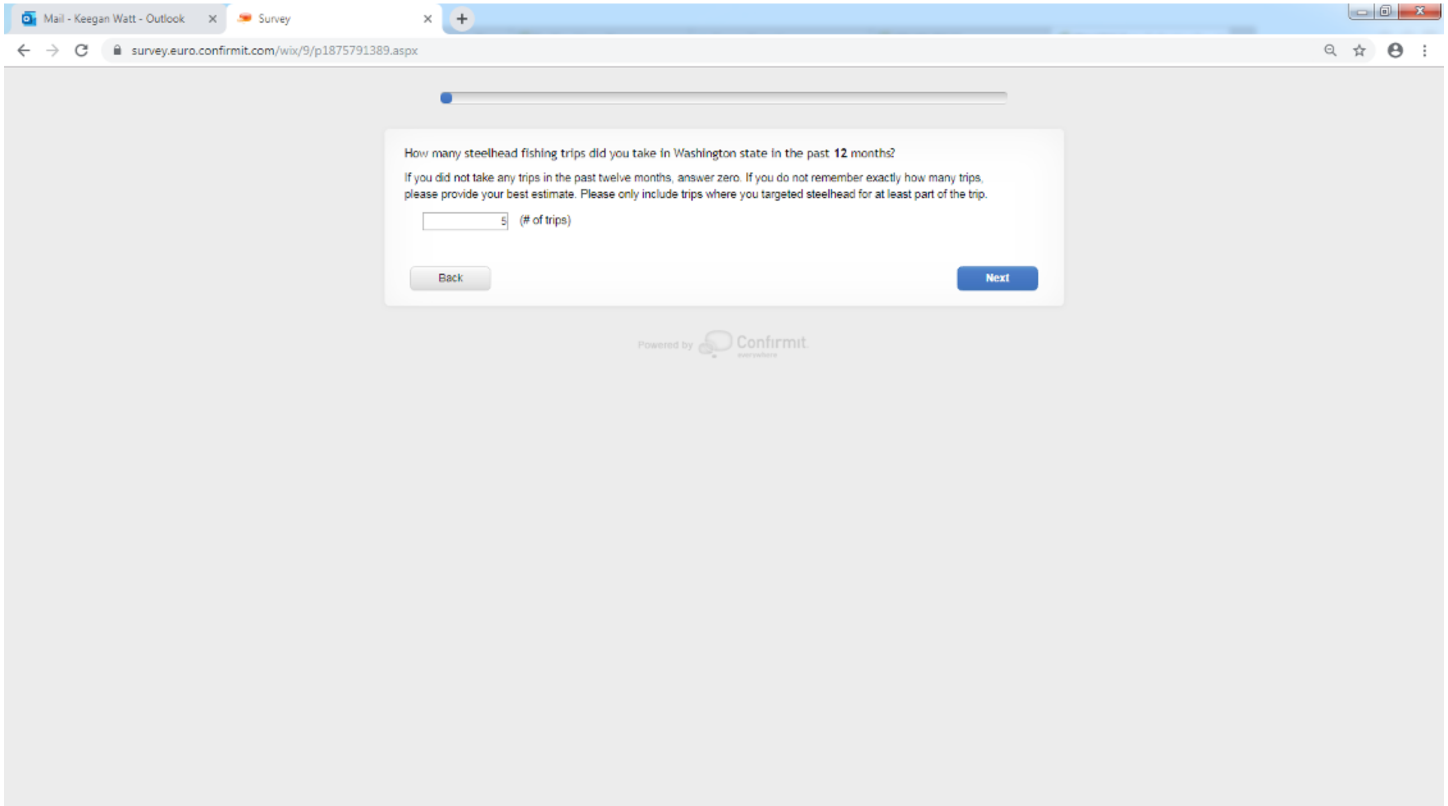
Mail - Keegan Watt - Outlook
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many steelhead fishing trips did you take in Washington state in the past 12 months?
If you did not take any trips in the past twelve months, answer zero. If you do not remember exactly how many trips, please provide your best estimate. Please only include trips where you targeted steelhead for at least part of the trip.
5
(# of trips)
Back
Next
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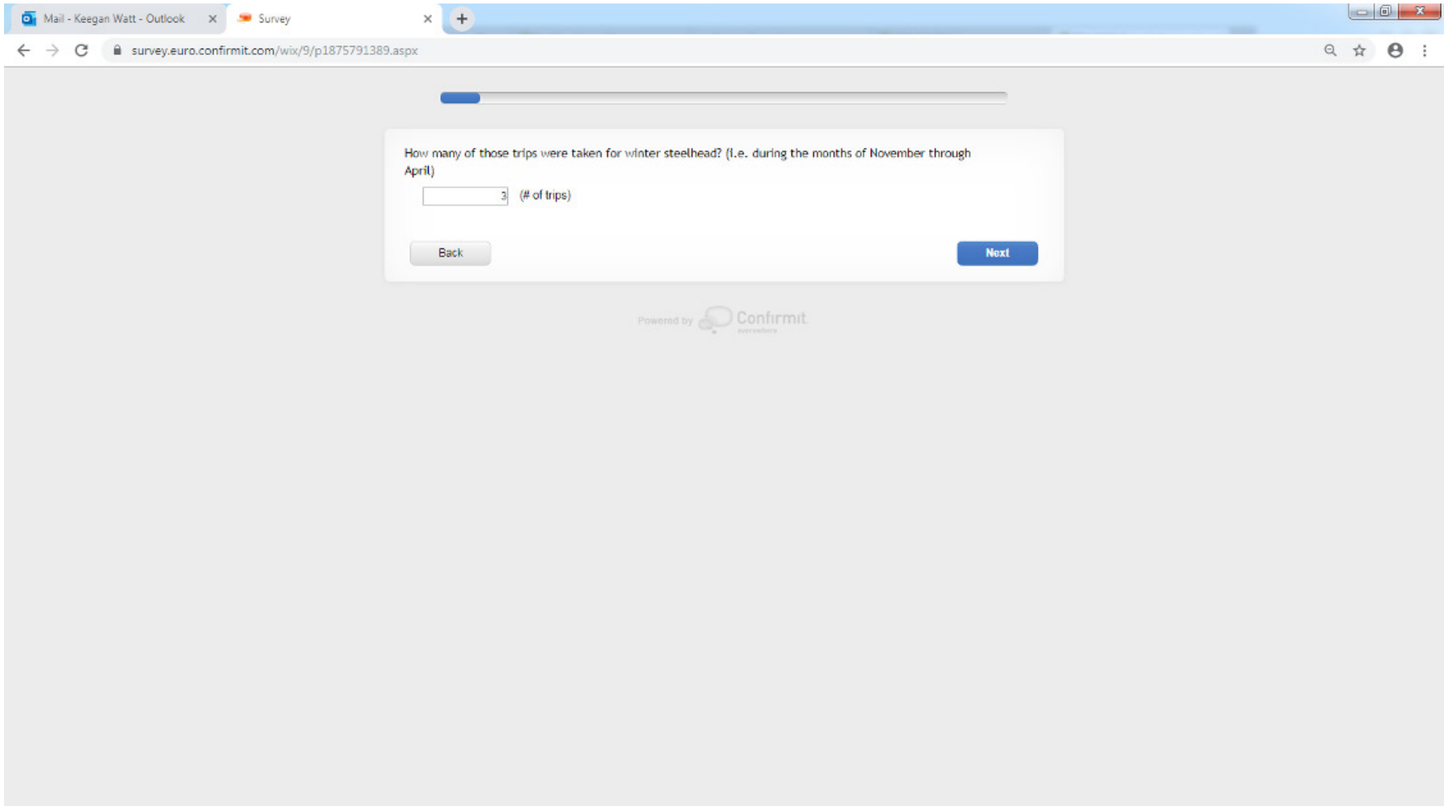
Mail - Keegan Watt - Outlook
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many of those trips were taken for winter steelhead? (I.e. during the months of November through April)
3
(# of trips)
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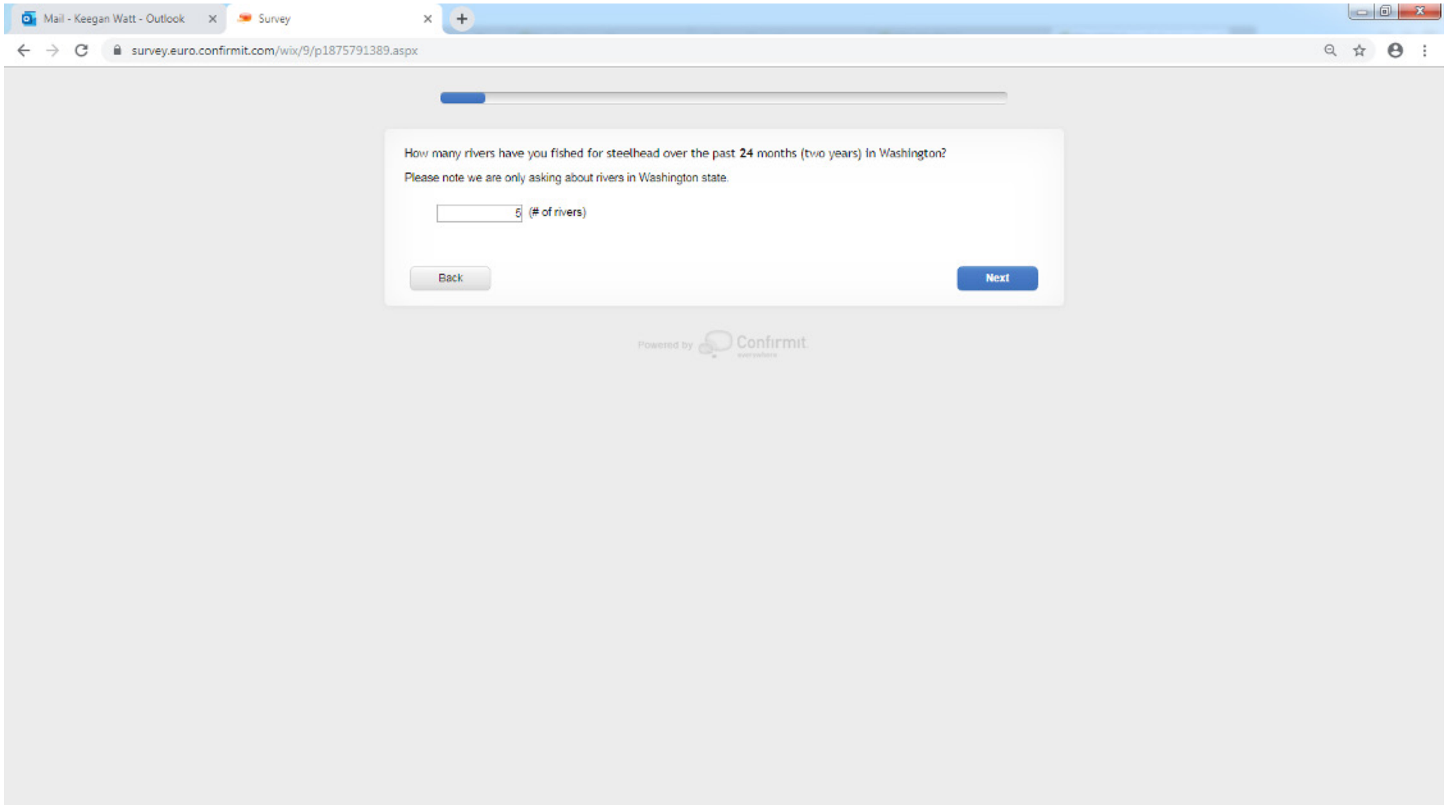
Mail - Keegan Watt - Outlook
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many rivers have you fished for steelhead over the past 24 months (two years) in Washington?
Please note we are only asking about rivers in Washington state.
5 (# of rivers)
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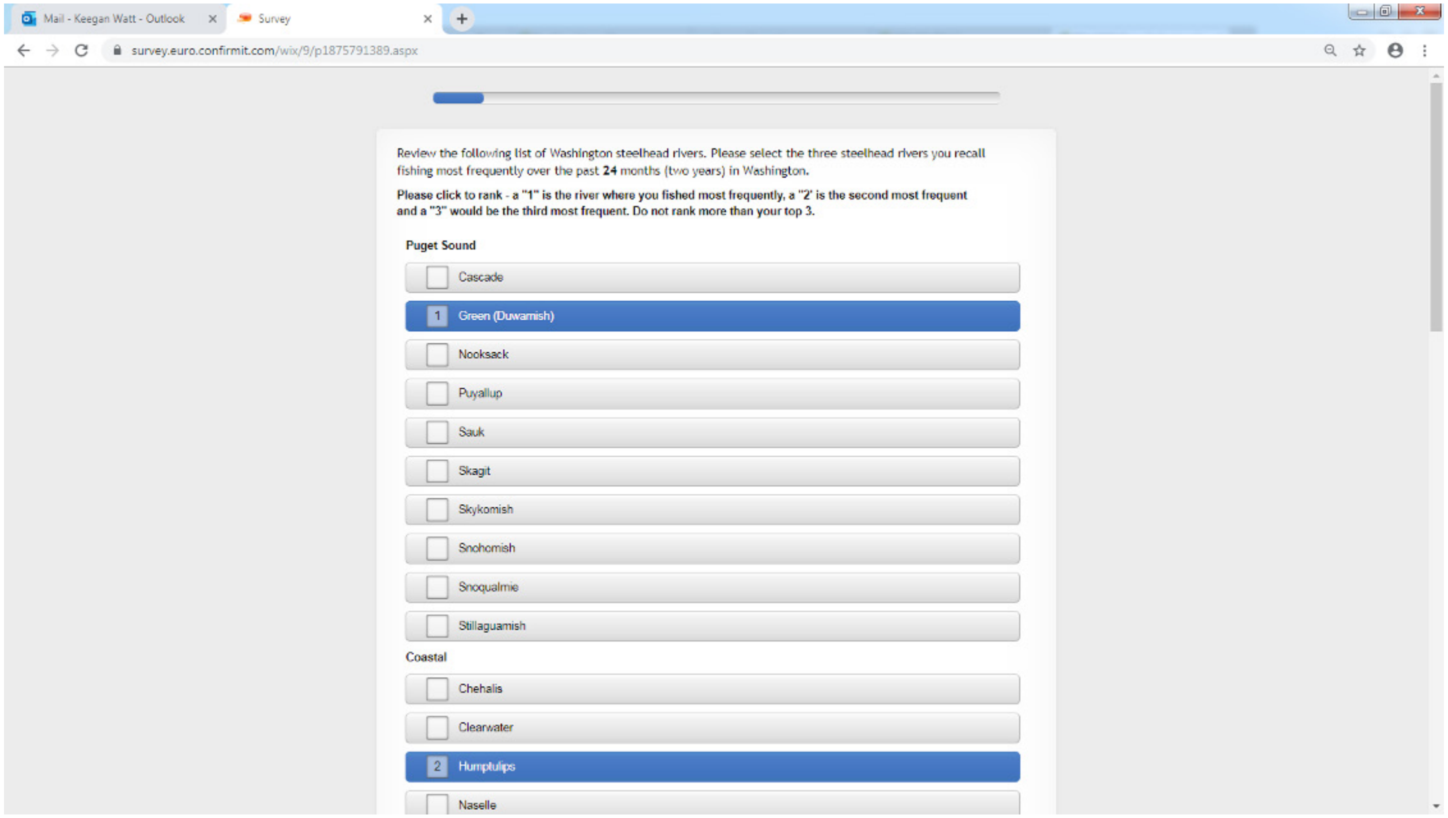
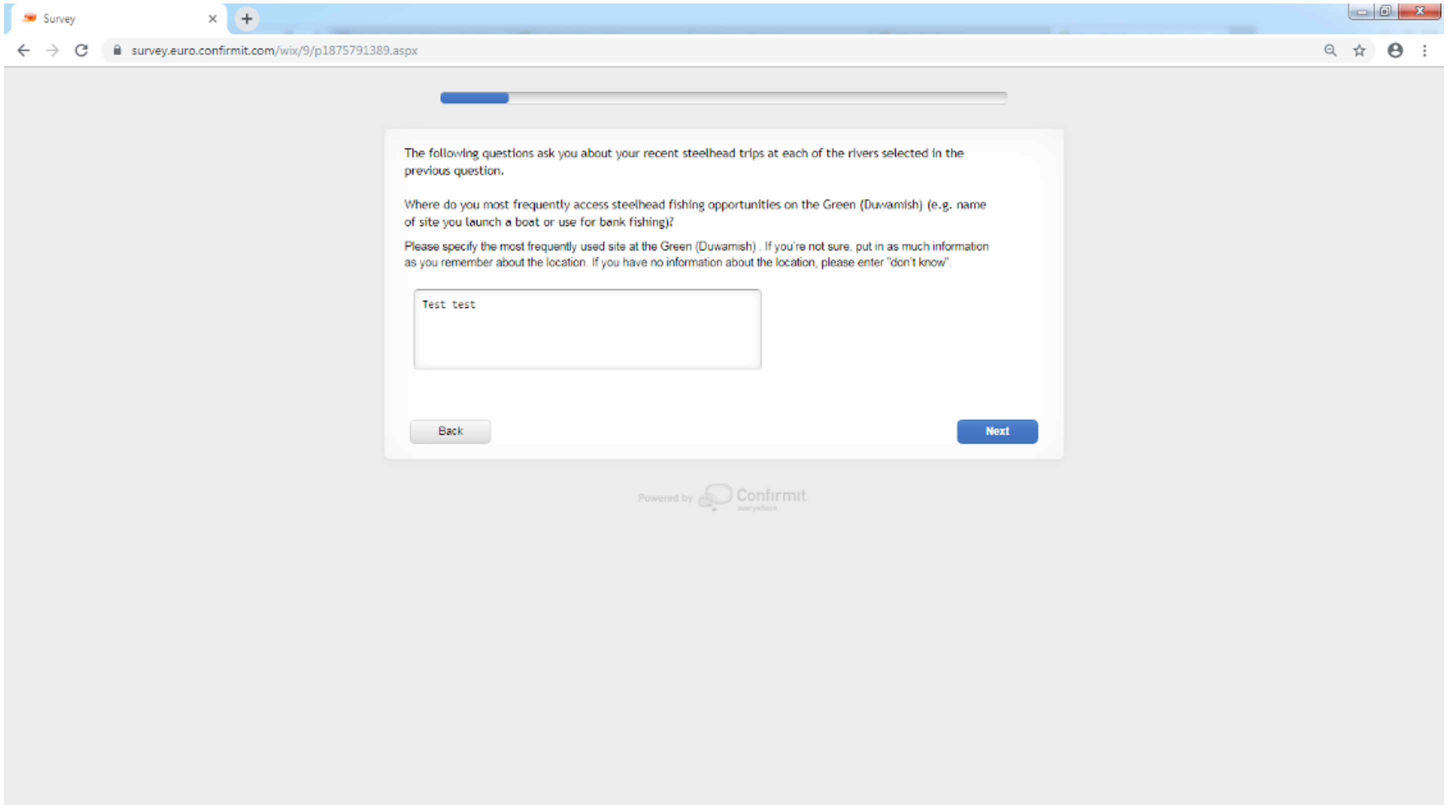

Mail - Keegan Watt - Outlook
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Review the following list of Washington steelhead rivers. Please select the three steelhead rivers you recall fishing most frequently over the past 24 months (two years) in Washington.
Please click to rank - a "1" is the river where you fished most frequently, a "2' is the second most frequent and a "3" would be the third most frequent. Do not rank more than your top 3.
Puget Sound
Cascade
1 Green (Duwamish)
Nooksack
Puyallup
Sauk
Skagit
Skykomish
Snohomish
Snoqualmie
Stillaguamish
Coastal
Chehalis
Clearwater
2 Humptulips
Naselle


Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
The following questions ask you about your recent steelhead trips at each of the rivers selected in the previous question.
Where do you most frequently access steelhead fishing opportunities on the Green (Duwamish) (e.g. name of site you launch a boat or use for bank fishing)?
Please specify the most frequently used site at the Green (Duwamish) . If you're not sure, put in as much information as you remember about the location. If you have no information about the location, please enter "don't know".
Test test
Back
Next
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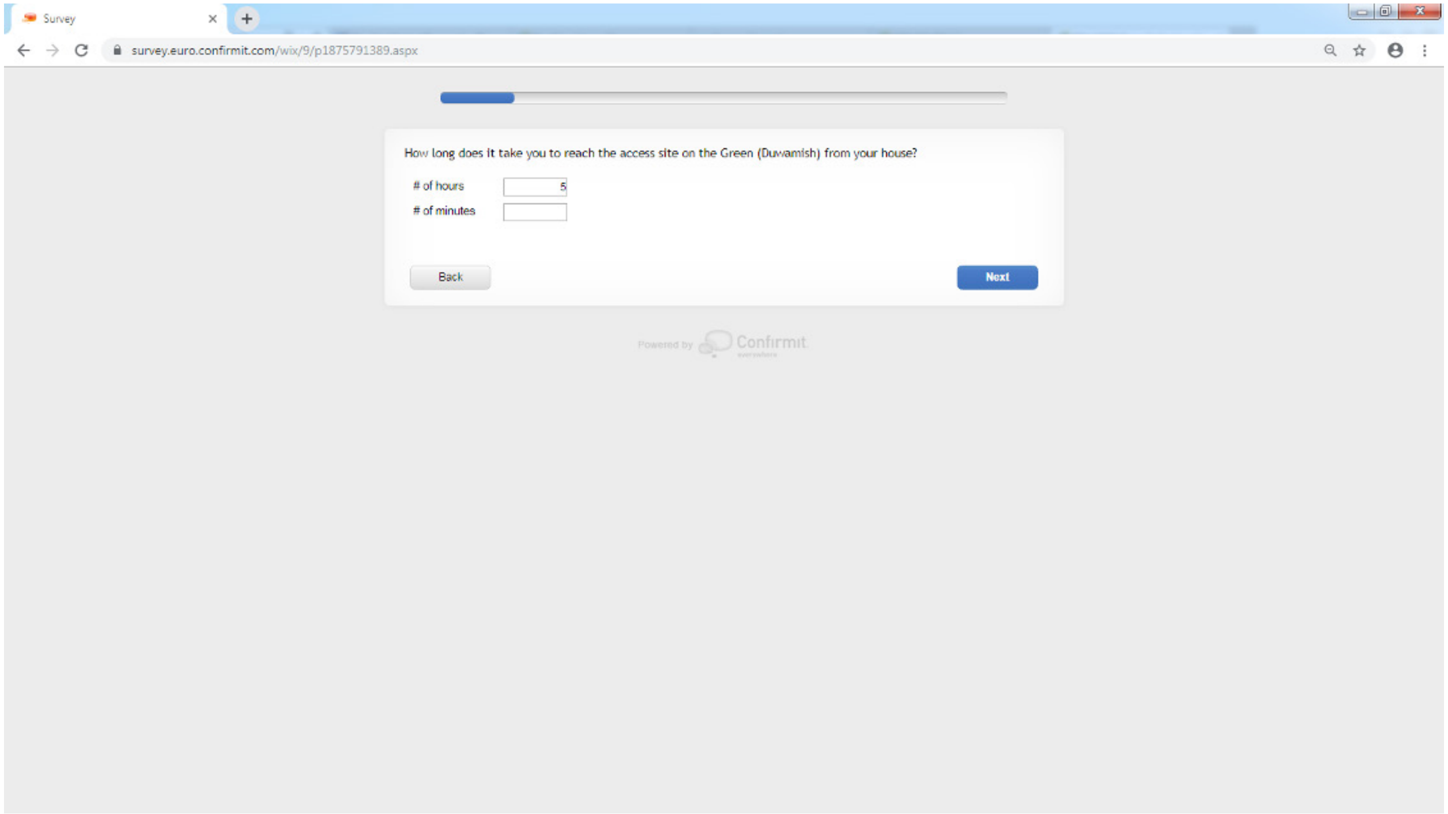
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How long does it take you to reach the access site on the Green (Duwamish) from your house?
# of hours
5
# of minutes
Back
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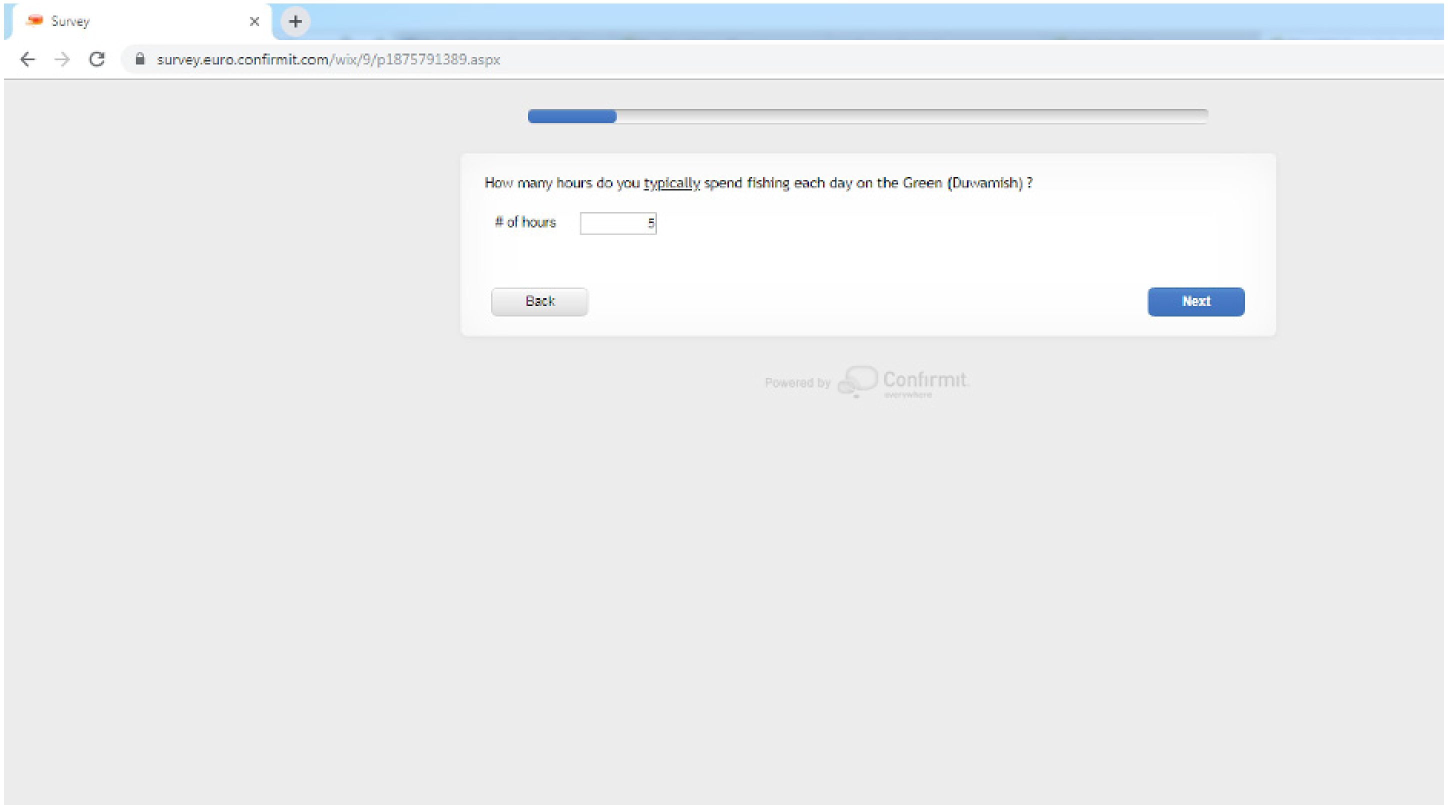
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many hours do you typically spend fishing each day on the Green (Duwamish) ?
# of hours
5
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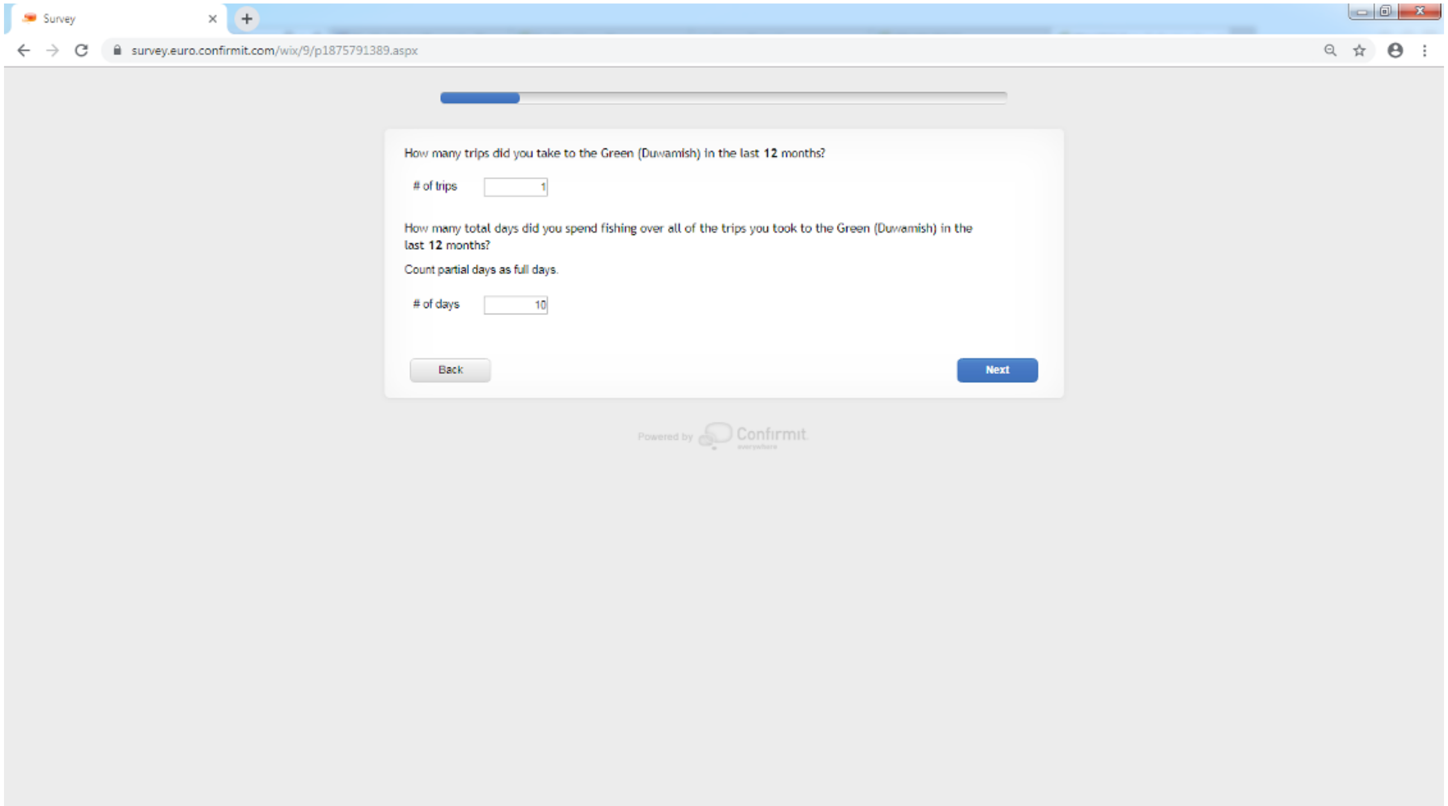
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many trips did you take to the Green (Duwamish) in the last **12** months?
# of trips
1
How many total days did you spend fishing over all of the trips you took to the Green (Duwamish) in the last **12** months?
Count partial days as full days.
# of days
10
Back
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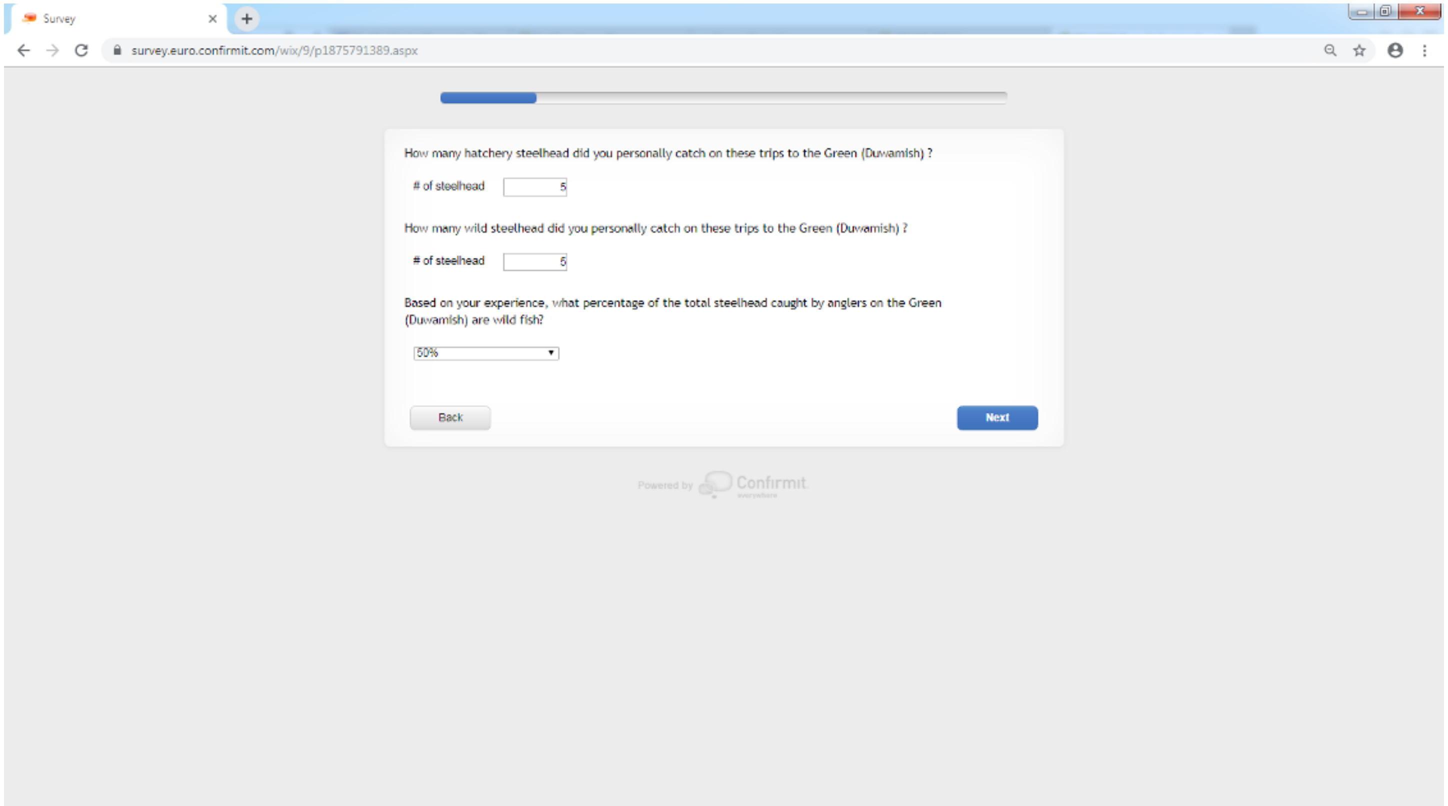
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many hatchery steelhead did you personally catch on these trips to the Green (Duwamish) ?
# of steelhead
5
How many wild steelhead did you personally catch on these trips to the Green (Duwamish) ?
# of steelhead
5
Based on your experience, what percentage of the total steelhead caught by anglers on the Green (Duwamish) are wild fish?
50%
Back
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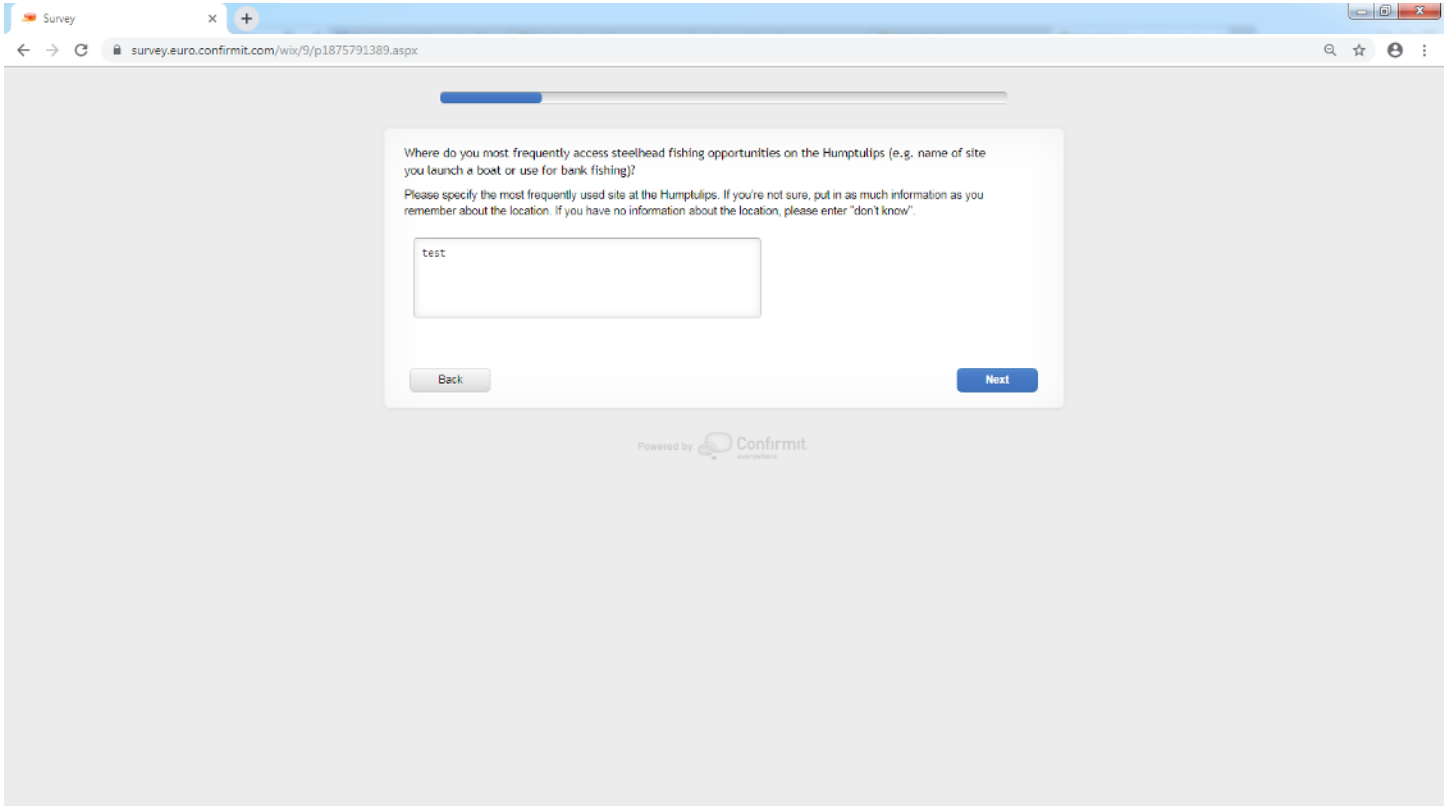
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Where do you most frequently access steelhead fishing opportunities on the Humptulips (e.g. name of site you launch a boat or use for bank fishing)?
Please specify the most frequently used site at the Humptulips. If you're not sure, put in as much information as you remember about the location. If you have no information about the location, please enter "don't know".
test
Back
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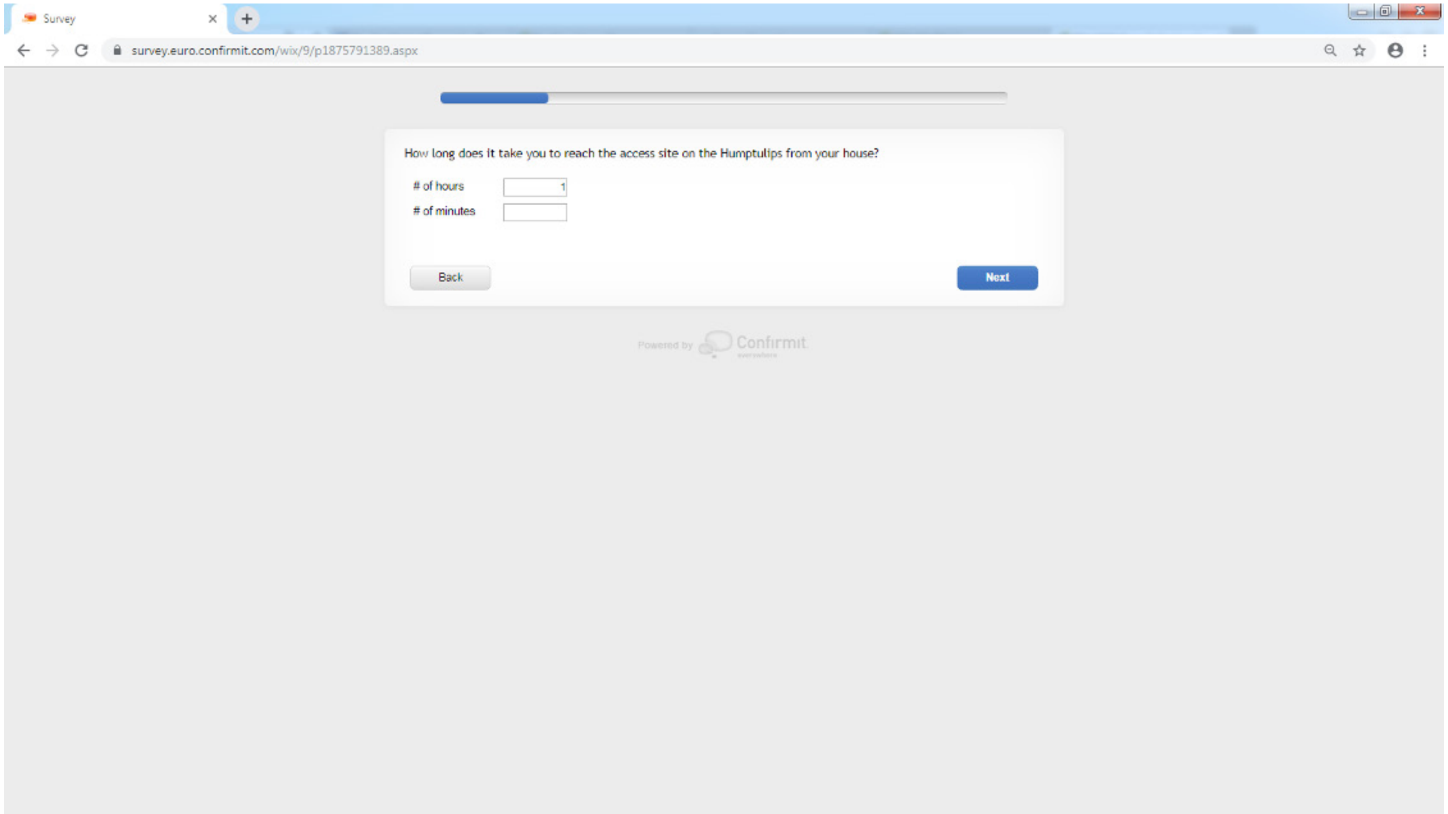
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How long does it take you to reach the access site on the Humptulips from your house?
# of hours
1
# of minutes
Back
Next
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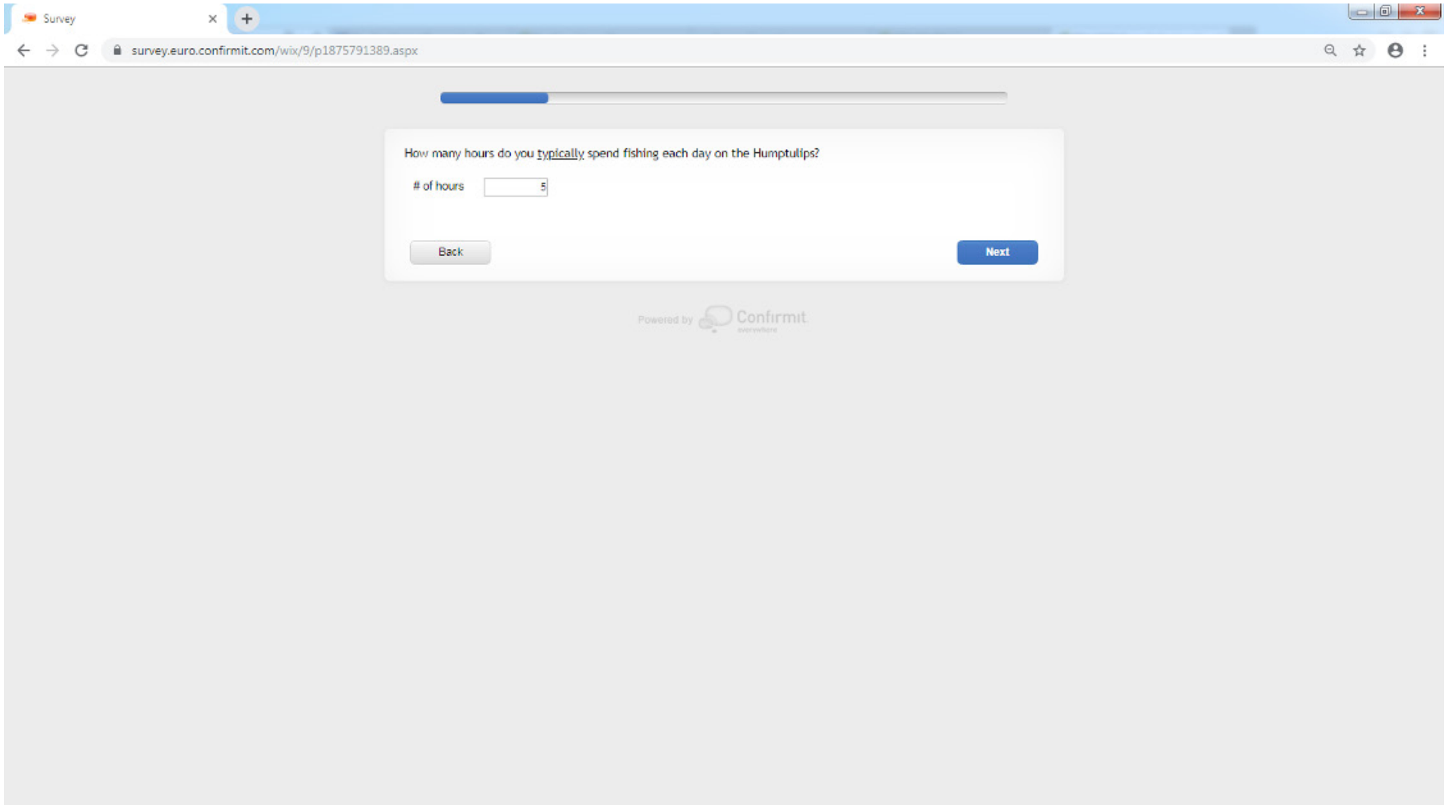
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many hours do you typically spend fishing each day on the Humptulips?
# of hours
5
Back
Next
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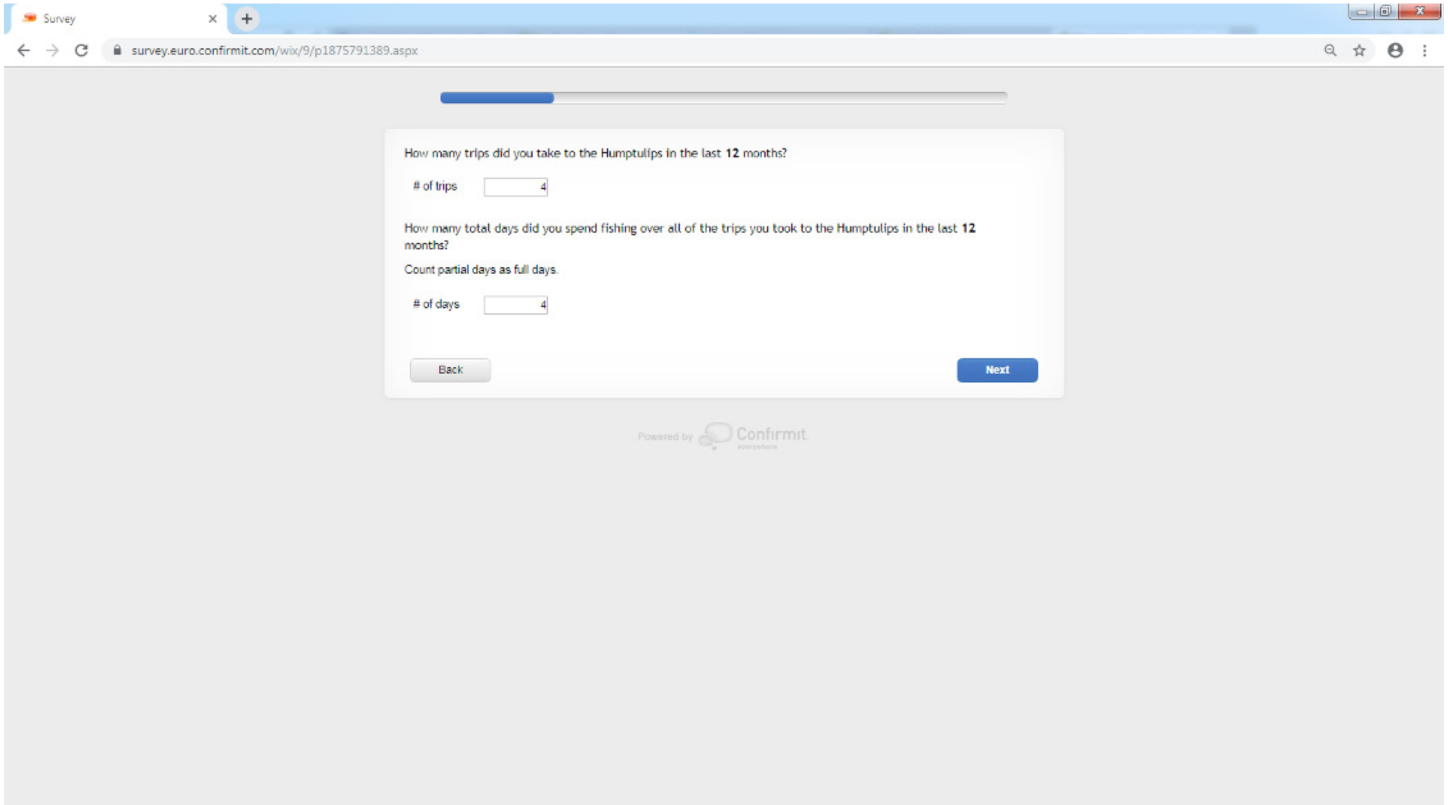
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many trips did you take to the Humptulips in the last 12 months?
# of trips
4
How many total days did you spend fishing over all of the trips you took to the Humptulips in the last 12 months?
Count partial days as full days.
# of days
4
Back
Next
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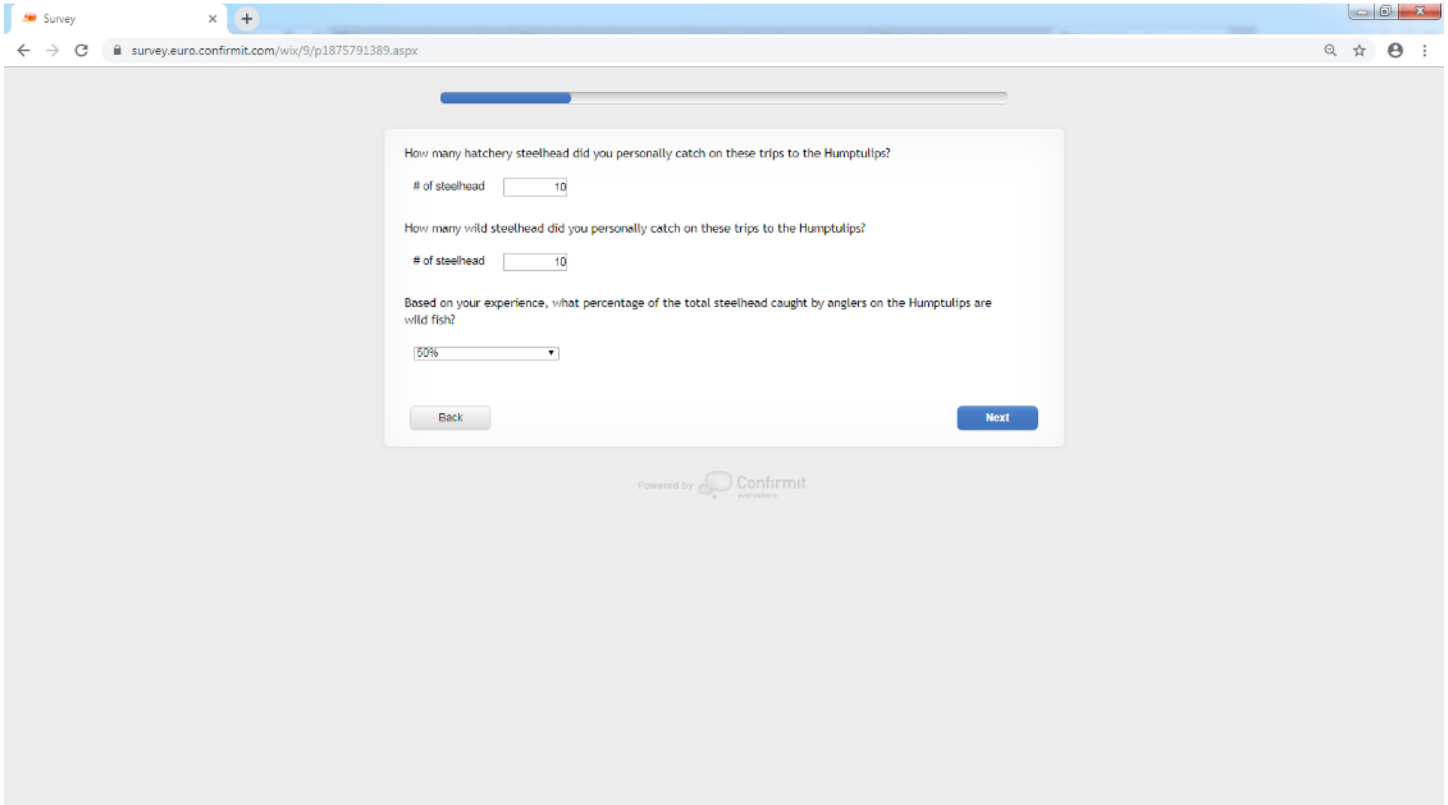
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many hatchery steelhead did you personally catch on these trips to the Humptulips?
# of steelhead
10
How many wild steelhead did you personally catch on these trips to the Humptulips?
# of steelhead
10
Based on your experience, what percentage of the total steelhead caught by anglers on the Humptulips are wild fish?
50%
Back
Next
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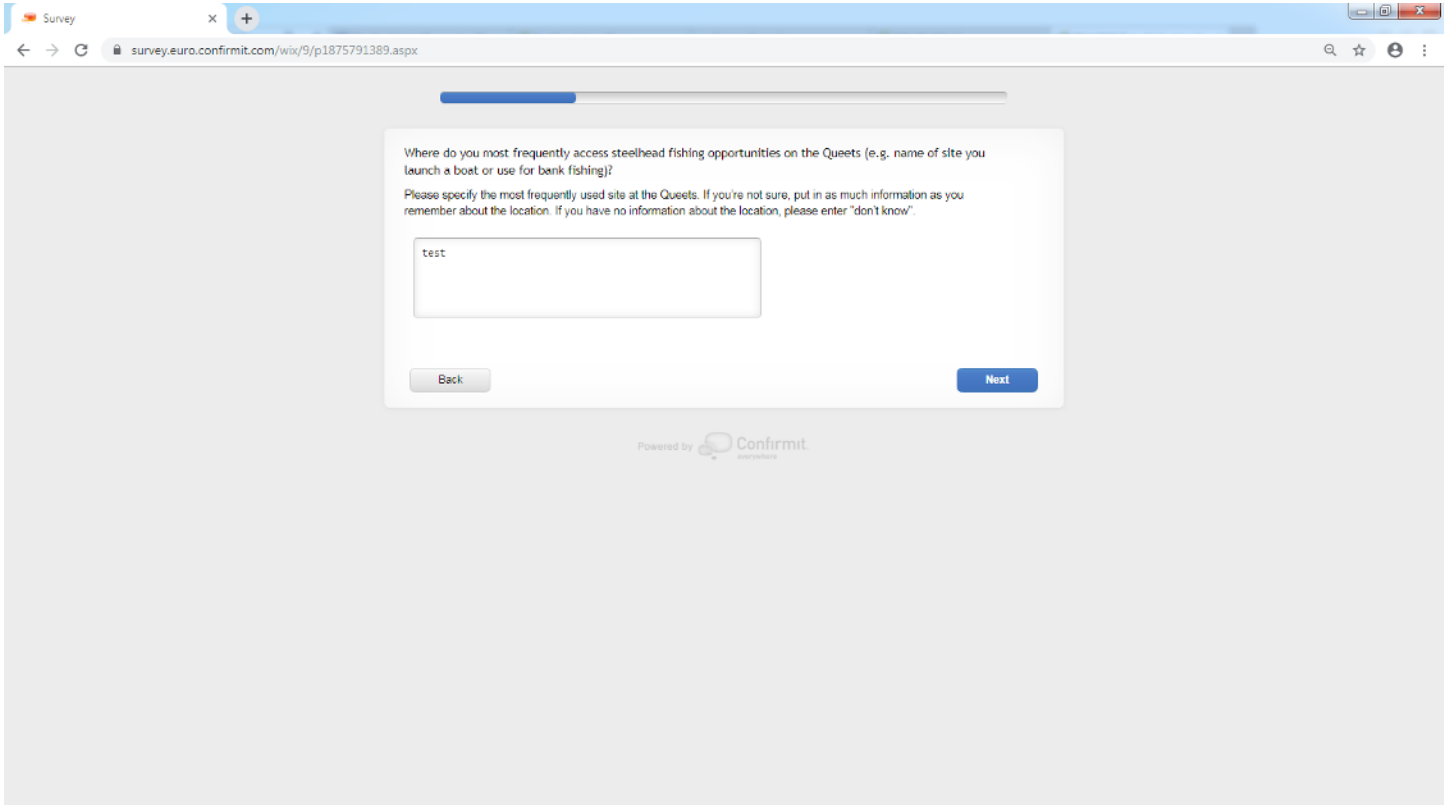
Confirmit


Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Where do you most frequently access steelhead fishing opportunities on the Queets (e.g. name of site you launch a boat or use for bank fishing)?
Please specify the most frequently used site at the Queets. If you're not sure, put in as much information as you remember about the location. If you have no information about the location, please enter "don't know".
test
Back
Next
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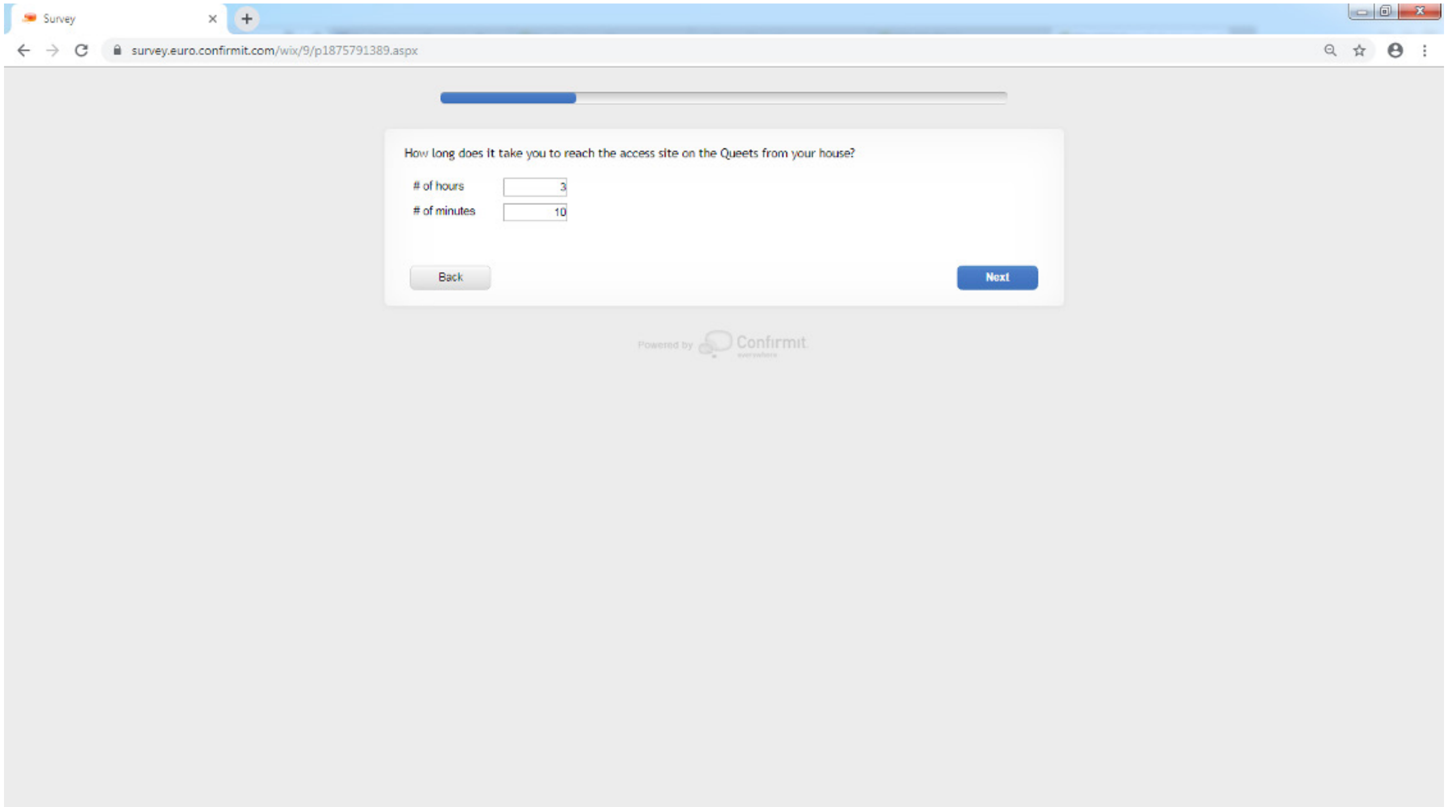
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How long does it take you to reach the access site on the Queets from your house?
# of hours
3
# of minutes
10
Back
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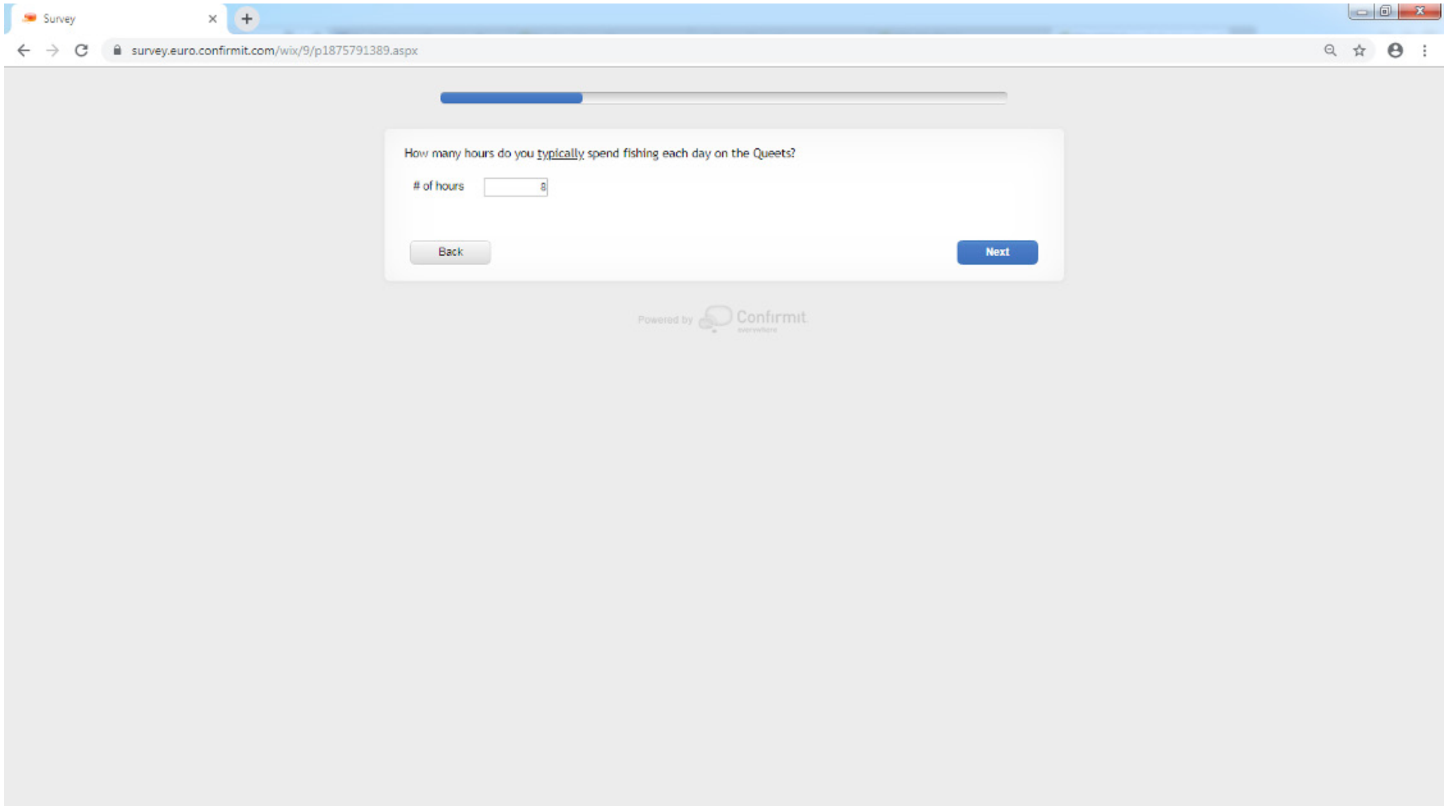
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many hours do you typically spend fishing each day on the Queets?
# of hours
8
Back
Next
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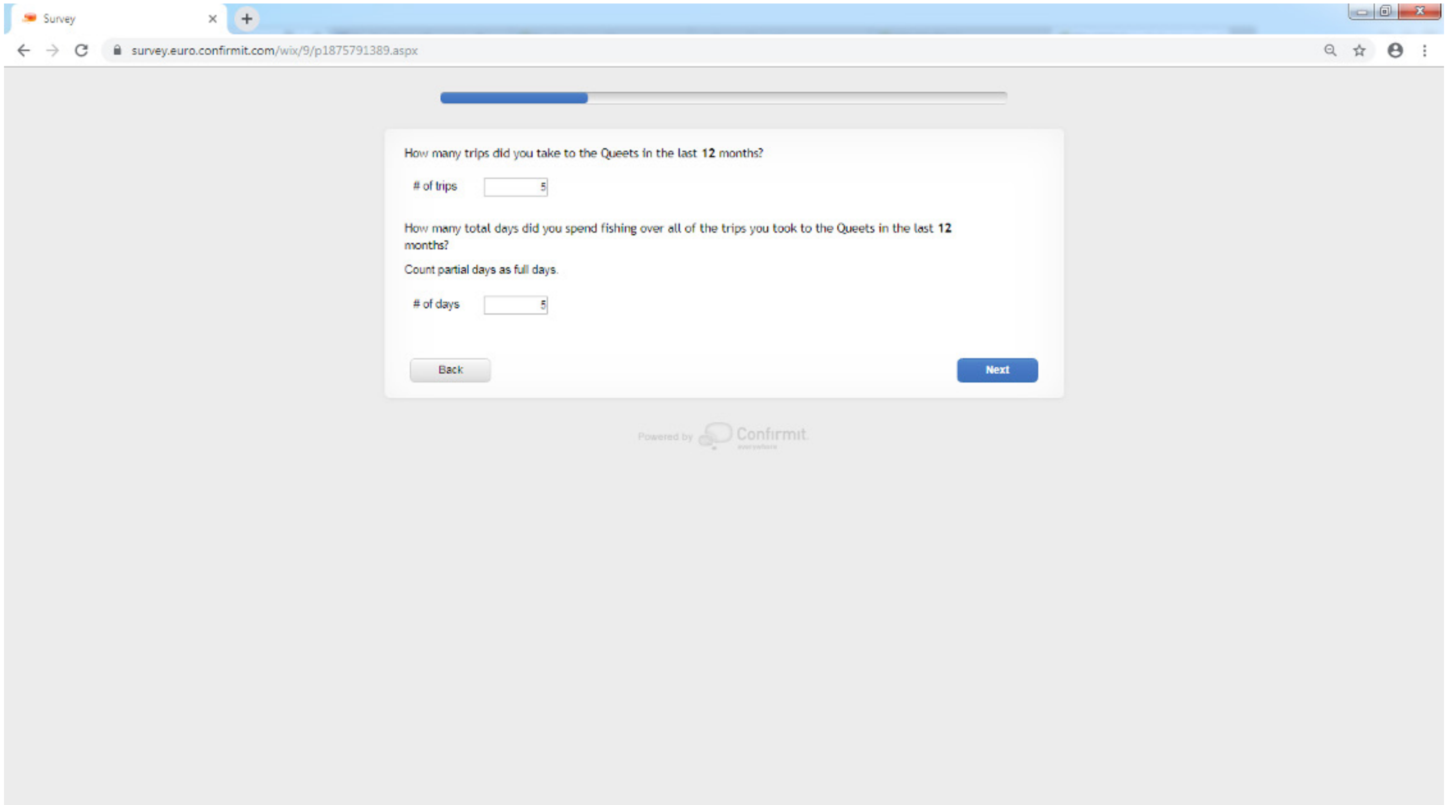
Confirmit


Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many trips did you take to the Queets in the last 12 months?
# of trips
5
How many total days did you spend fishing over all of the trips you took to the Queets in the last 12 months?
Count partial days as full days.
# of days
5
Back
Next
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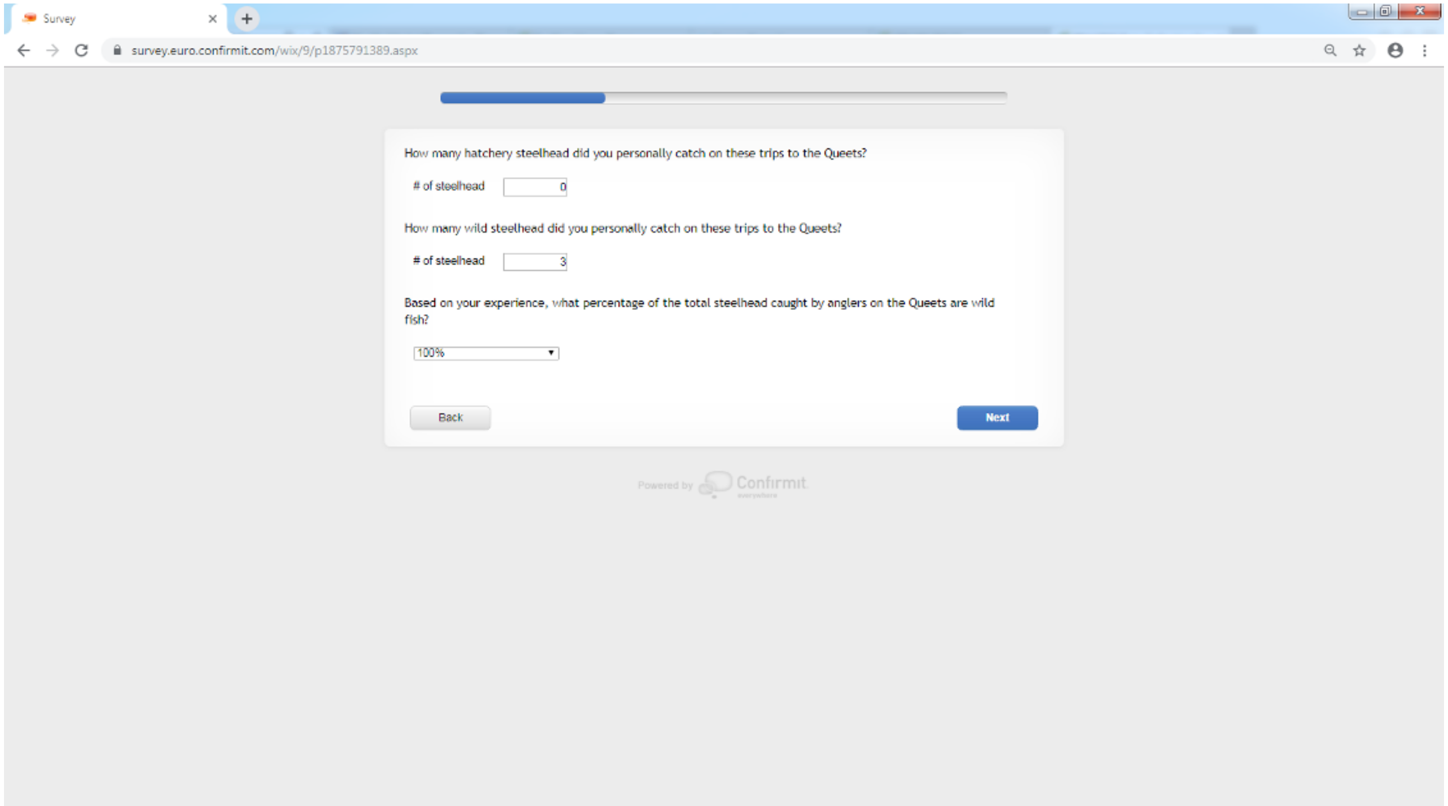
Survey
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How many hatchery steelhead did you personally catch on these trips to the Queets?
# of steelhead
0
How many wild steelhead did you personally catch on these trips to the Queets?
# of steelhead
3
Based on your experience, what percentage of the total steelhead caught by anglers on the Queets are wild fish?
100%
Back
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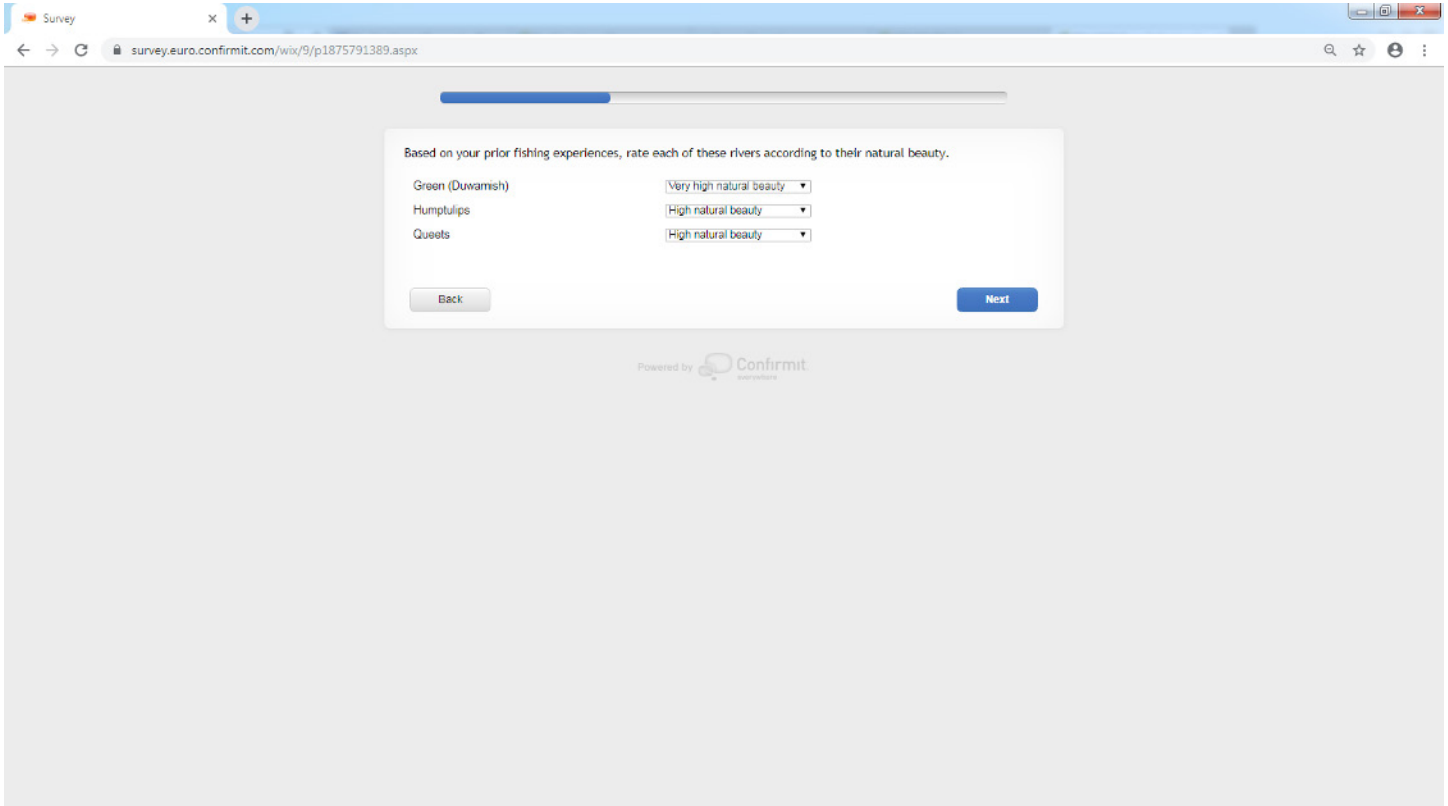
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Based on your prior fishing experiences, rate each of these rivers according to their natural beauty.
Green (Duwamish)
Very high natural beauty
Humptulips
High natural beauty
Queets
High natural beauty
Back
Next
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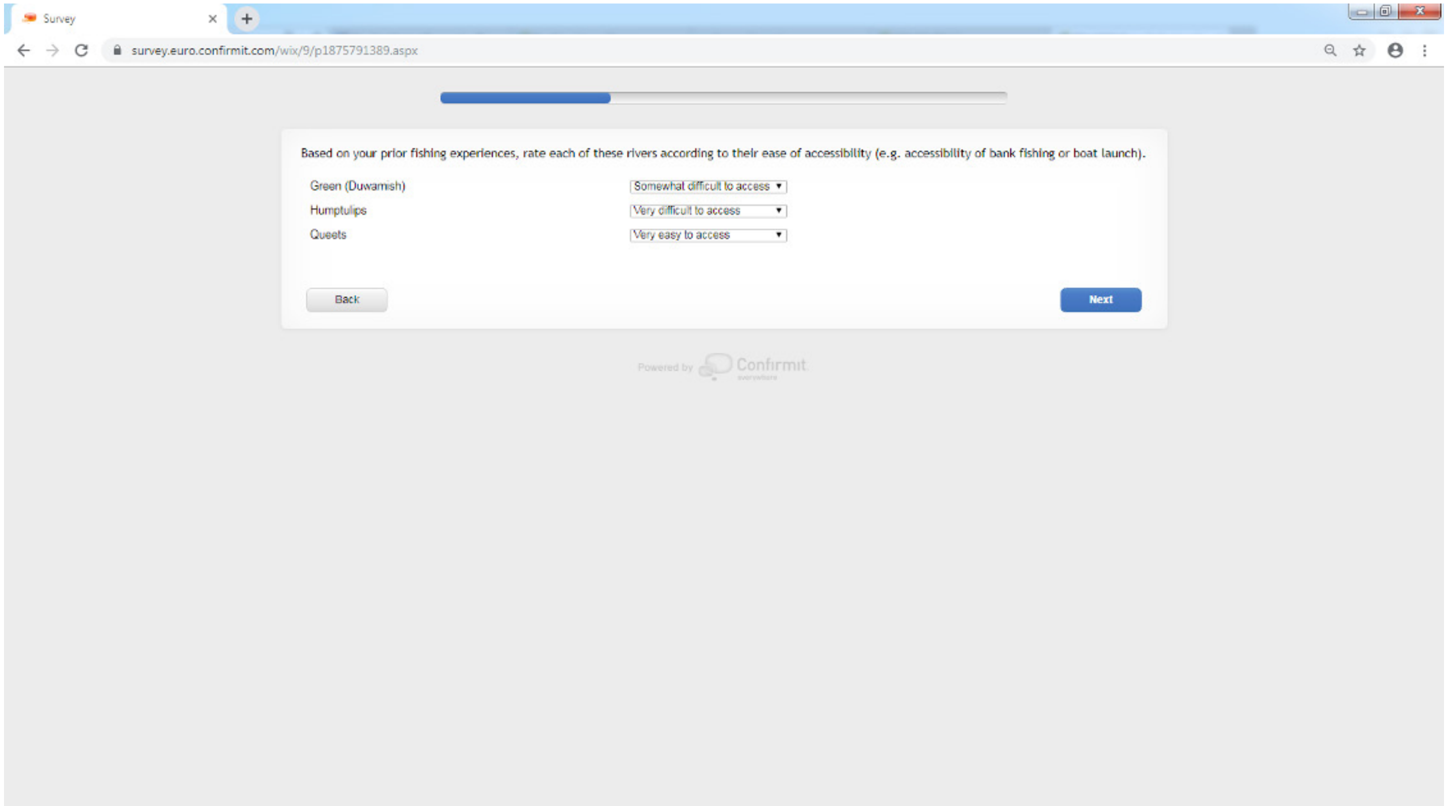
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Based on your prior fishing experiences, rate each of these rivers according to their ease of accessibility (e.g. accessibility of bank fishing or boat launch).
Green (Duwamish)
Somewhat difficult to access
Humptulips
Very difficult to access
Queets
Very easy to access
Back
Next
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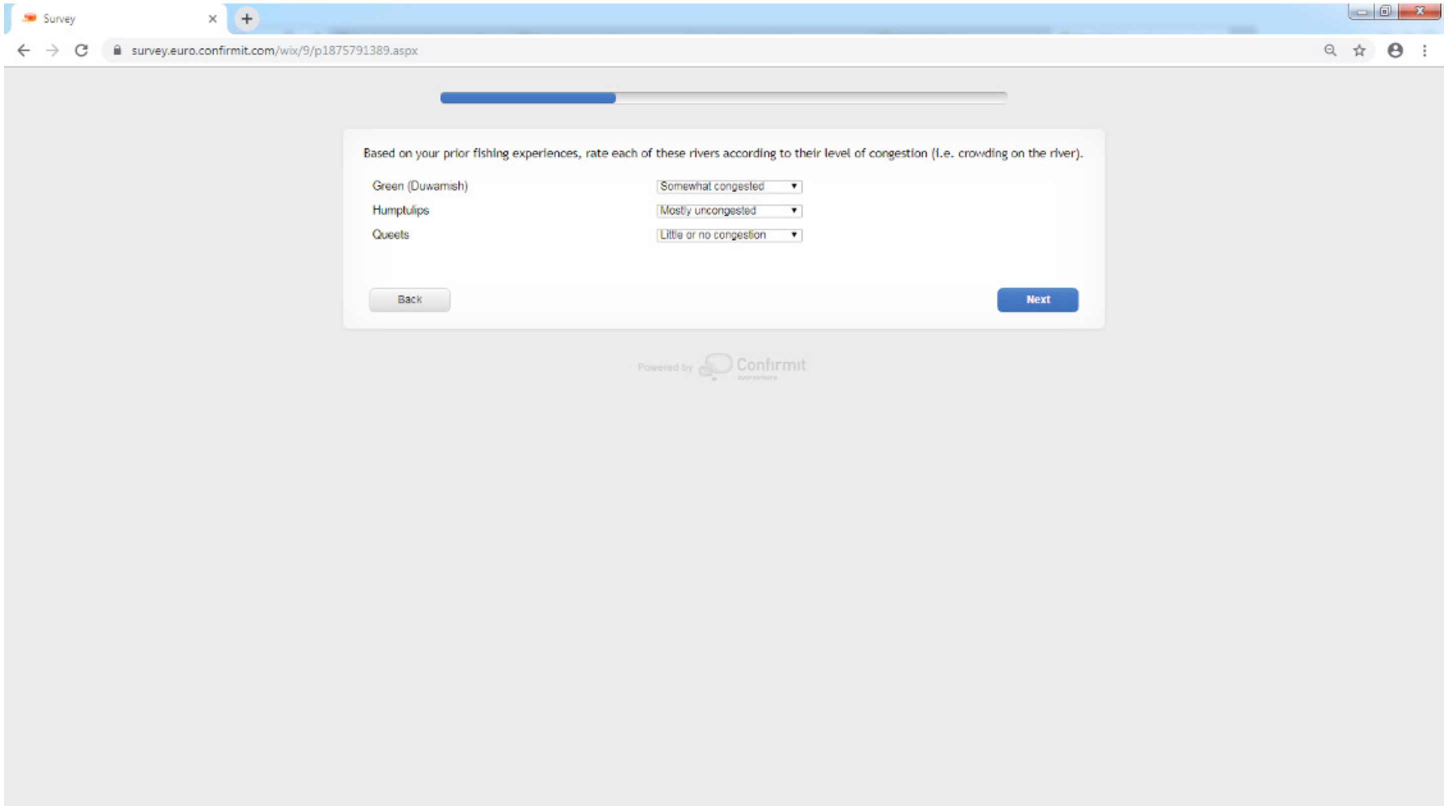
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Based on your prior fishing experiences, rate each of these rivers according to their level of congestion (i.e. crowding on the river).
Green (Duwamish)
Somewhat congested
Humptulips
Mostly uncongested
Queets
Little or no congestion
Back
Next
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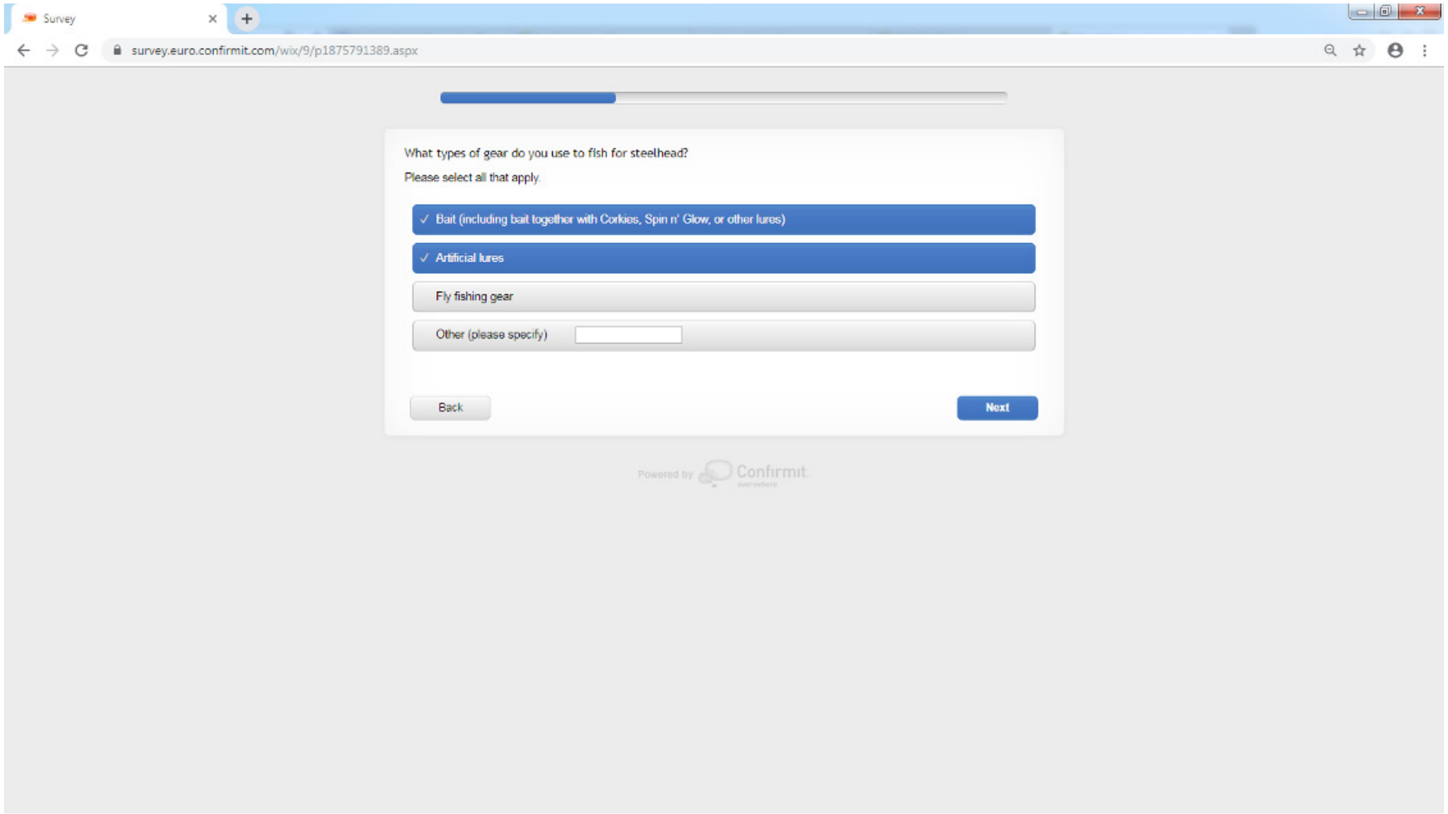
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
What types of gear do you use to fish for steelhead?
Please select all that apply.
✓ Bait (including bait together with Corkies, Spin n' Glow, or other lures)
✓ Artificial lures
Fly fishing gear
Other (please specify)
Back
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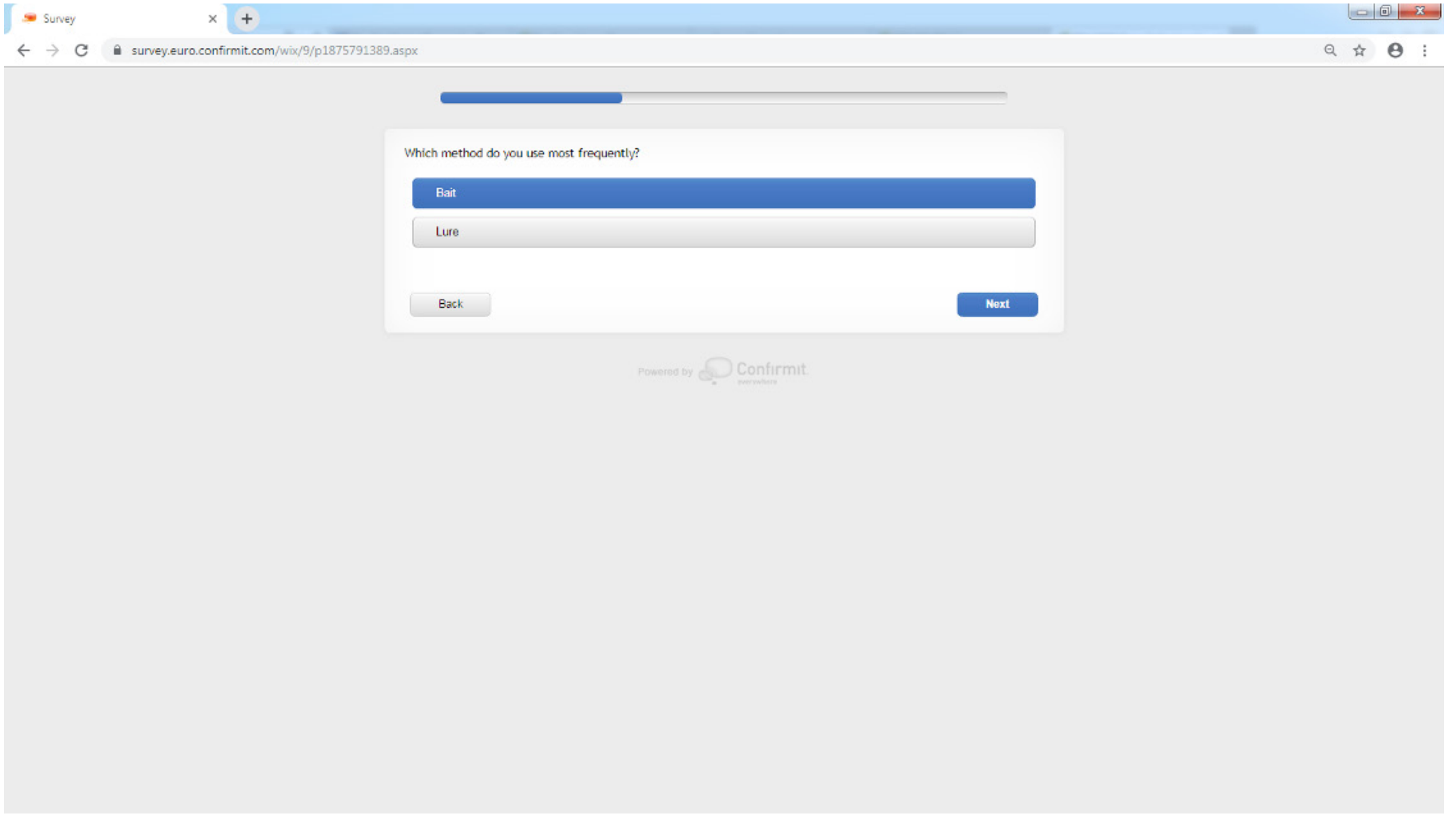
Survey
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Which method do you use most frequently?
Bait
Lure
Back
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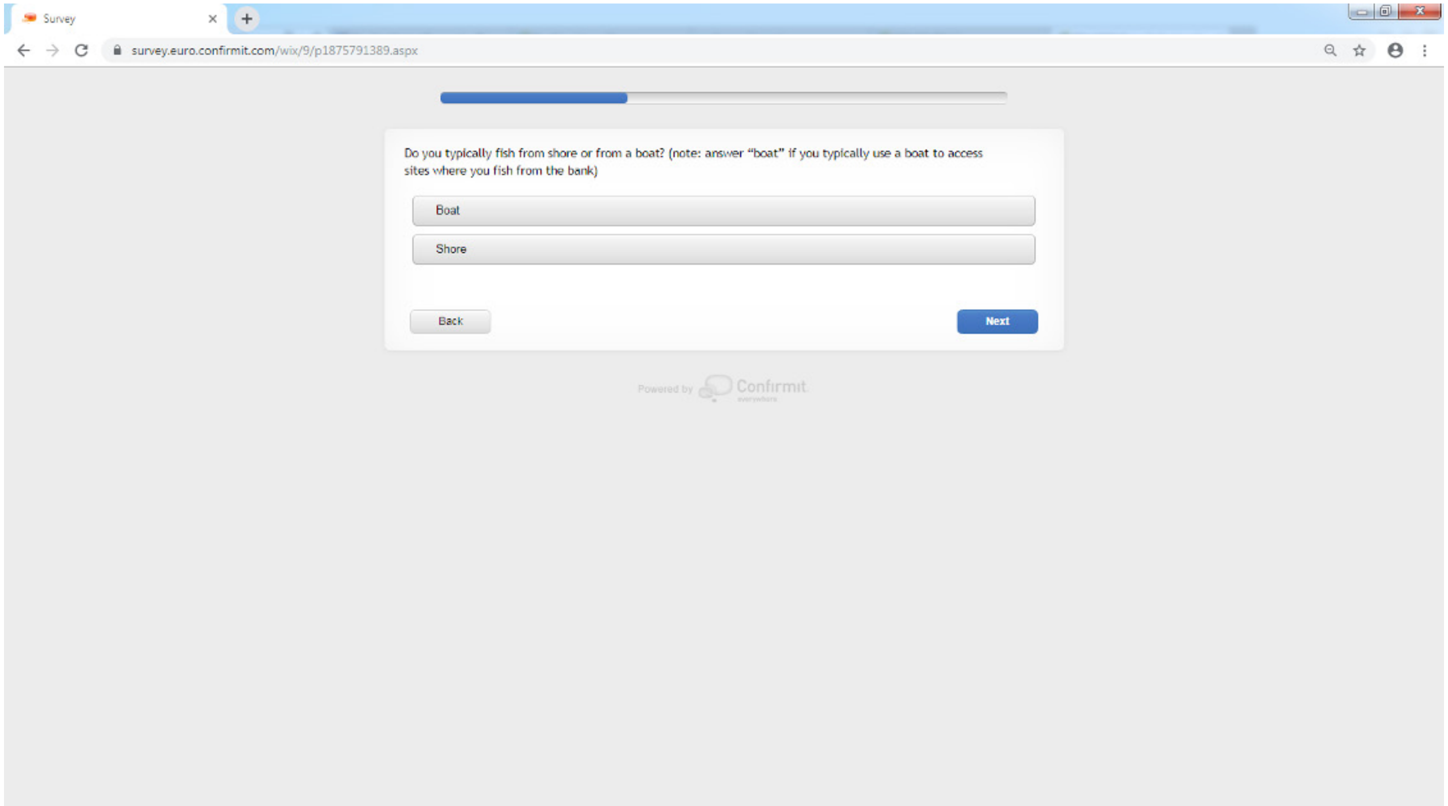
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Do you typically fish from shore or from a boat? (note: answer “boat” if you typically use a boat to access sites where you fish from the bank)
Boat
Shore
Back
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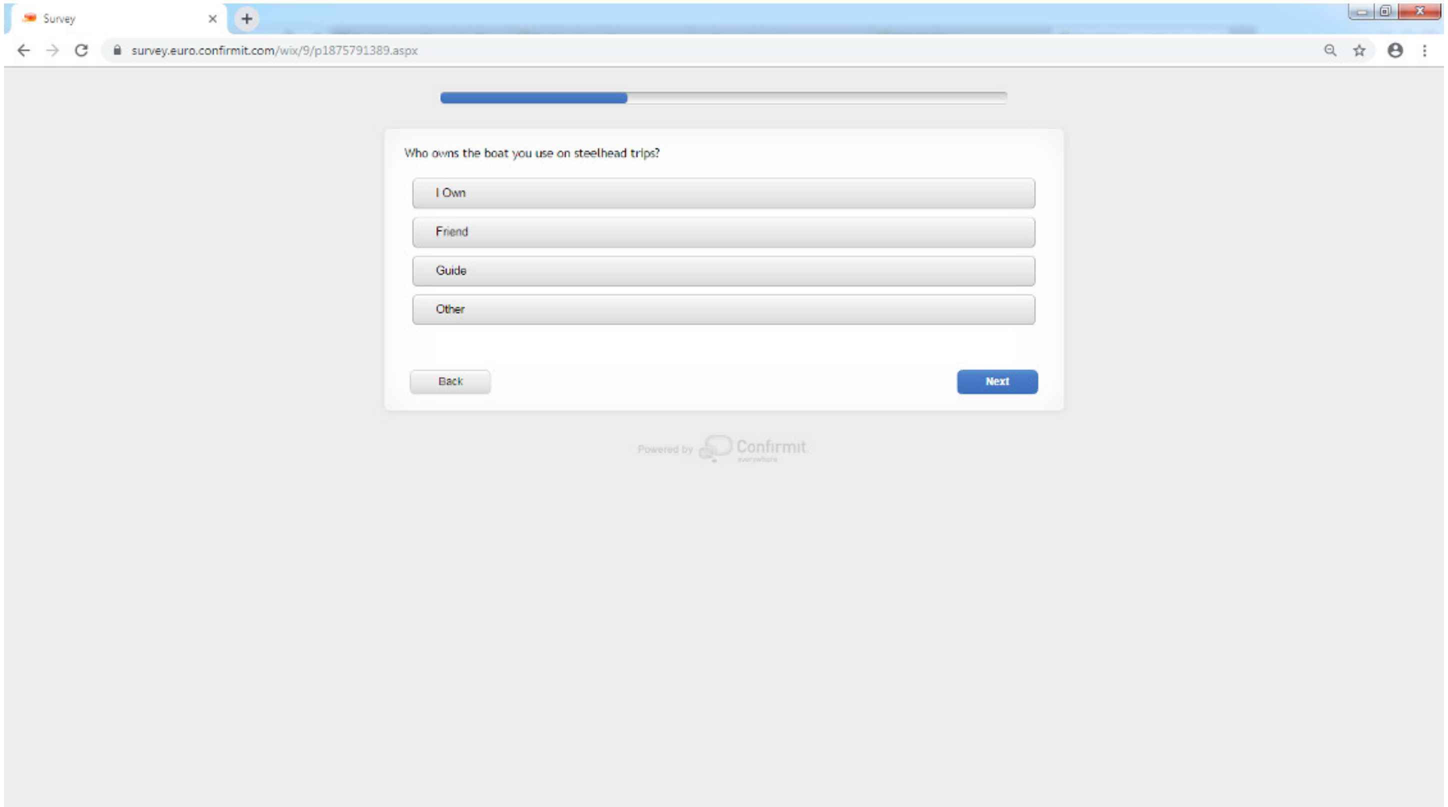
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Who owns the boat you use on steelhead trips?
I Own
Friend
Guide
Other
Back
Next
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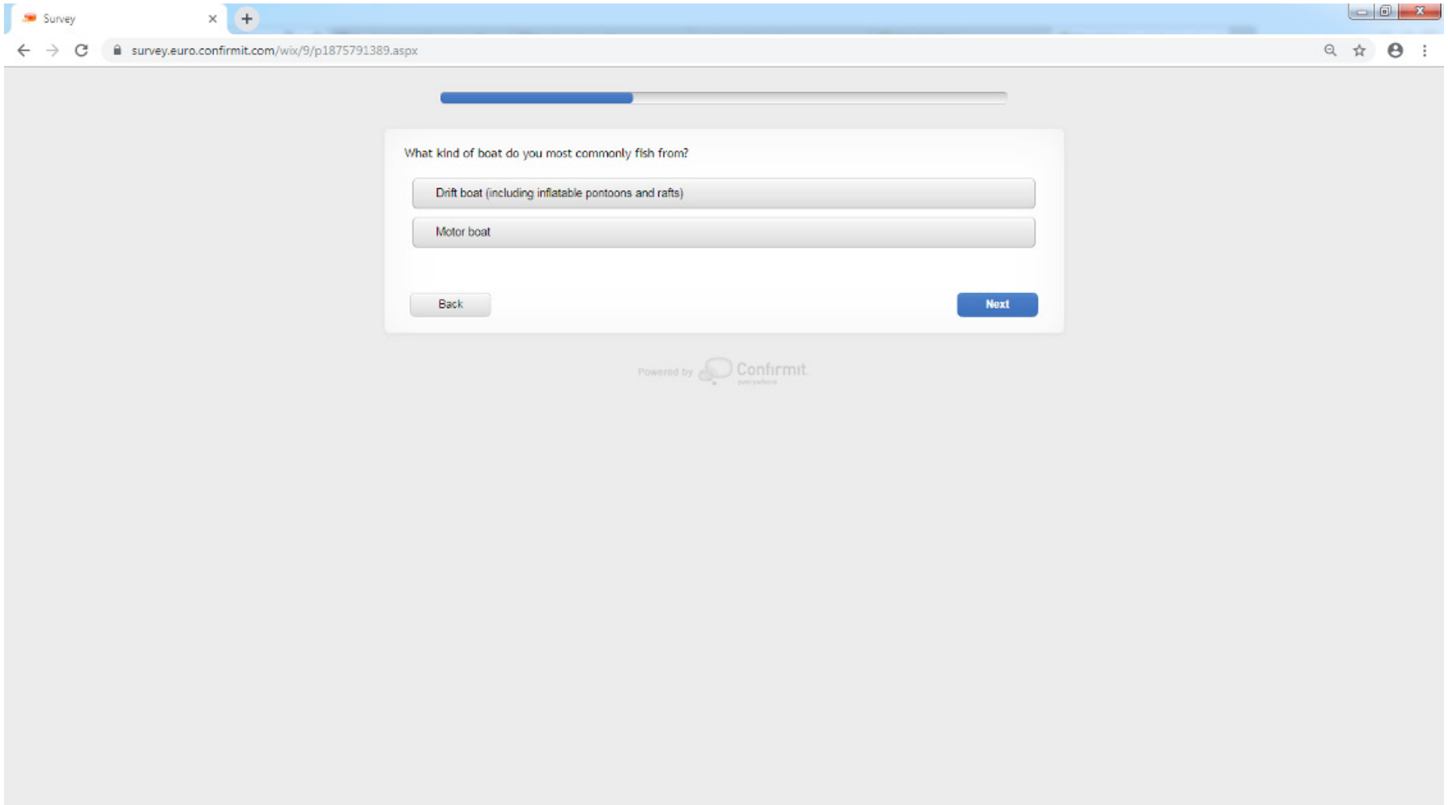
Survey
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What kind of boat do you most commonly fish from?
Drift boat (including inflatable pontoons and rafts)
Motor boat
Back
Next
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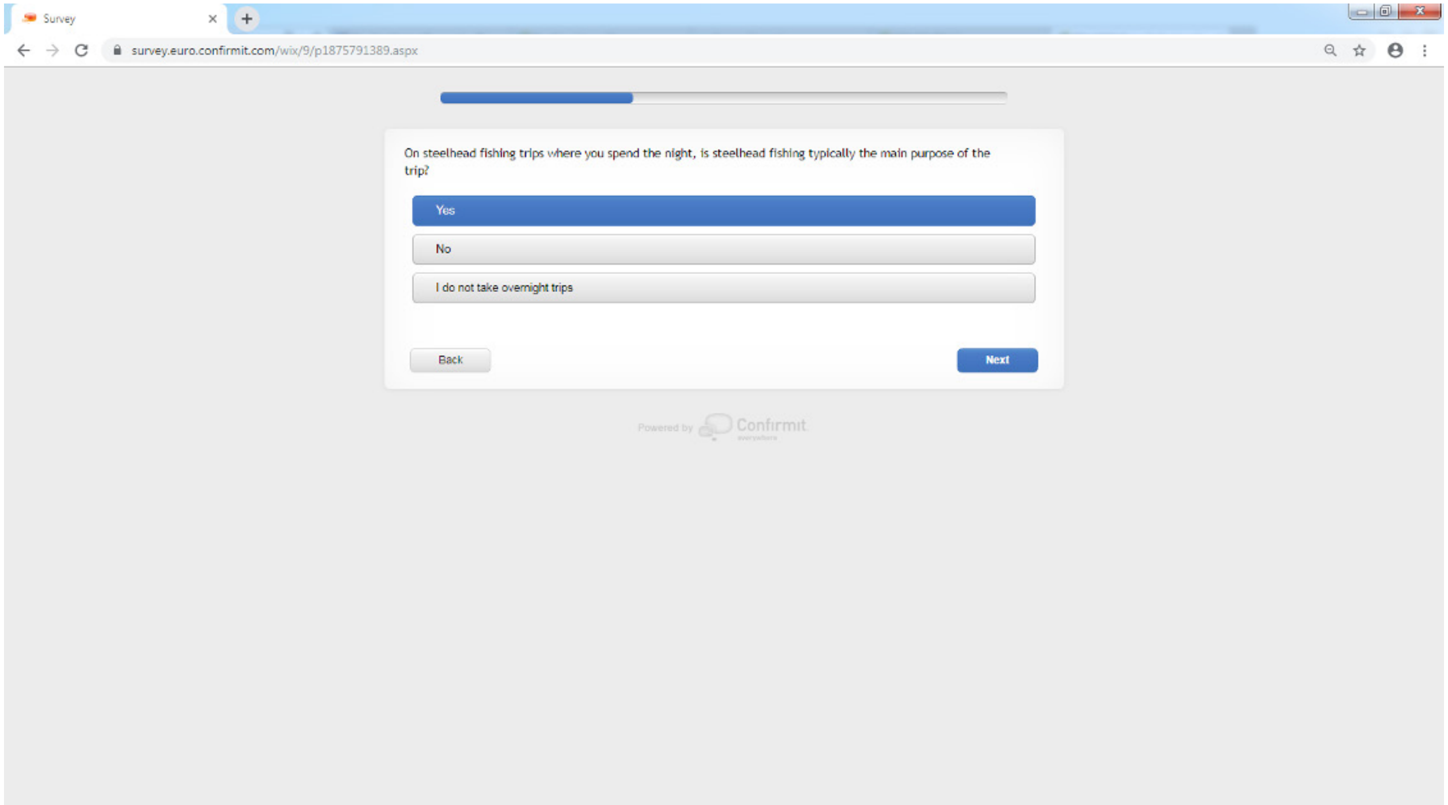
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
On steelhead fishing trips where you spend the night, is steelhead fishing typically the main purpose of the trip?
Yes
No
I do not take overnight trips
Back
Next
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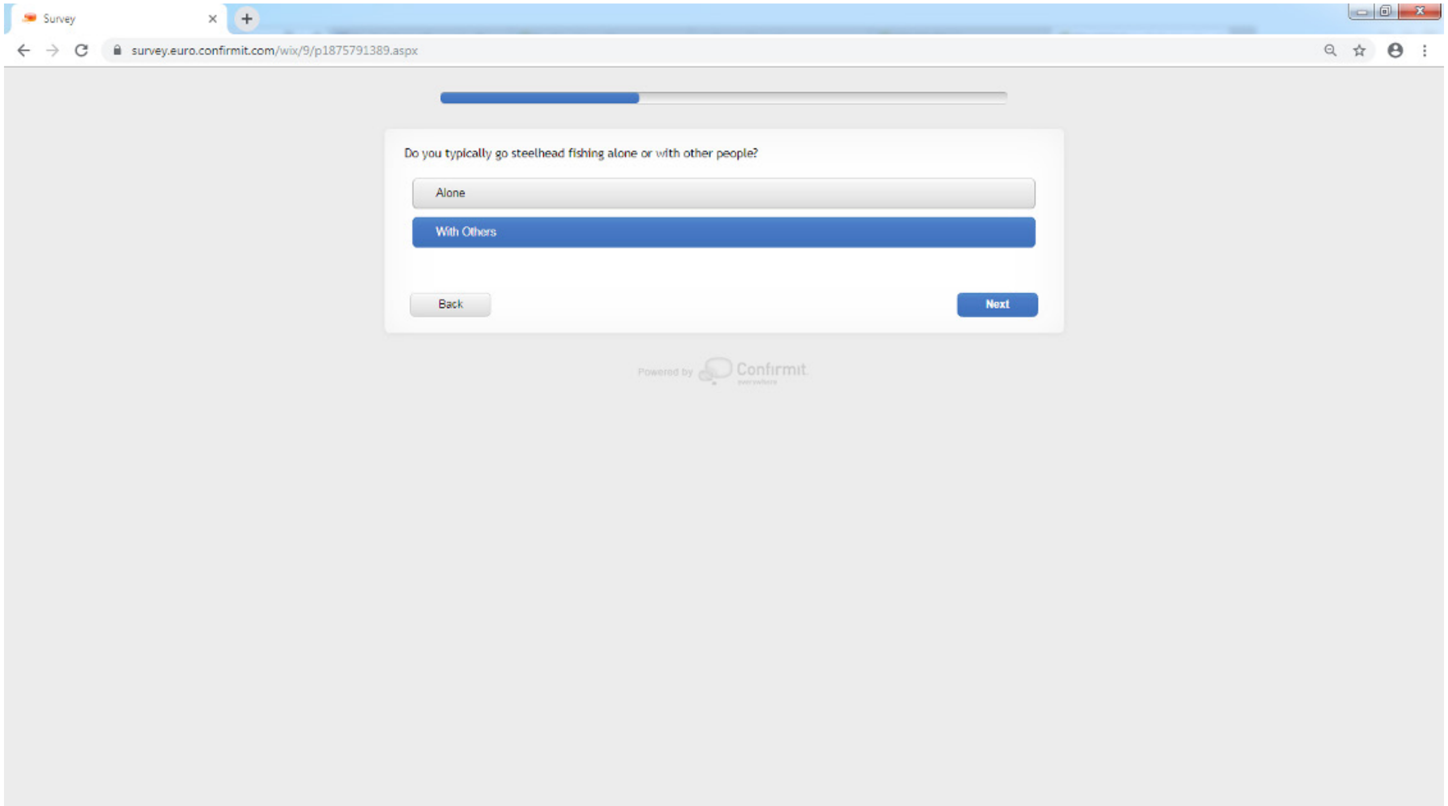
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Do you typically go steelhead fishing alone or with other people?
Alone
With Others
Back
Next
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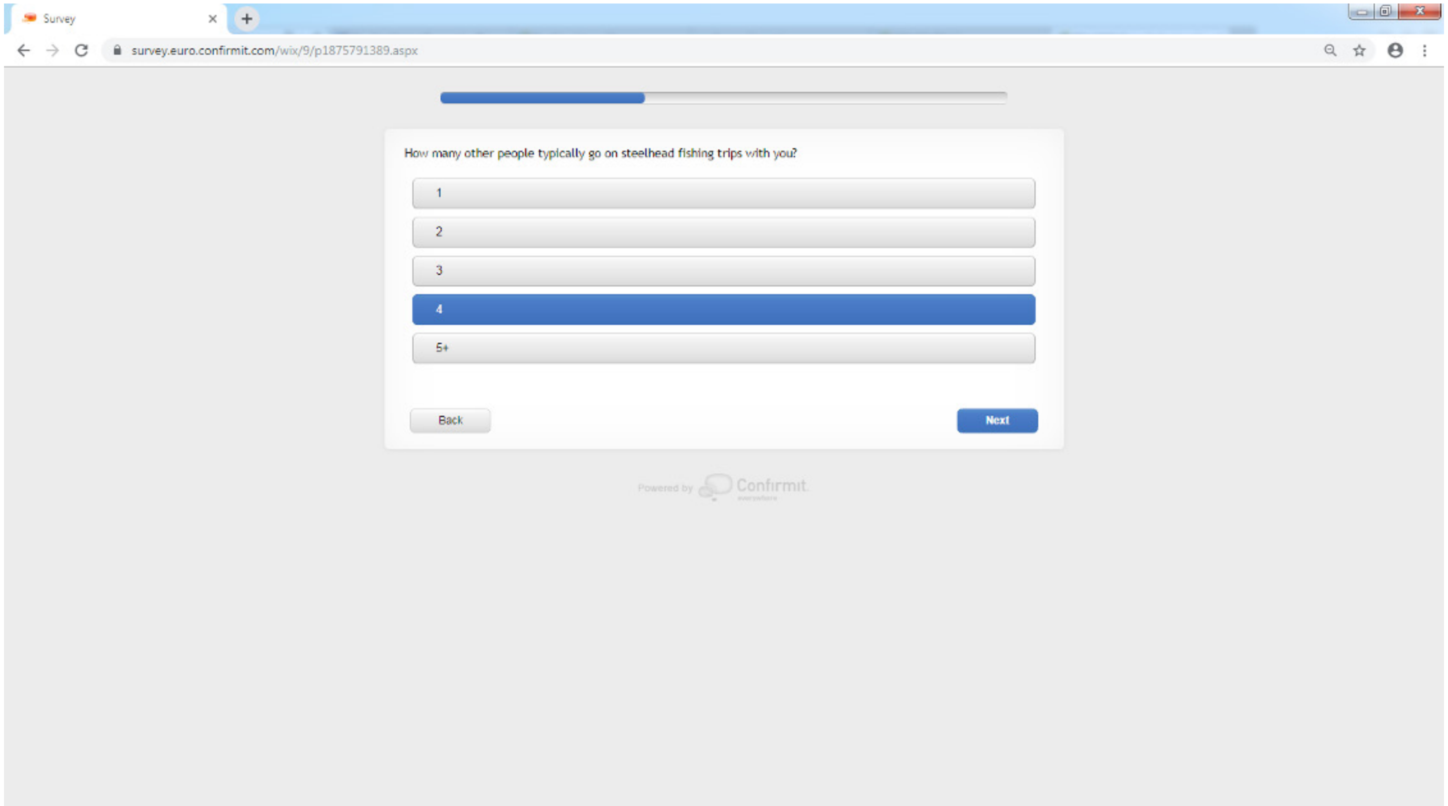
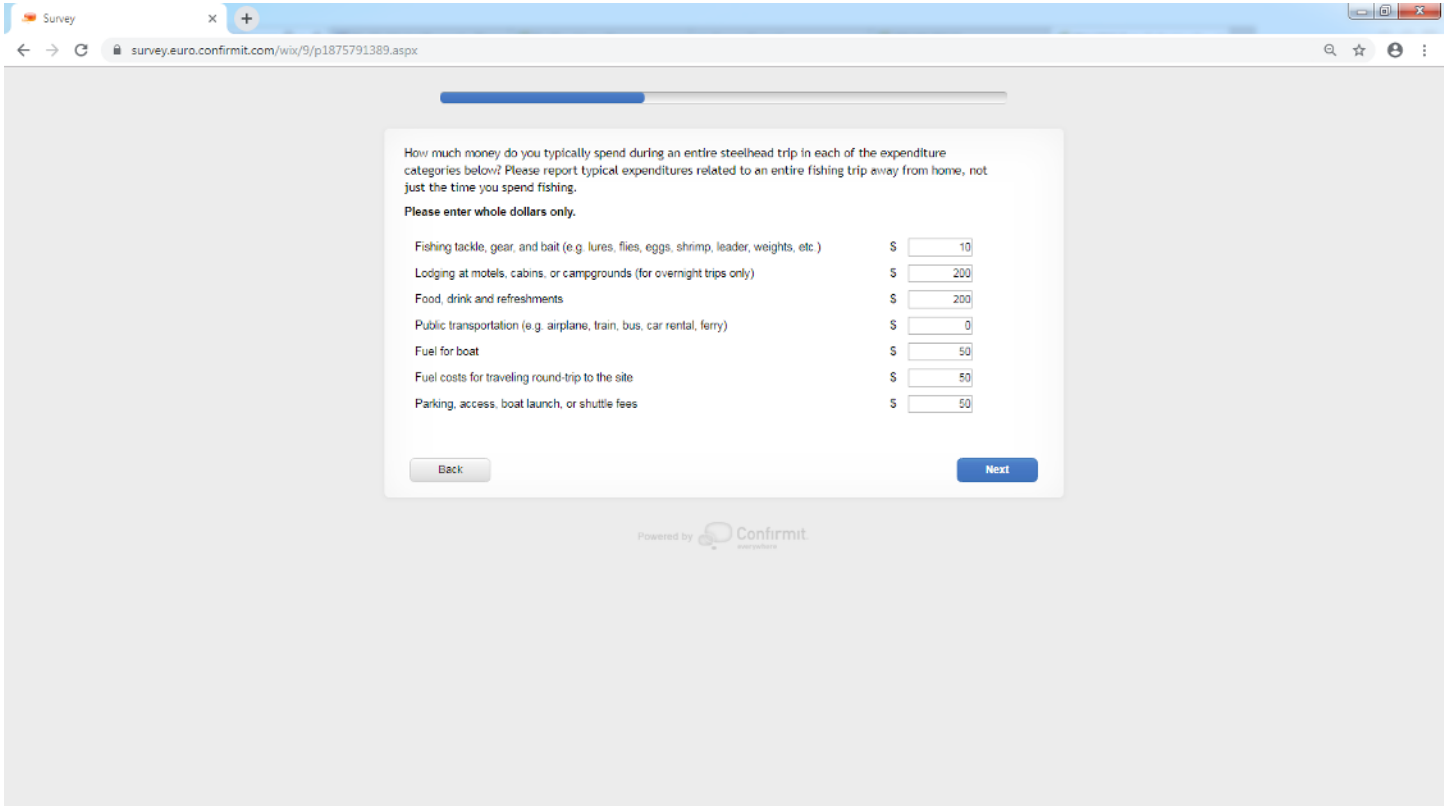

Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How many other people typically go on steelhead fishing trips with you?
1
2
3
4
5+
Back
Next
Confirmit

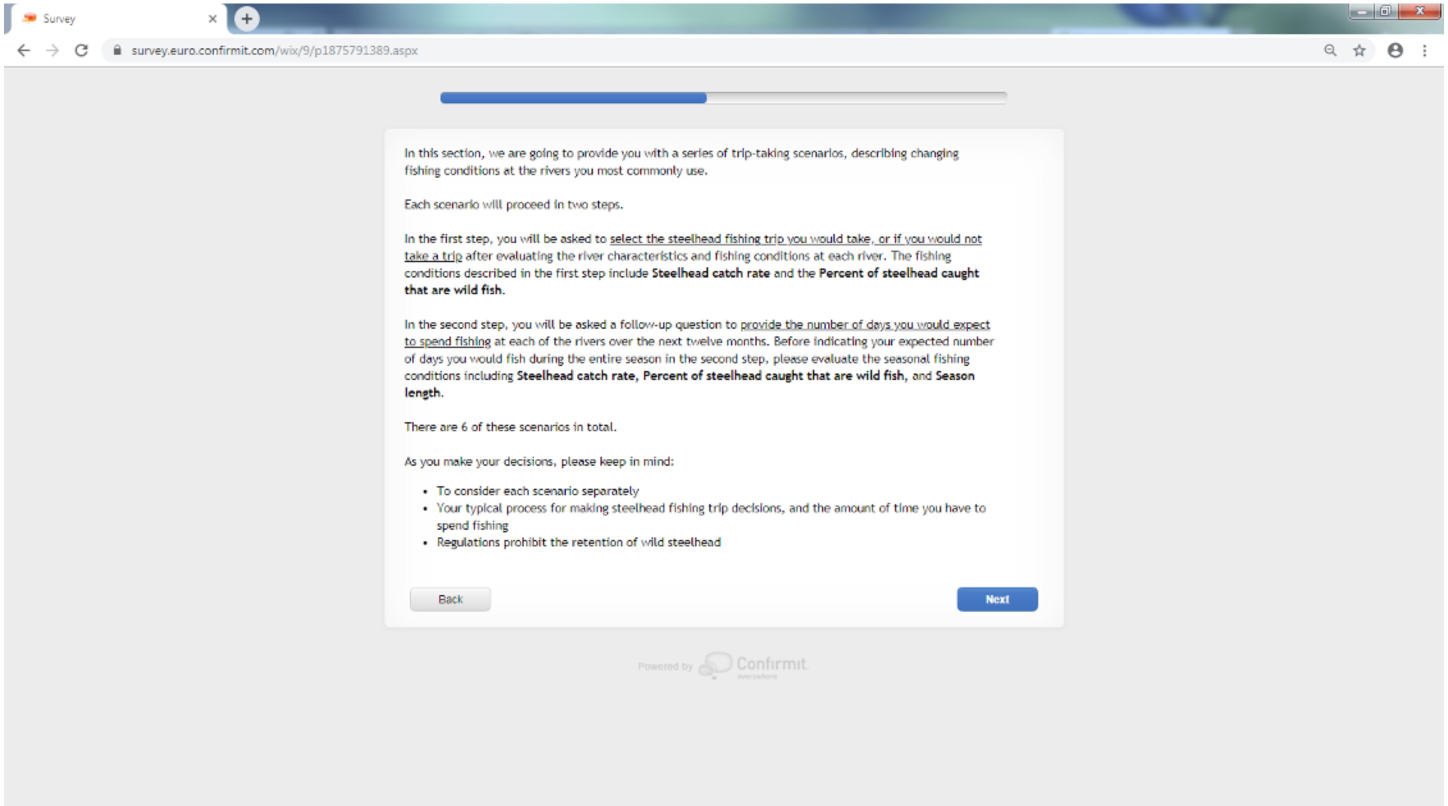


How much money do you typically spend during an entire steelhead trip in each of the expenditure categories below? Please report typical expenditures related to an entire fishing trip away from home, not just the time you spend fishing.

Please enter whole dollars only.

Fishing tackle, gear, and bait (e.g. lures, flies, eggs, shrimp, leader, weights, etc.)	$	10
Lodging at motels, cabins, or campgrounds (for overnight trips only)	$	200
Food, drink and refreshments	$	200
Public transportation (e.g. airplane, train, bus, car rental, ferry)	$	0
Fuel for boat	$	50
Fuel costs for traveling round-trip to the site	$	50
Parking, access, boat launch, or shuttle fees	$	50

Back Next


Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
In this section, we are going to provide you with a series of trip-taking scenarios, describing changing fishing conditions at the rivers you most commonly use.
Each scenario will proceed in two steps.
In the first step, you will be asked to select the steelhead fishing trip you would take, or if you would not take a trip after evaluating the river characteristics and fishing conditions at each river. The fishing conditions described in the first step include Steelhead catch rate and the Percent of steelhead caught that are wild fish.
In the second step, you will be asked a follow-up question to provide the number of days you would expect to spend fishing at each of the rivers over the next twelve months. Before indicating your expected number of days you would fish during the entire season in the second step, please evaluate the seasonal fishing conditions including Steelhead catch rate, Percent of steelhead caught that are wild fish, and Season length.
There are 6 of these scenarios in total.
As you make your decisions, please keep in mind:
• To consider each scenario separately
• Your typical process for making steelhead fishing trip decisions, and the amount of time you have to spend fishing
• Regulations prohibit the retention of wild steelhead
Back
Next
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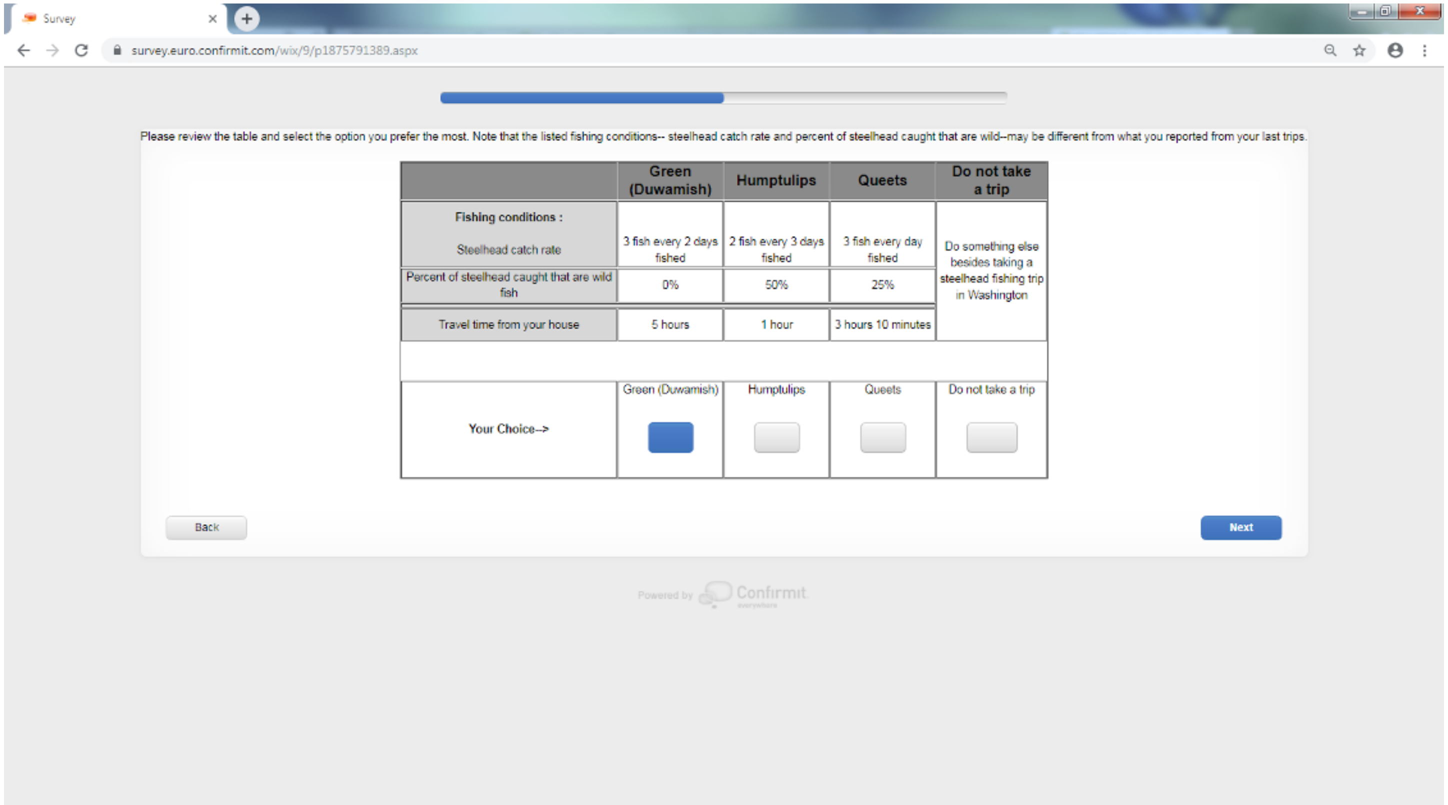

Survey

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Please review the table and select the option you prefer the most. Note that the listed fishing conditions-- steelhead catch rate and percent of steelhead caught that are wild--may be different from what you reported from your last trips.

	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	3 fish every 2 days fished	2 fish every 3 days fished	3 fish every day fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	0%	50%	25%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip

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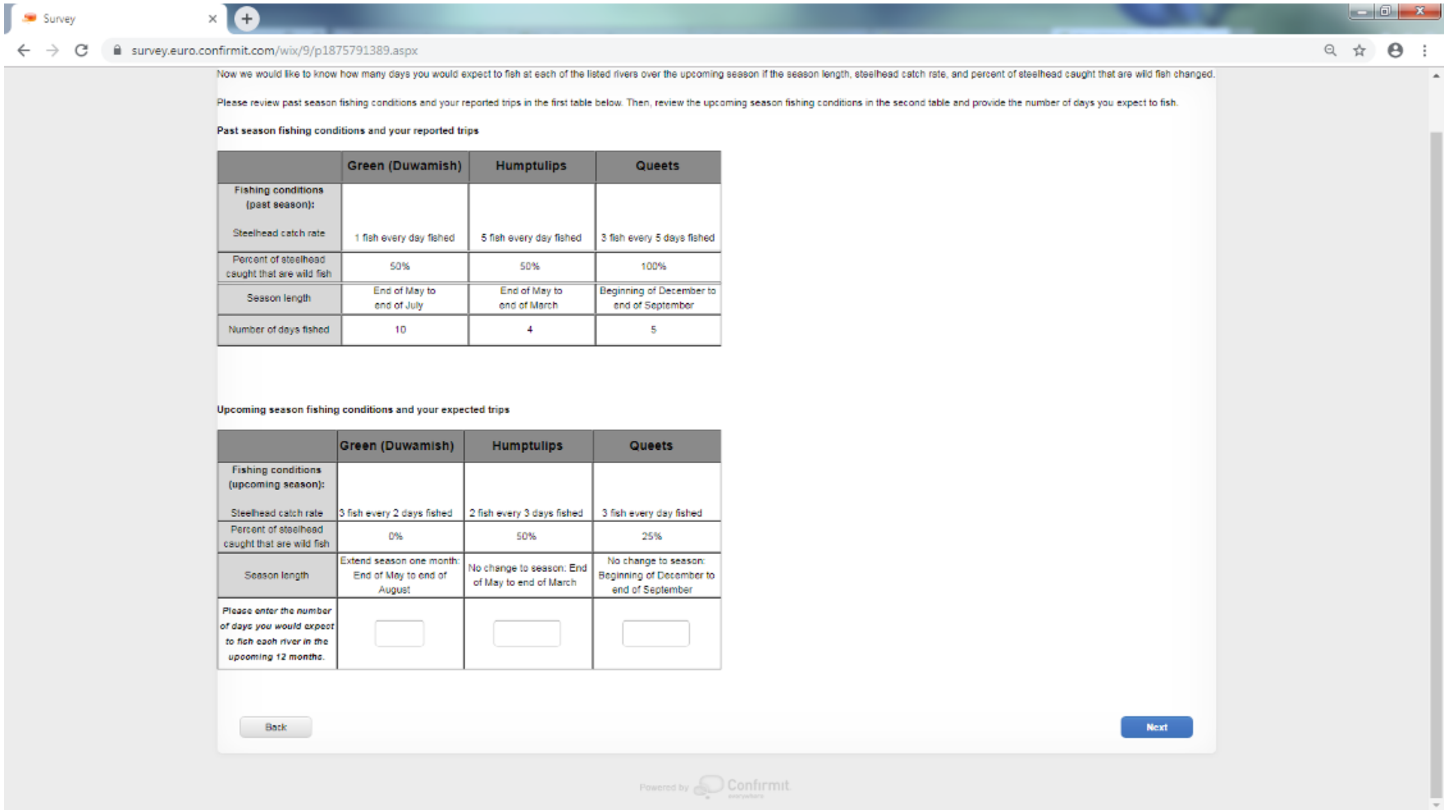

Survey

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Now we would like to know how many days you would expect to fish at each of the listed rivers over the upcoming season if the season length, steelhead catch rate, and percent of steelhead caught that are wild fish changed.

Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	3 fish every 2 days fished	2 fish every 3 days fished	3 fish every day fished
Percent of steelhead caught that are wild fish	0%	50%	25%
Season length	Extend season one month: End of May to end of August	No change to season: End of May to end of March	No change to season: Beginning of December to end of September
Please enter the number of days you would expect to fish each river in the upcoming 12 months.			

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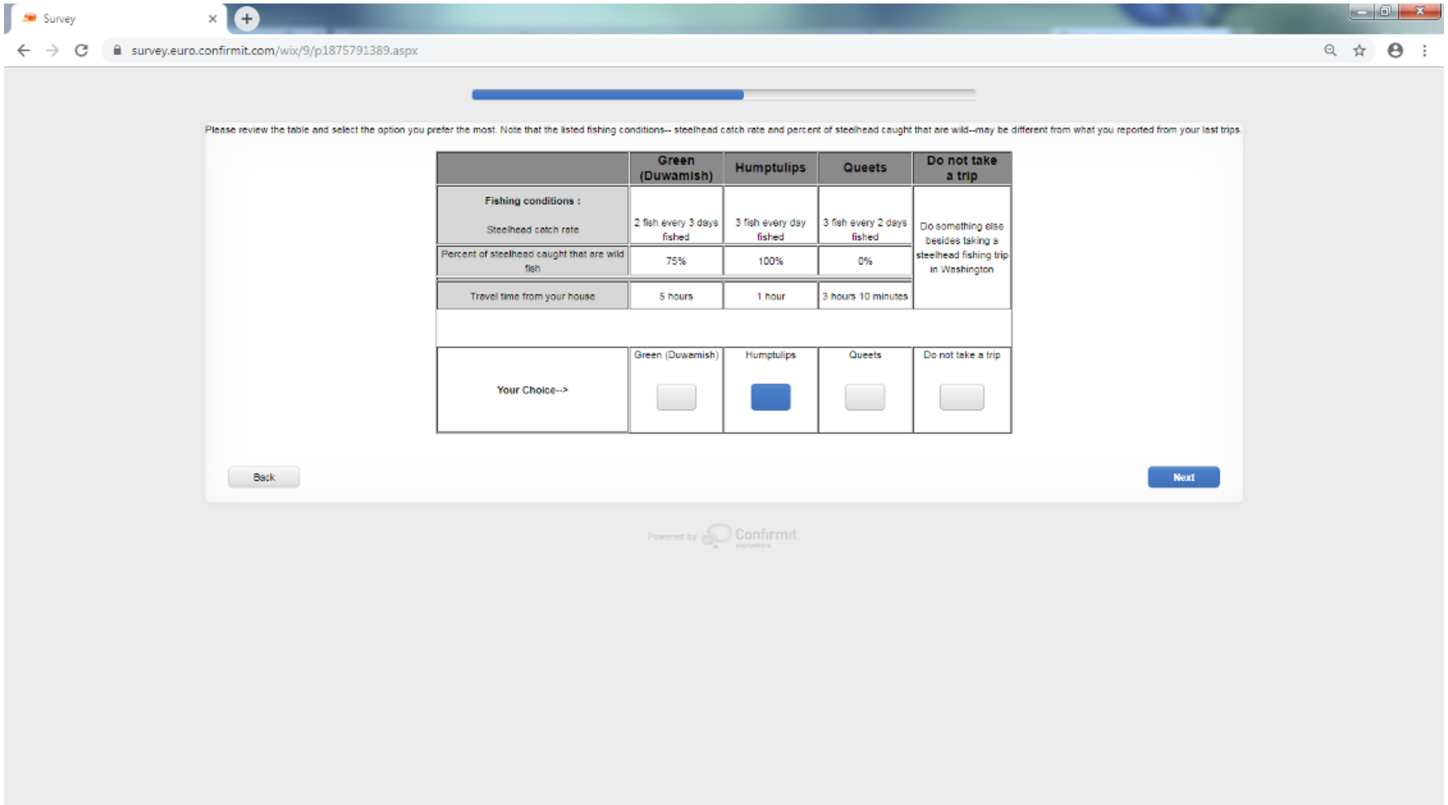

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Please review the table and select the option you prefer the most. Note that the listed fishing conditions-- steelhead catch rate and percent of steelhead caught that are wild--may be different from what you reported from your last trips.

	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	2 fish every 3 days fished	3 fish every day fished	3 fish every 2 days fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	75%	100%	0%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip

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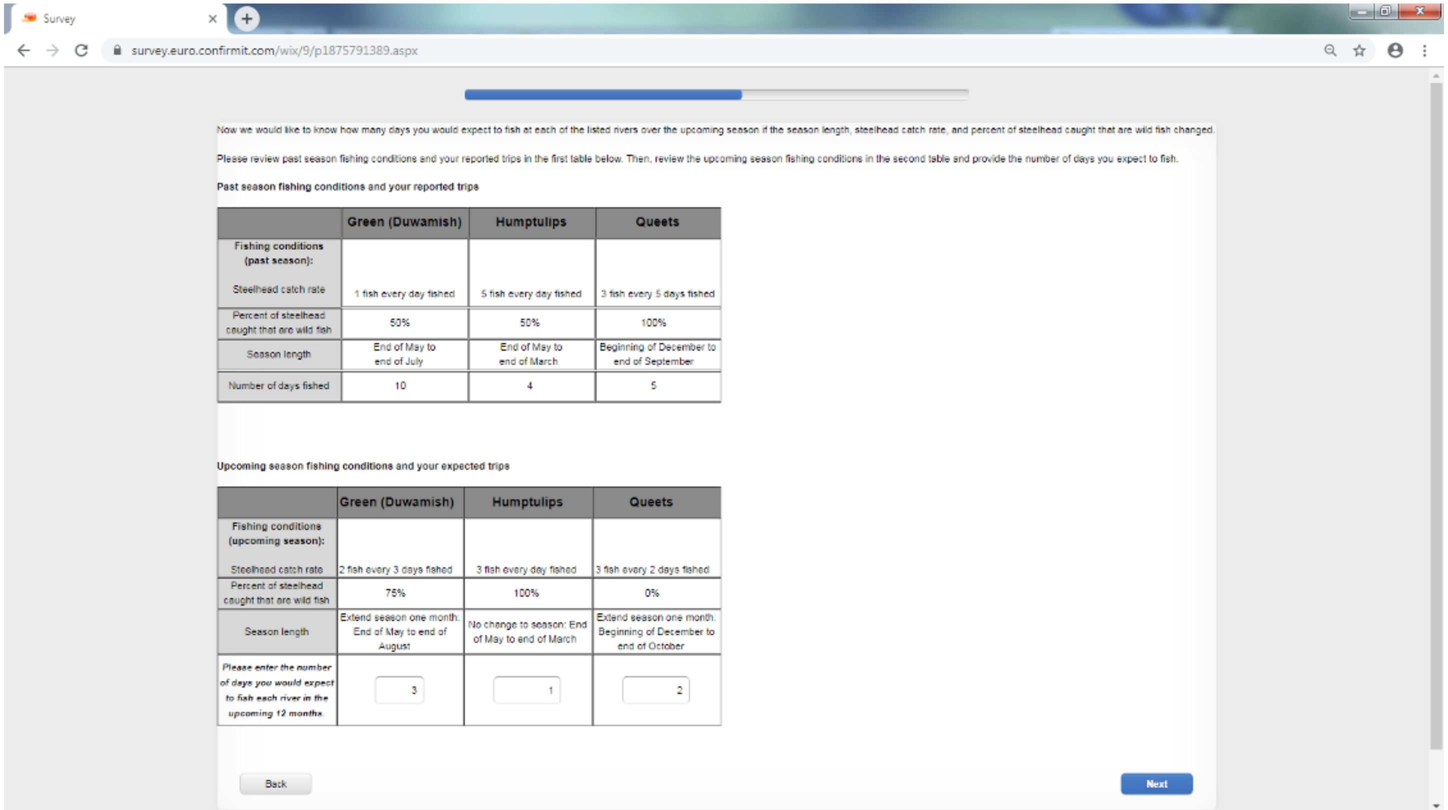

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Now we would like to know how many days you would expect to fish at each of the listed rivers over the upcoming season if the season length, steelhead catch rate, and percent of steelhead caught that are wild fish changed.

Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	2 fish every 3 days fished	3 fish every day fished	3 fish every 2 days fished
Percent of steelhead caught that are wild fish	75%	100%	0%
Season length	Extend season one month: End of May to end of August	No change to season: End of May to end of March	Extend season one month: Beginning of December to end of October
Please enter the number of days you would expect to fish each river in the upcoming 12 months.	3	1	2

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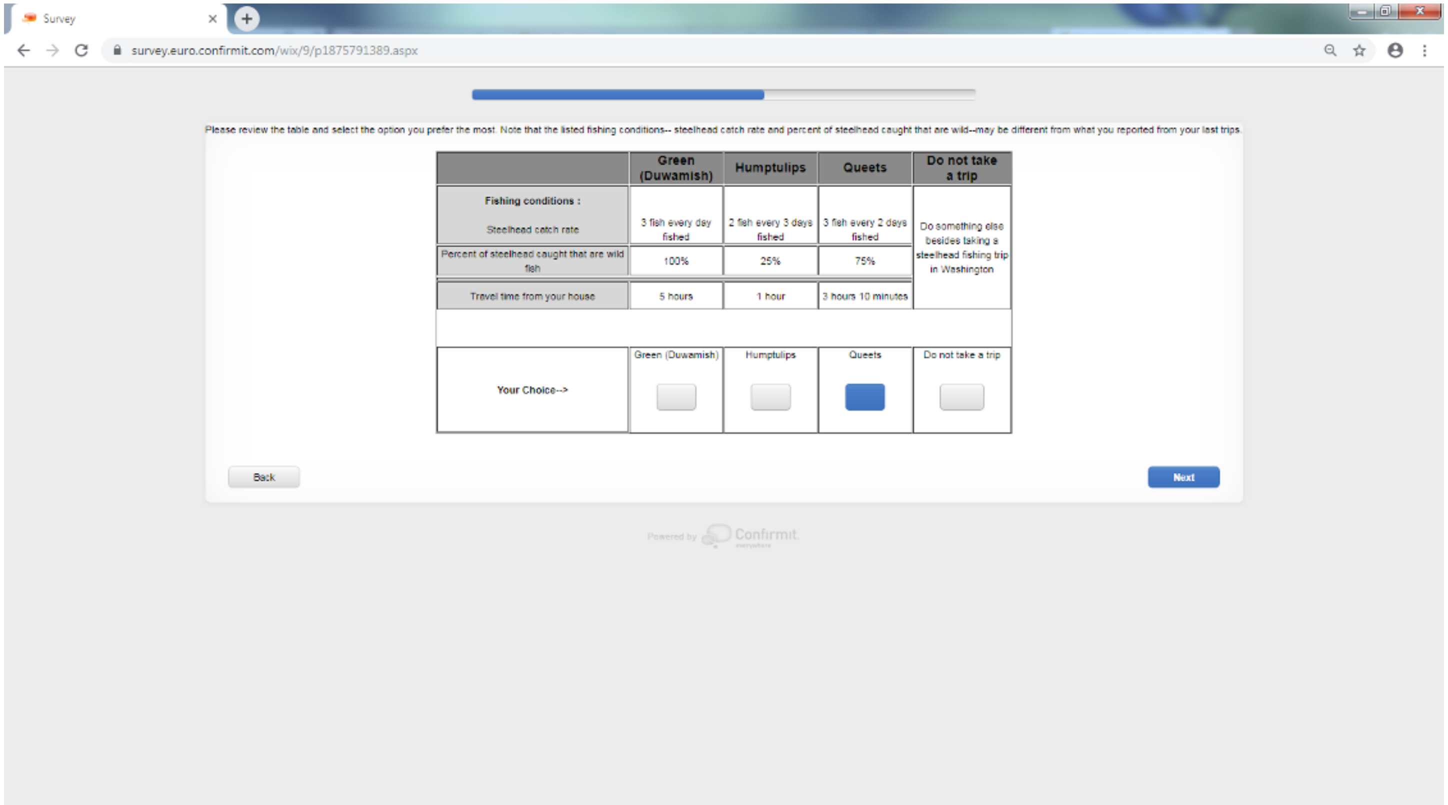

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Please review the table and select the option you prefer the most. Note that the listed fishing conditions-- steelhead catch rate and percent of steelhead caught that are wild--may be different from what you reported from your last trips.

	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	3 fish every day fished	2 fish every 3 days fished	3 fish every 2 days fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	100%	25%	75%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip

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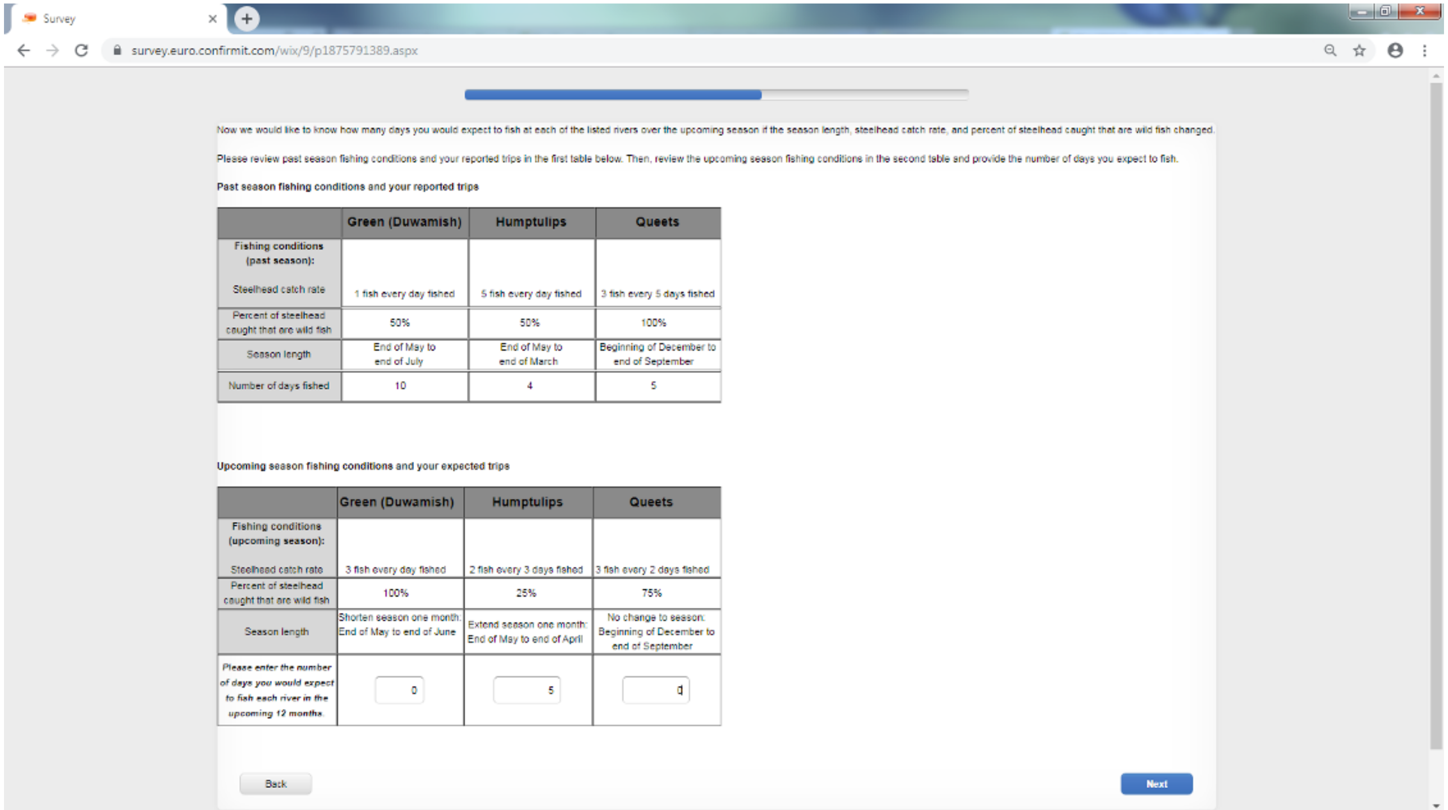
Survey

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Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	3 fish every day fished	2 fish every 3 days fished	3 fish every 2 days fished
Percent of steelhead caught that are wild fish	100%	25%	75%
Season length	Shorten season one month: End of May to end of June	Extend season one month: End of May to end of April	No change to season: Beginning of December to end of September
Please enter the number of days you would expect to fish each river in the upcoming 12 months.	0	5	0

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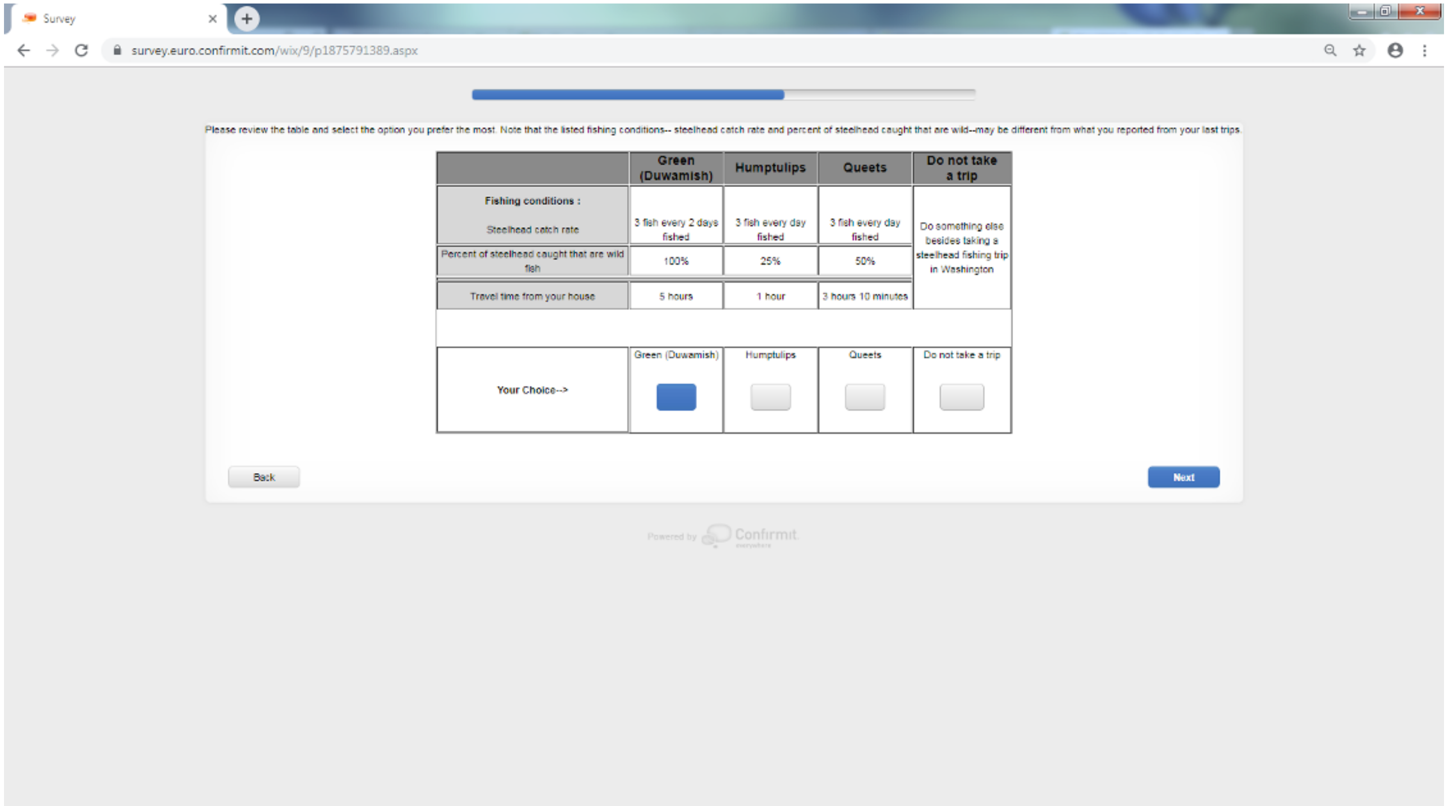
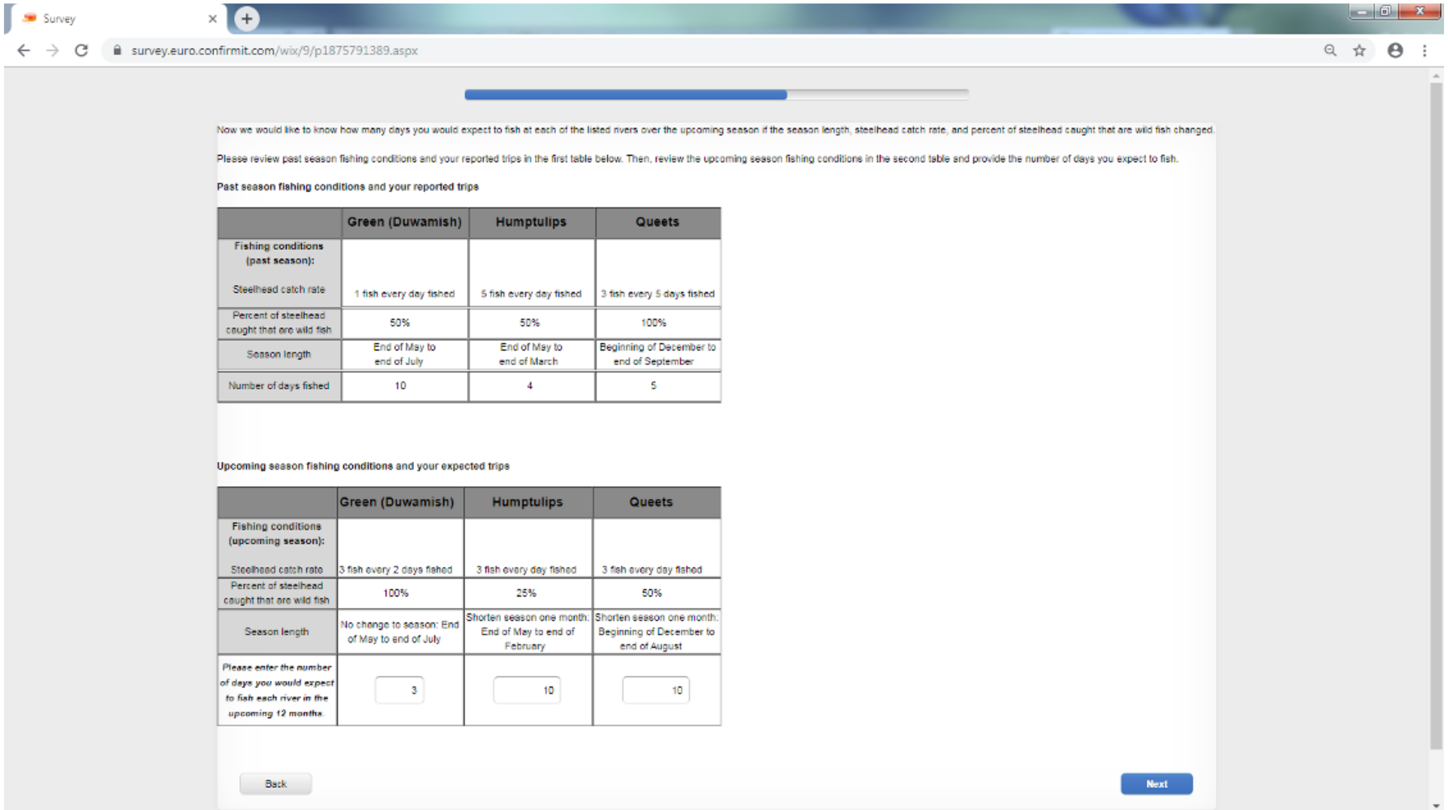


Please review the table and select the option you prefer the most. Note that the listed fishing conditions-- steelhead catch rate and percent of steelhead caught that are wild--may be different from what you reported from your last trips.

	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	3 fish every 2 days fished	3 fish every day fished	3 fish every day fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	100%	25%	50%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip



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Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	3 fish every 2 days fished	3 fish every day fished	3 fish every day fished
Percent of steelhead caught that are wild fish	100%	25%	50%
Season length	No change to season: End of May to end of July	Shorten season one month: End of May to end of February	Shorten season one month: Beginning of December to end of August
Please enter the number of days you would expect to fish each river in the upcoming 12 months.	3	10	10

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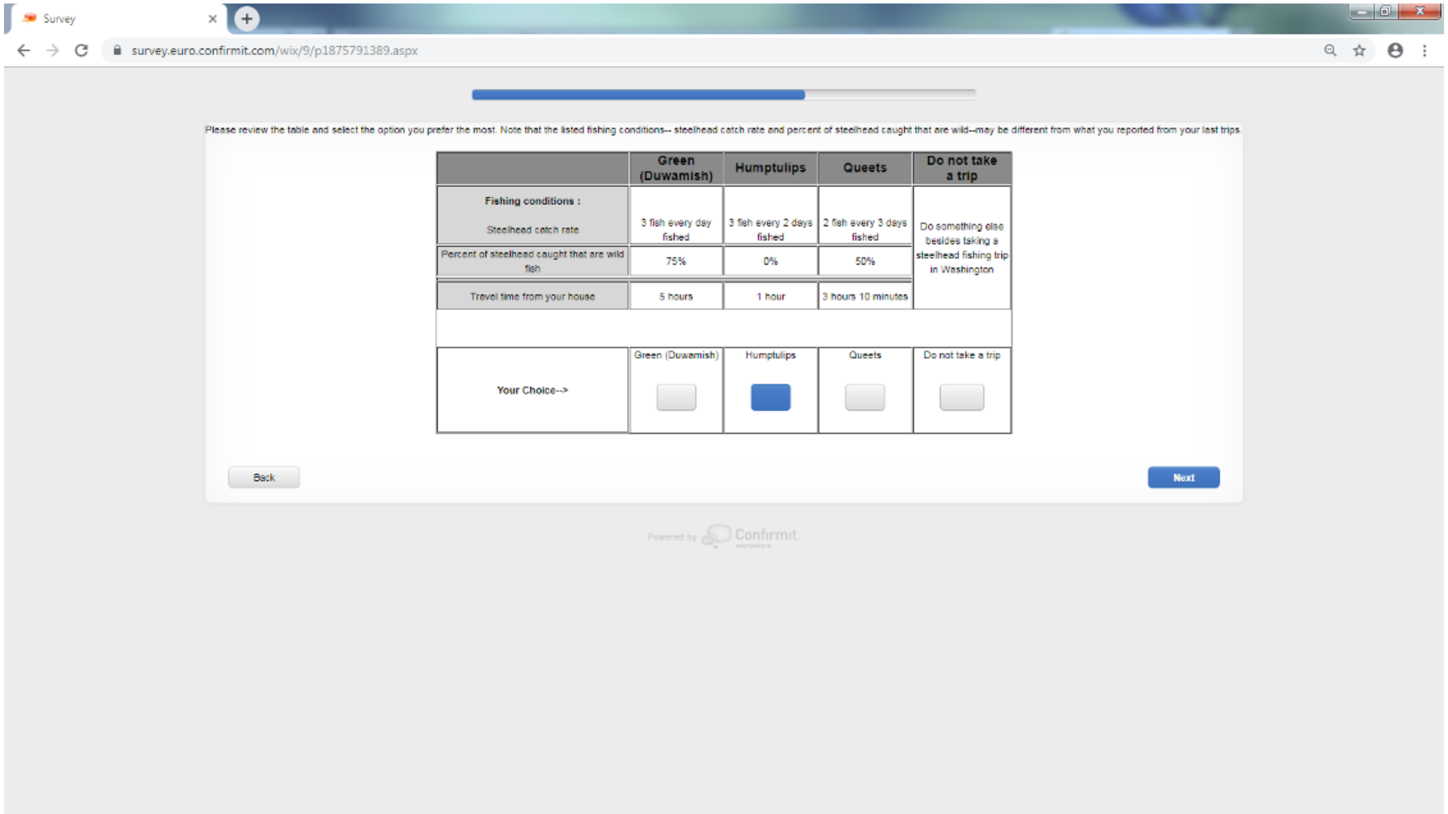
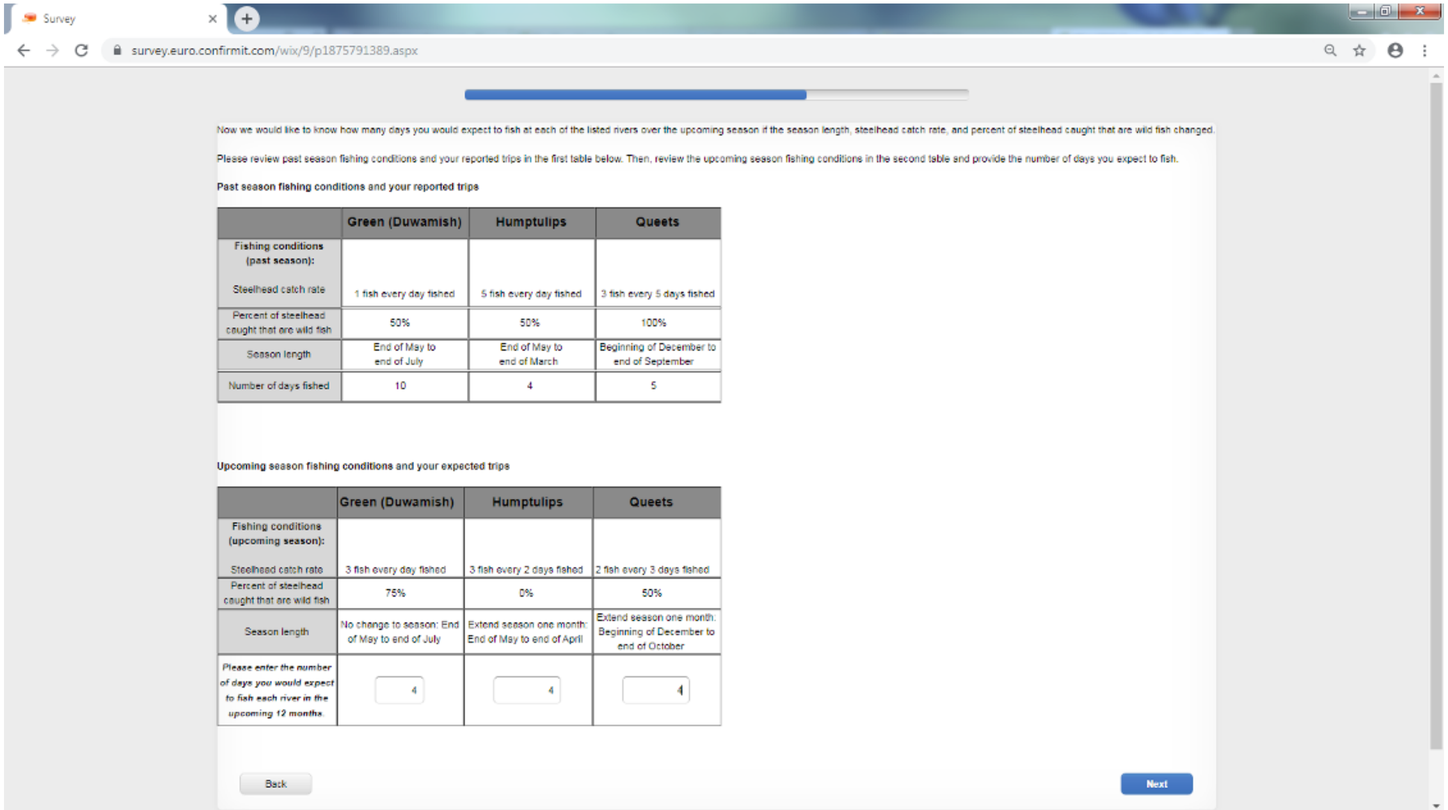


Please review the table and select the option you prefer the most. Note that the listed fishing conditions-- steelhead catch rate and percent of steelhead caught that are wild--may be different from what you reported from your last trips.

	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	3 fish every day fished	3 fish every 2 days fished	2 fish every 3 days fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	75%	0%	50%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip


Survey

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Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	3 fish every day fished	3 fish every 2 days fished	2 fish every 3 days fished
Percent of steelhead caught that are wild fish	75%	0%	50%
Season length	No change to season: End of May to end of July	Extend season one month: End of May to end of April	Extend season one month: Beginning of December to end of October
Please enter the number of days you would expect to fish each river in the upcoming 12 months.	4	4	4

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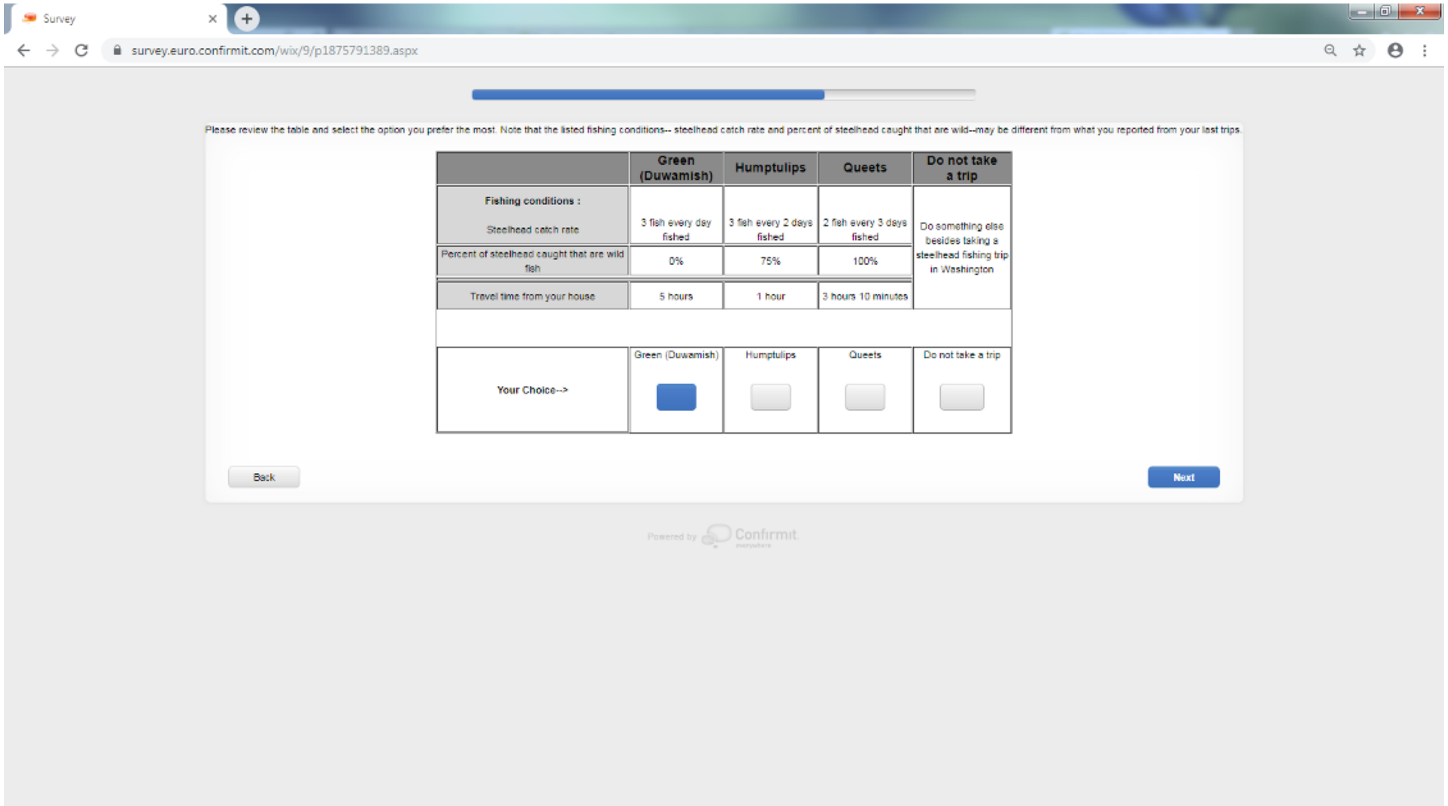
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	Green (Duwamish)	Humptulips	Queets	Do not take a trip
Fishing conditions : Steelhead catch rate	3 fish every day fished	3 fish every 2 days fished	2 fish every 3 days fished	Do something else besides taking a steelhead fishing trip in Washington
Percent of steelhead caught that are wild fish	0%	75%	100%	
Travel time from your house	5 hours	1 hour	3 hours 10 minutes	
Your Choice-->	Green (Duwamish)	Humptulips	Queets	Do not take a trip

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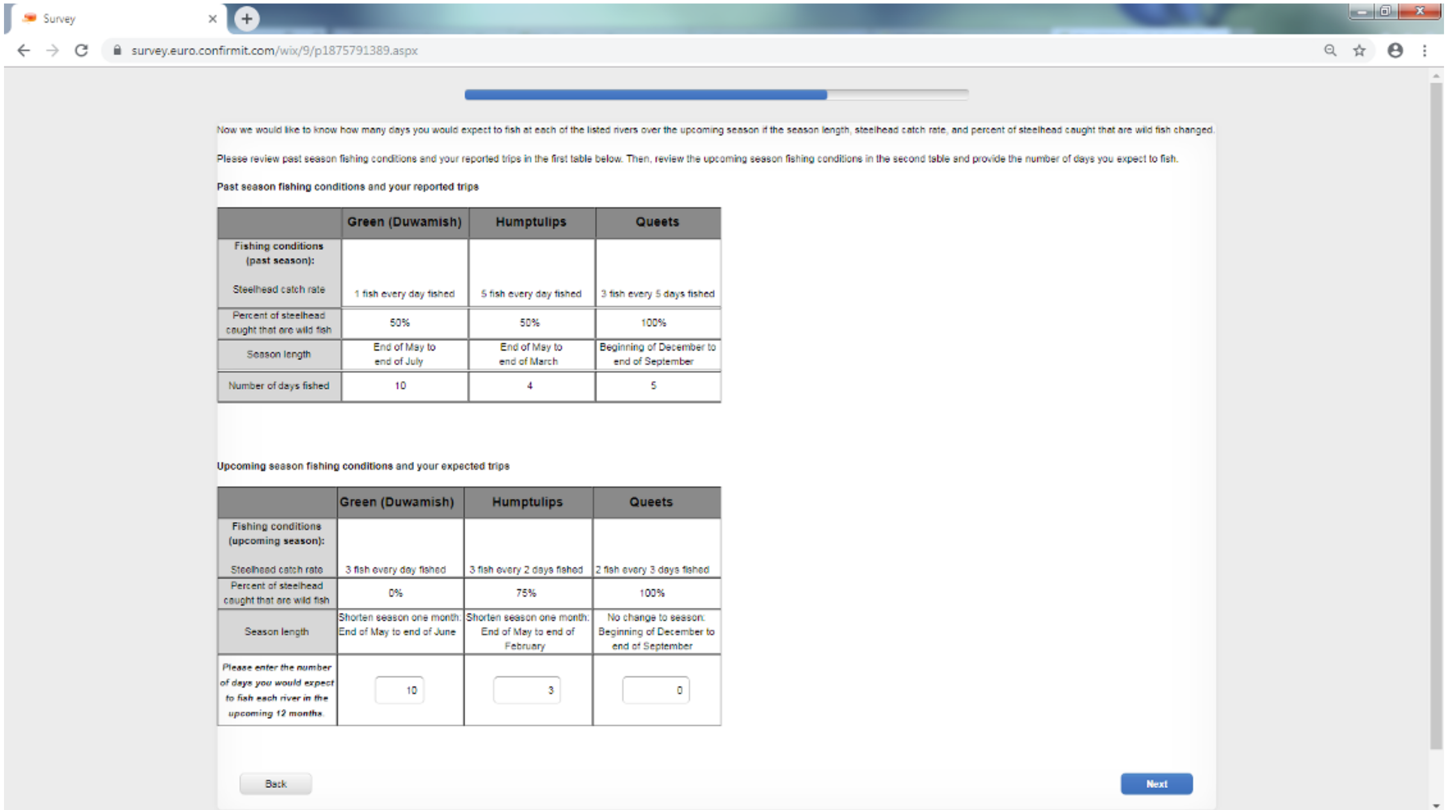

Survey

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Now we would like to know how many days you would expect to fish at each of the listed rivers over the upcoming season if the season length, steelhead catch rate, and percent of steelhead caught that are wild fish changed.

Please review past season fishing conditions and your reported trips in the first table below. Then, review the upcoming season fishing conditions in the second table and provide the number of days you expect to fish.

Past season fishing conditions and your reported trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (past season): Steelhead catch rate	1 fish every day fished	5 fish every day fished	3 fish every 5 days fished
Percent of steelhead caught that are wild fish	50%	50%	100%
Season length	End of May to end of July	End of May to end of March	Beginning of December to end of September
Number of days fished	10	4	5

Upcoming season fishing conditions and your expected trips

	Green (Duwamish)	Humptulips	Queets
Fishing conditions (upcoming season): Steelhead catch rate	3 fish every day fished	3 fish every 2 days fished	2 fish every 3 days fished
Percent of steelhead caught that are wild fish	0%	75%	100%
Season length	Shorten season one month: End of May to end of June	Shorten season one month: End of May to end of February	No change to season: Beginning of December to end of September
Please enter the number of days you would expect to fish each river in the upcoming 12 months.	10	3	0

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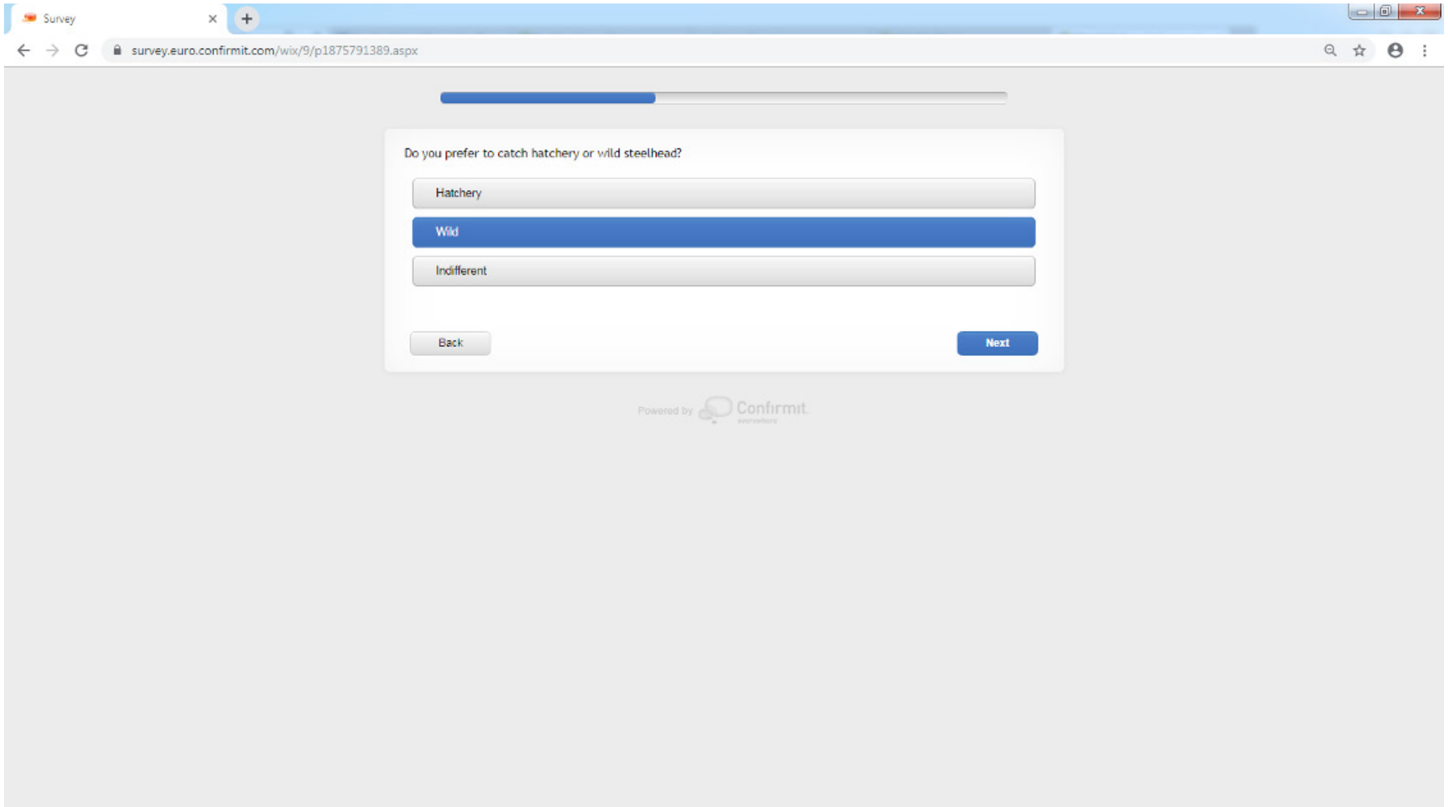
Survey
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Do you prefer to catch hatchery or wild steelhead?
Hatchery
Wild
Indifferent
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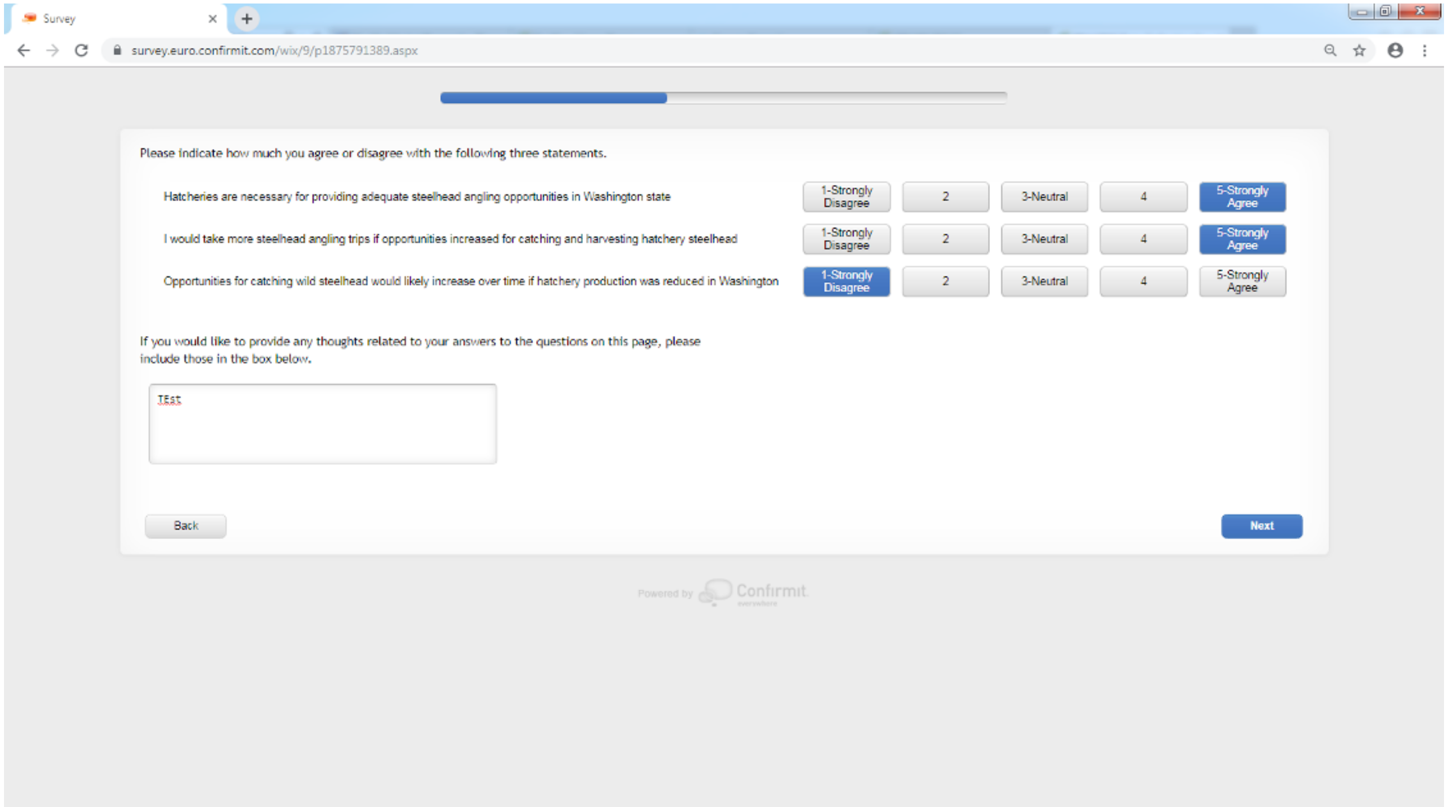
Survey
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Please indicate how much you agree or disagree with the following three statements.
Hatcheries are necessary for providing adequate steelhead angling opportunities in Washington state
I would take more steelhead angling trips if opportunities increased for catching and harvesting hatchery steelhead
Opportunities for catching wild steelhead would likely increase over time if hatchery production was reduced in Washington
1-Strongly Disagree
2
3-Neutral
4
5-Strongly Agree
If you would like to provide any thoughts related to your answers to the questions on this page, please include those in the box below.
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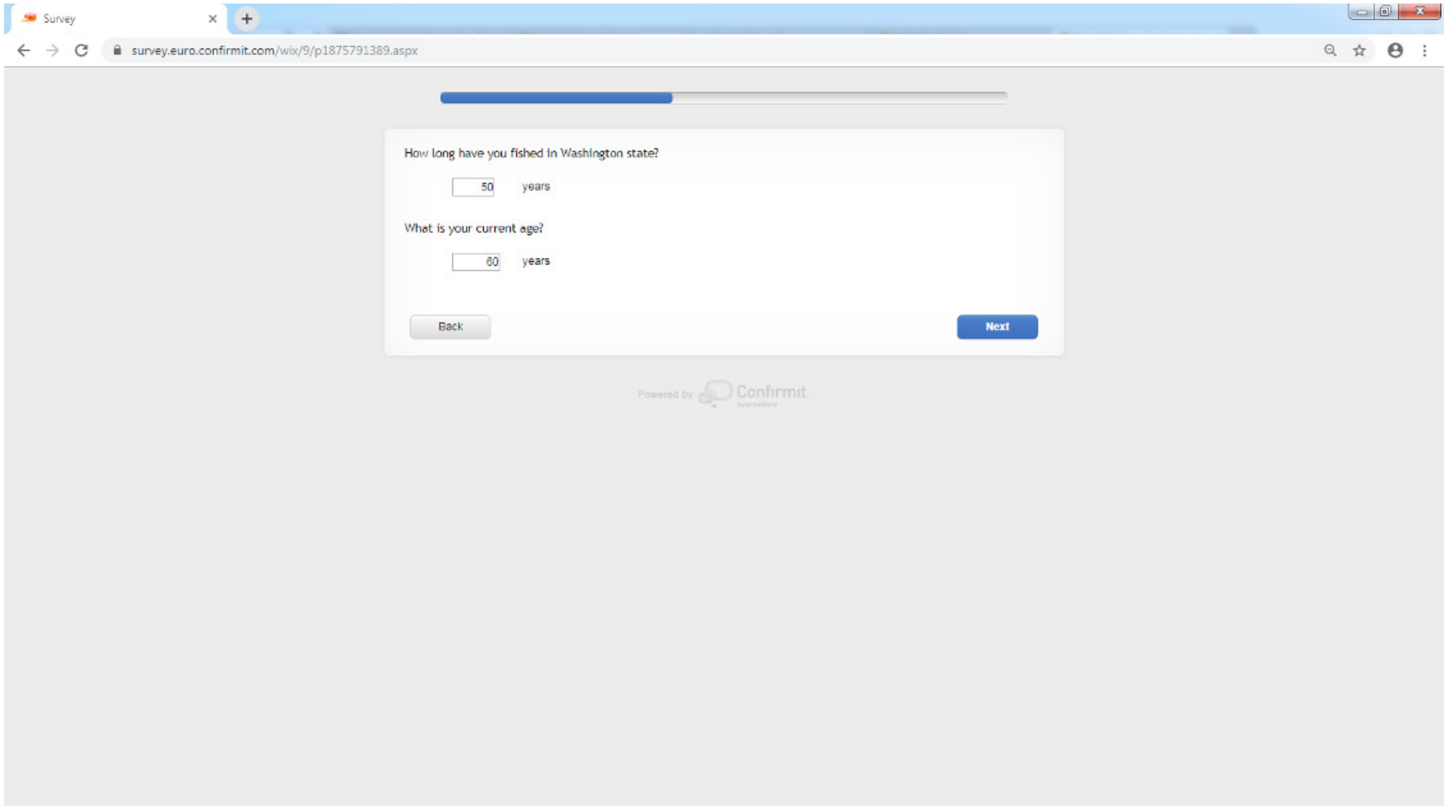
Survey
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How long have you fished in Washington state?
50
years
What is your current age?
60
years
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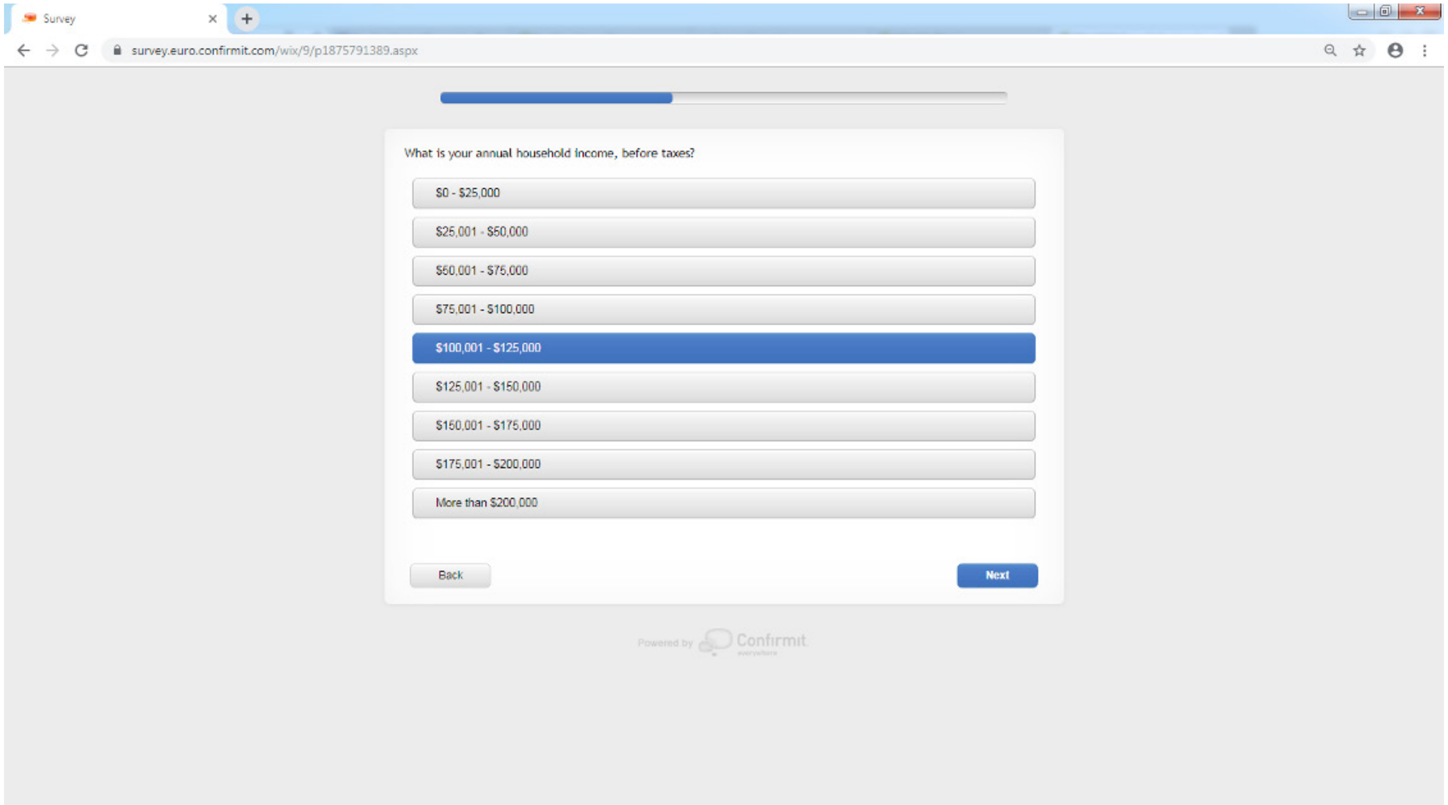
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What is your annual household income, before taxes?
$0 - $25,000
$25,001 - $50,000
$50,001 - $75,000
$75,001 - $100,000
$100,001 - $125,000
$125,001 - $150,000
$150,001 - $175,000
$175,001 - $200,000
More than $200,000
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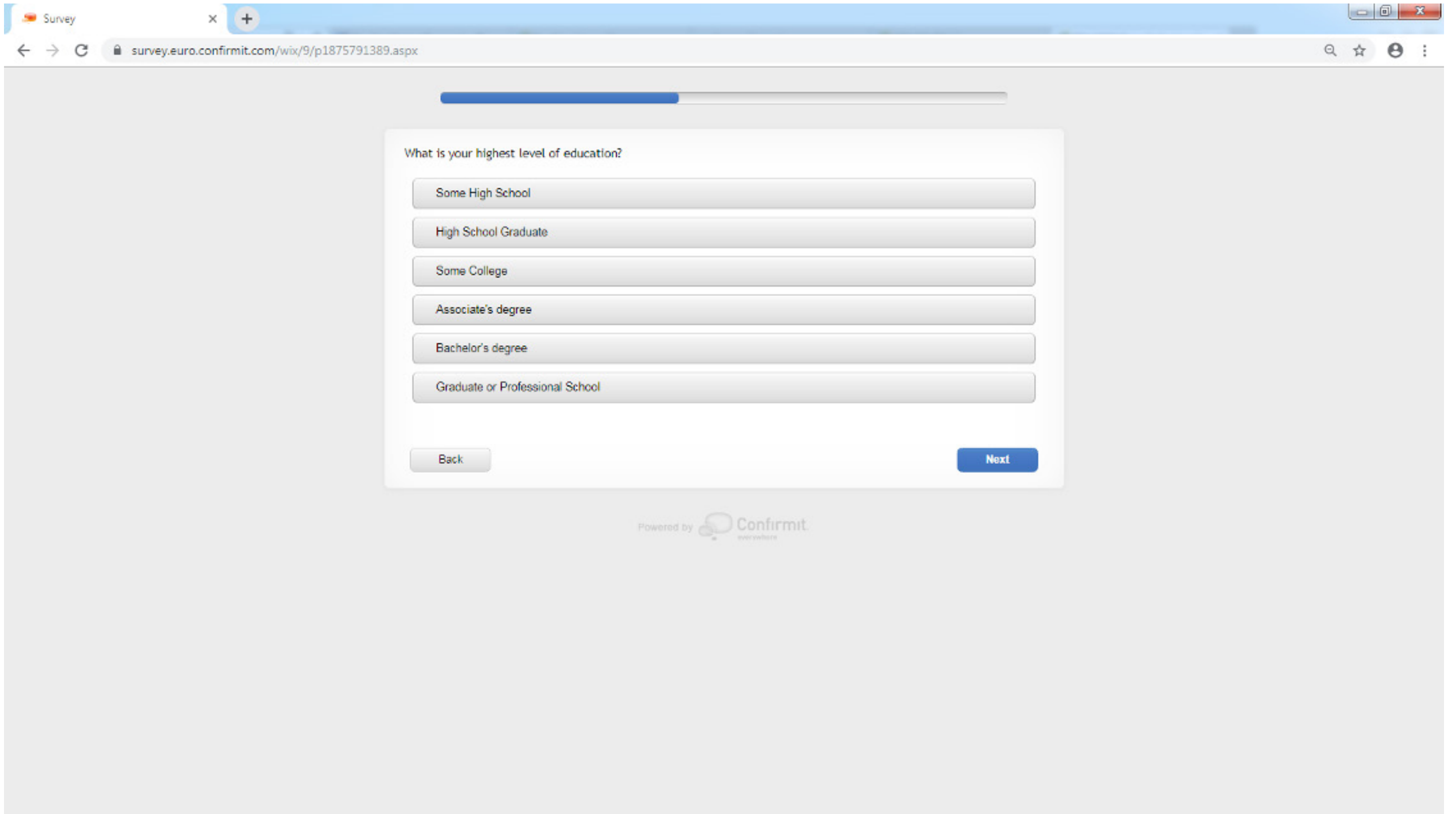
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What is your highest level of education?
Some High School
High School Graduate
Some College
Associate's degree
Bachelor's degree
Graduate or Professional School
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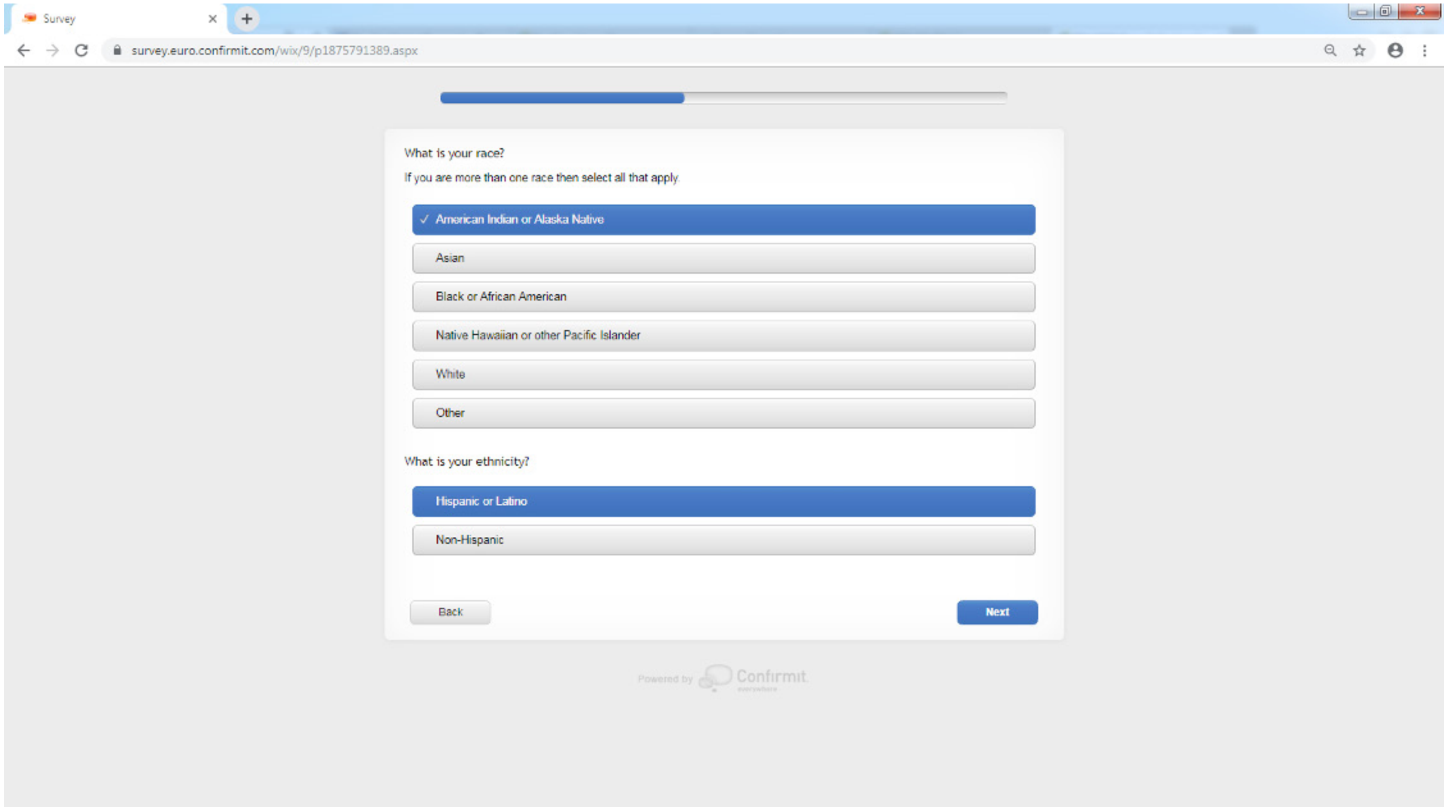
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What is your race?
If you are more than one race then select all that apply
✓ American Indian or Alaska Native
Asian
Black or African American
Native Hawaiian or other Pacific Islander
White
Other
What is your ethnicity?
Hispanic or Latino
Non-Hispanic
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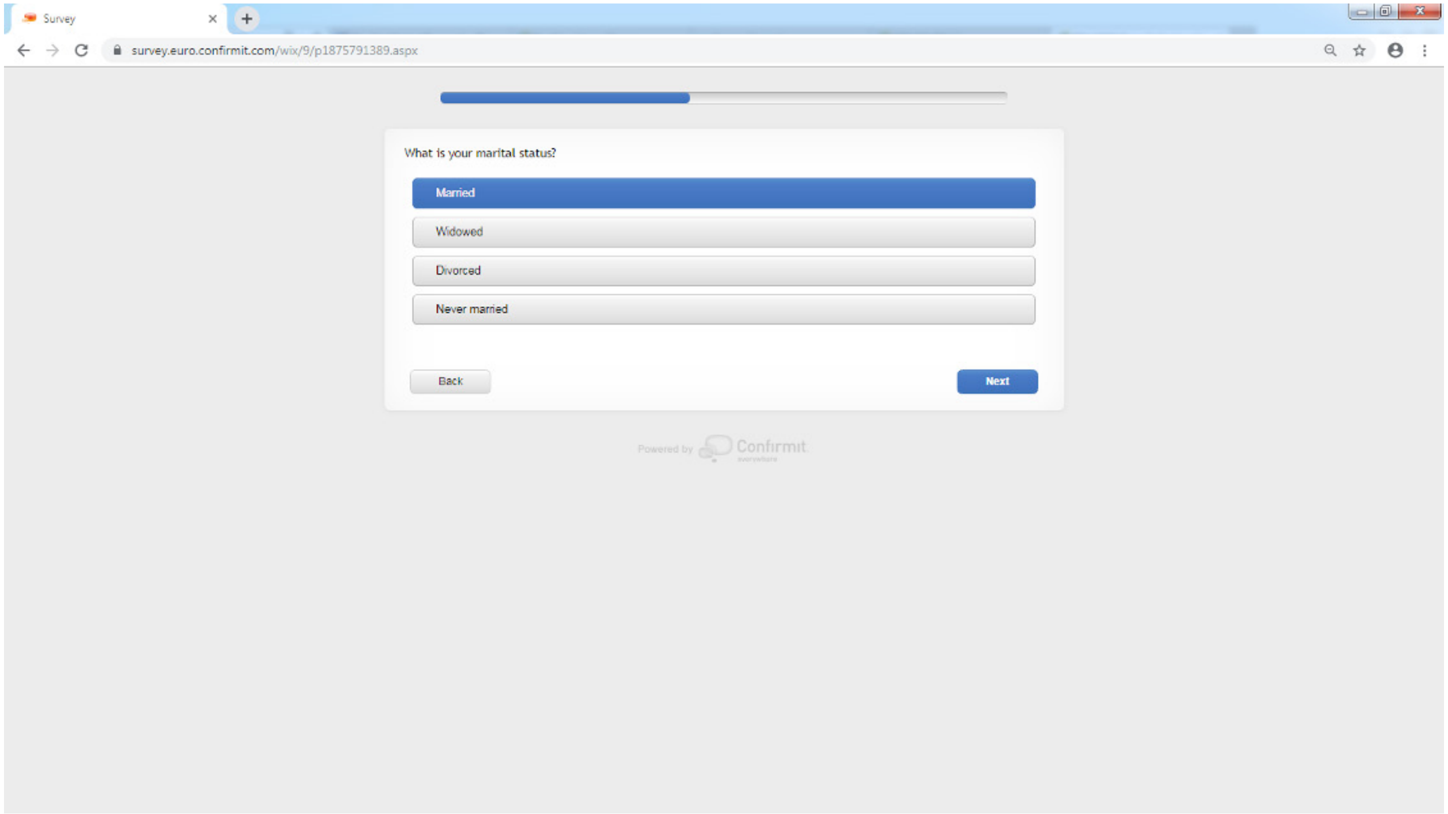
Survey
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What is your marital status?
Married
Widowed
Divorced
Never married
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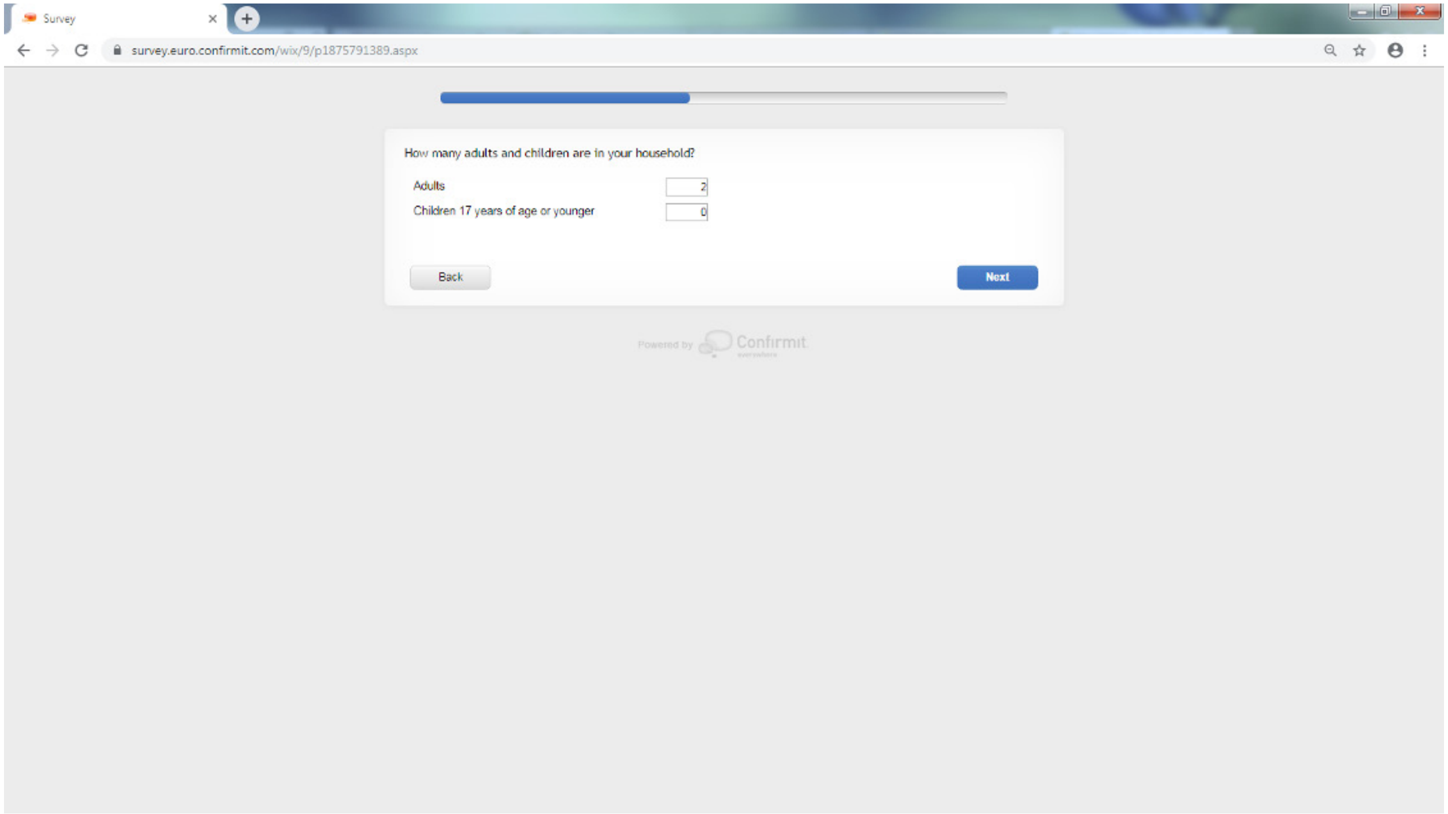
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How many adults and children are in your household?
Adults
2
Children 17 years of age or younger
0
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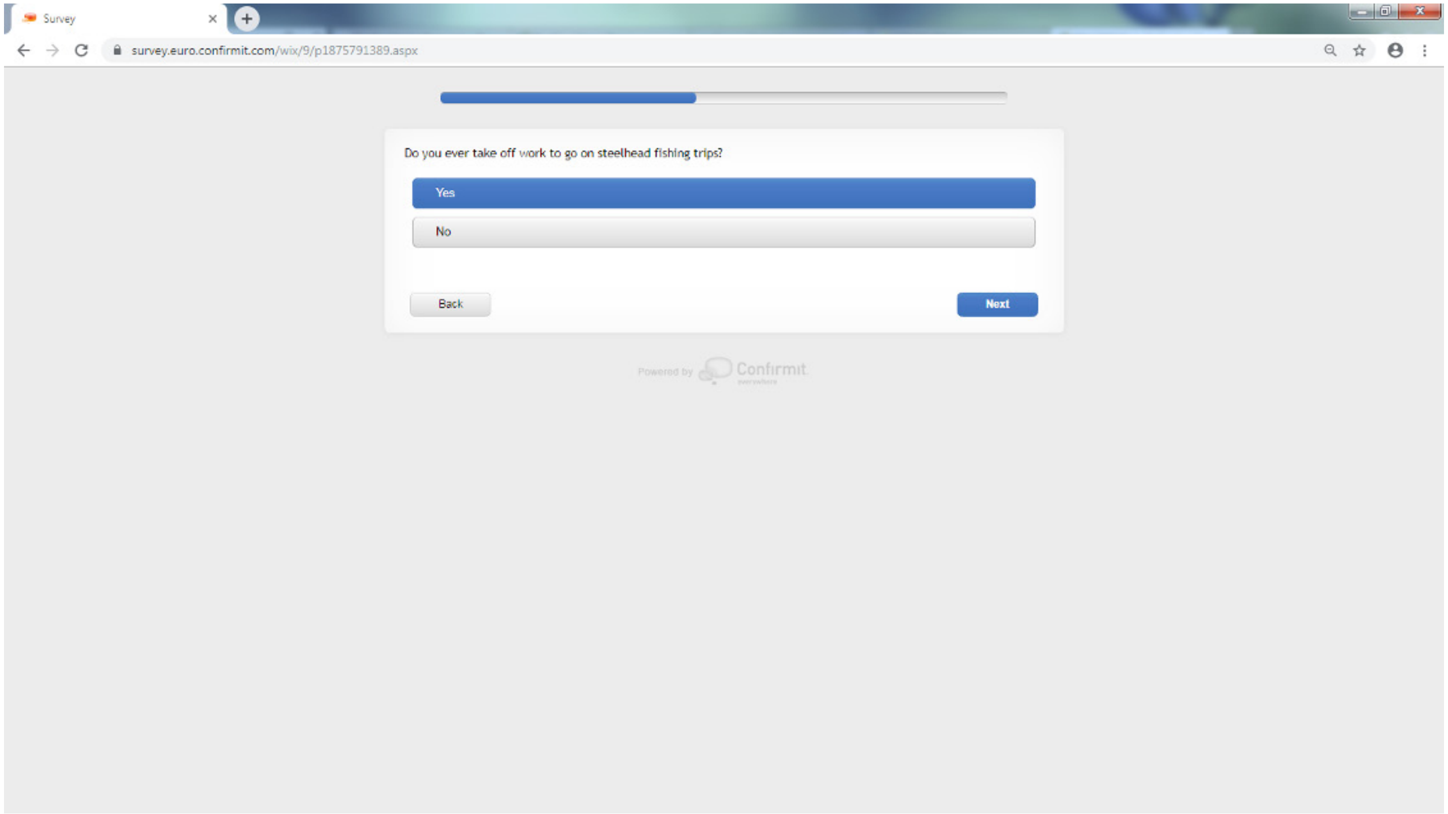
Survey
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Do you ever take off work to go on steelhead fishing trips?
Yes
No
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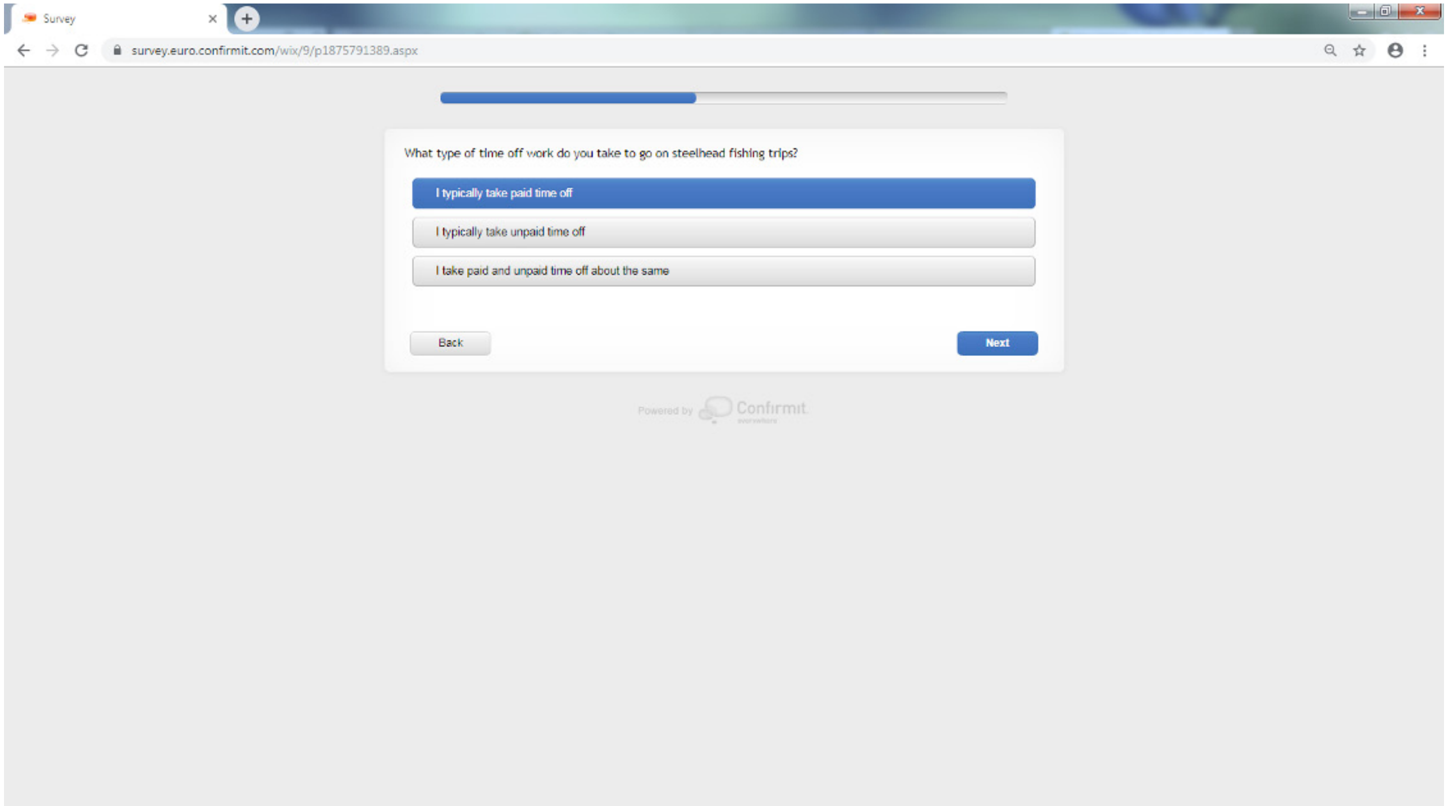
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
What type of time off work do you take to go on steelhead fishing trips?
I typically take paid time off
I typically take unpaid time off
I take paid and unpaid time off about the same
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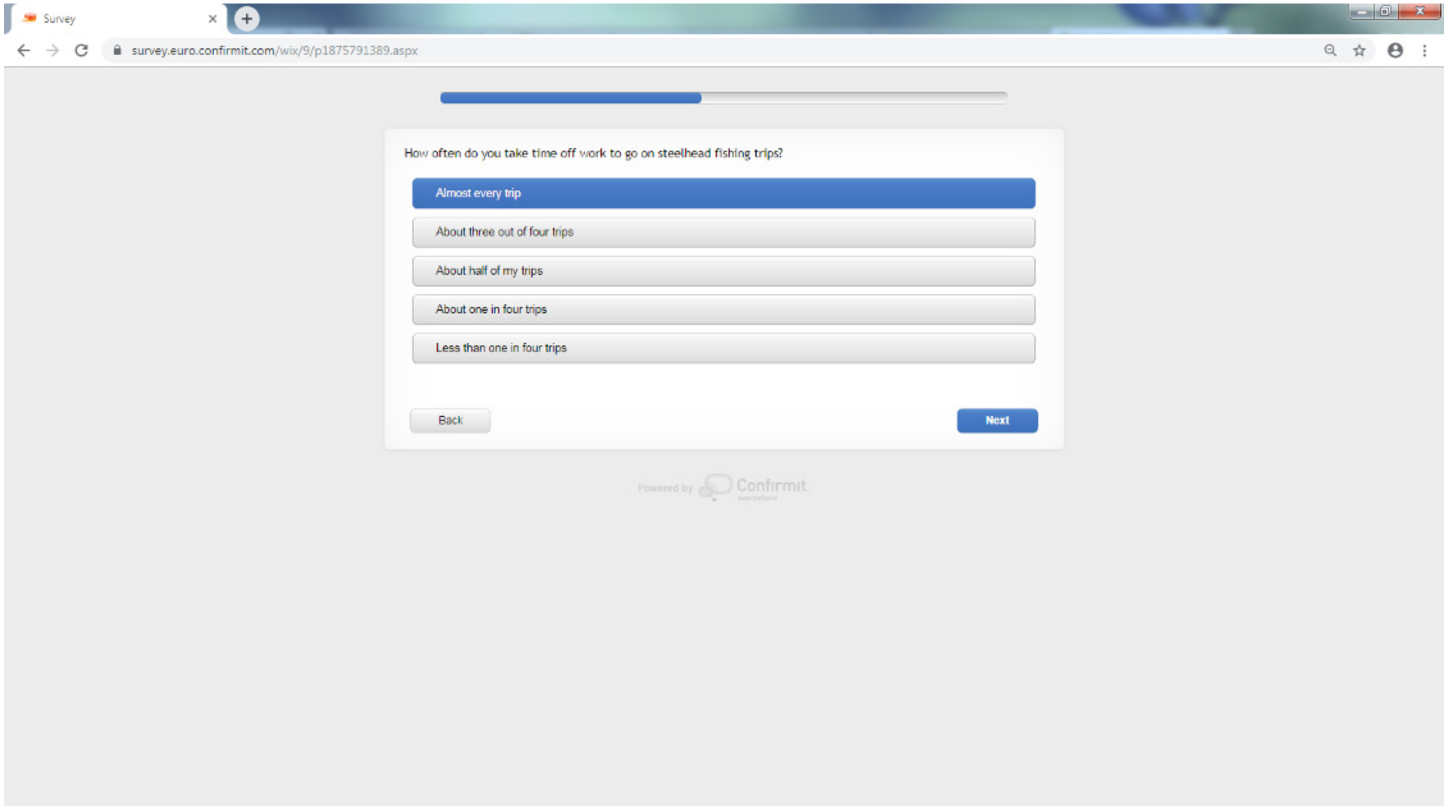

Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
How often do you take time off work to go on steelhead fishing trips?
Almost every trip
About three out of four trips
About half of my trips
About one in four trips
Less than one in four trips
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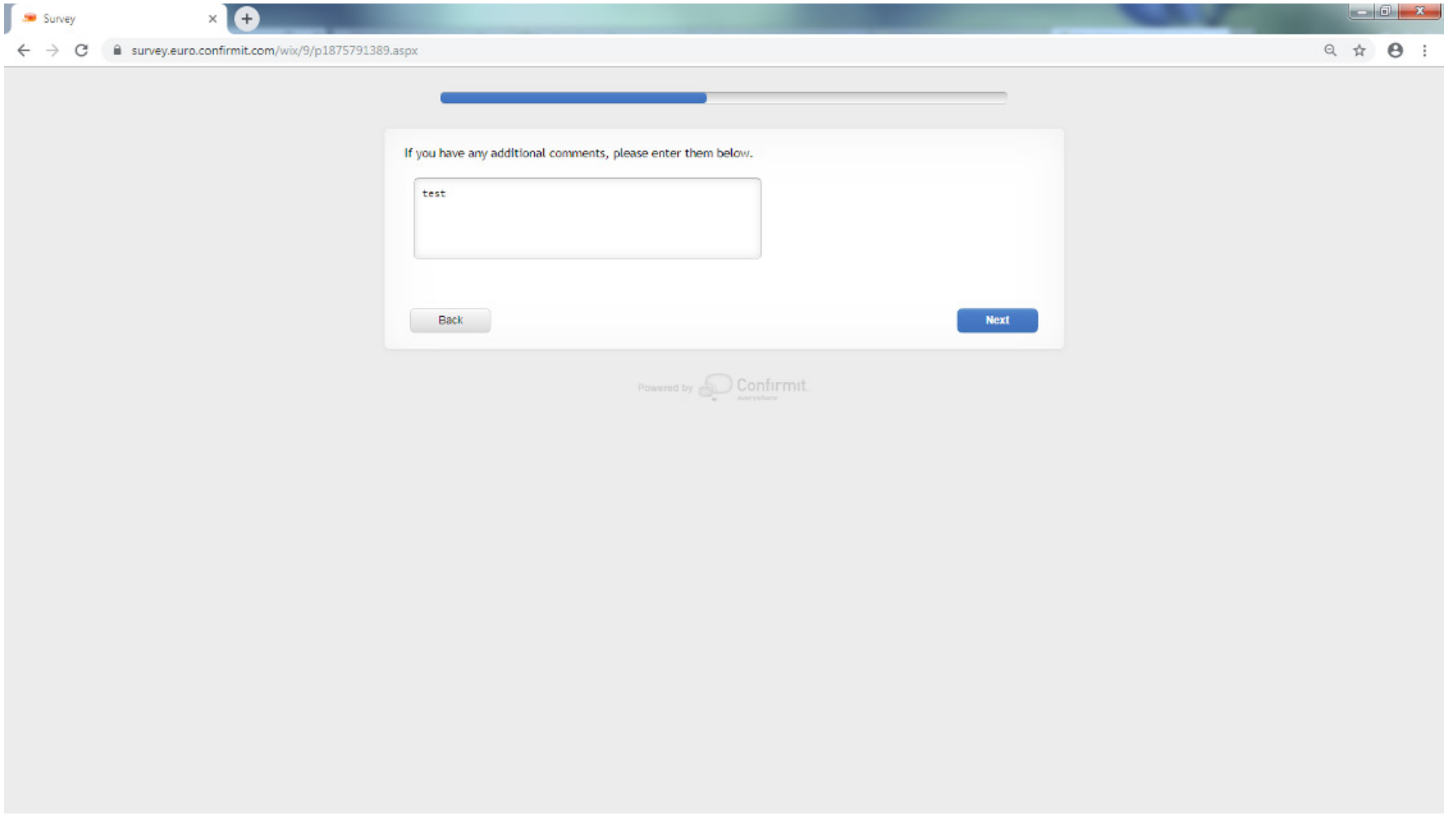
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If you have any additional comments, please enter them below.
test
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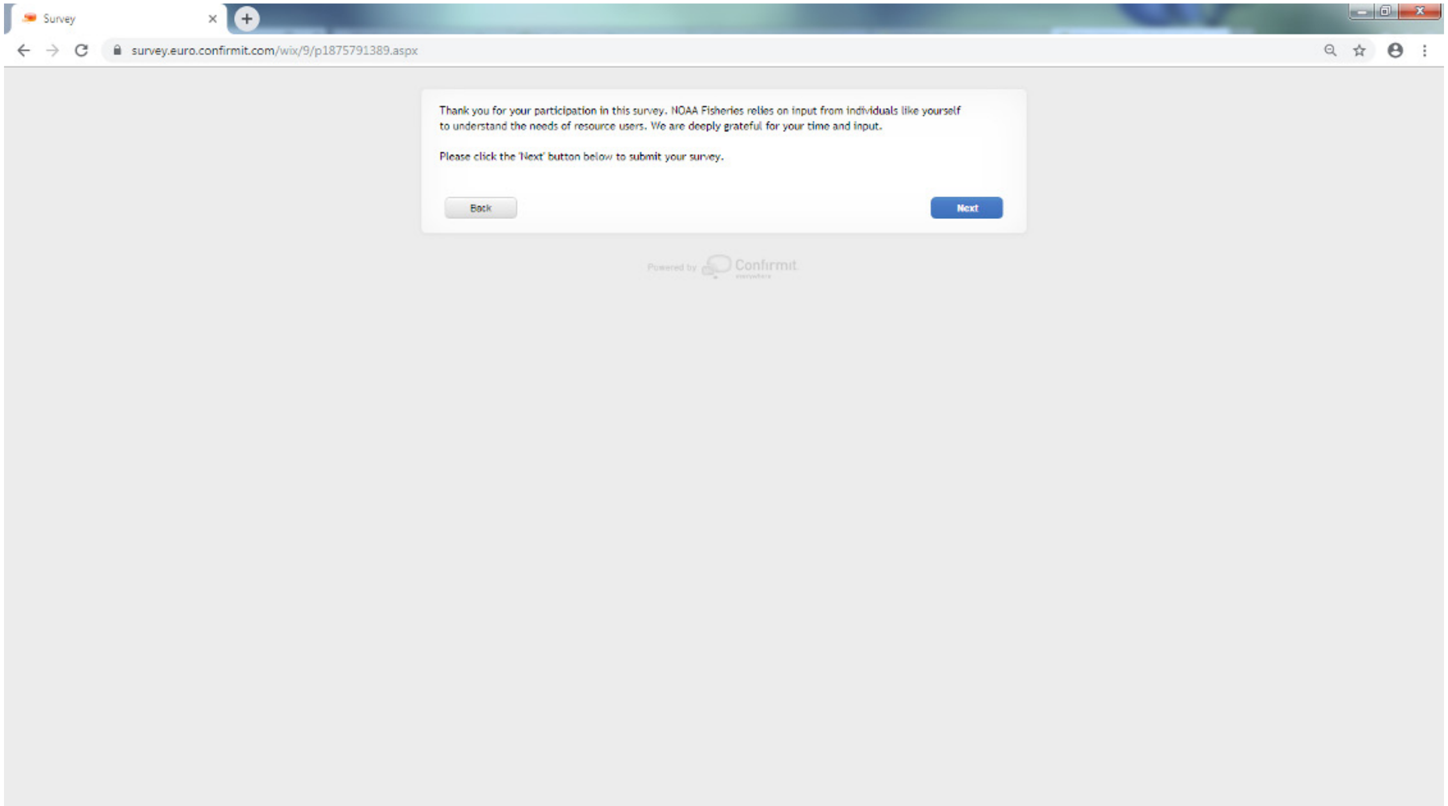
Survey
survey.euro.confirmit.com/wix/9/p1875791389.aspx
Thank you for your participation in this survey. NOAA Fisheries relies on input from individuals like yourself
to understand the needs of resource users. We are deeply grateful for your time and input.
Please click the 'Next' button below to submit your survey.
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Thank you!

pac01.us/web_cati/SRP/thanksn.html

SURVEY RECEIVED

That completes the interview.
Thank you for your participation.
You may now close your browser.

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NOAA Technical Memorandum NMFS-NWFSC-

166 **Somers, K. A., J. E. Jannot, K. E. Richerson, V. J. Tuttle, N. B. Riley, and J. T. McVeigh. 2021.** Estimated Discard and Catch of Groundfish Species in U.S. West Coast Fisheries. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-166. https://doi.org/10.25923/z84a-w607

165 **Jannot, J. E., A. Wuest, T. P. Good, K. A. Somers, V. J. Tuttle, K. E. Richerson, R. S. Shama, and J. T. McVeigh. 2021.** Seabird Bycatch in U.S. West Coast Fisheries, 2002–18. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-165. https://doi.org/10.25923/78vk-v149

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U.S. Secretary of Commerce
Gina M. Raimondo

Acting Under Secretary of Commerce
for Oceans and Atmosphere
Benjamin Friedman

Acting Assistant Administrator for
Fisheries
Dr. Paul N. Doremus

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