Understanding the Alaska Charter Recreational Fishing Sector Using Website Data

D. K. Lew , K. D. Ray, and R. Kosaka

July 2023

Understanding the Alaska Charter Recreational Fishing Sector Using Website Data

D. K. Lew[1] , K. D. Ray[2], and R. Kosaka[3]

[1]Resource Ecology and Fisheries
Management Division
Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE
Seattle, WA 98115

[2]Pacific States Marine Fisheries Commission
in support of the
Southwest Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
8901 La Jolla Shores Dr
La Jolla, CA 92037

[3]Southwest Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
110 Shaffer Road
Santa Cruz, CA 95060

U.S. DEPARTMENT OF COMMERCE

ABSTRACT

The diversity of the Alaska charter recreational fishing sector in terms of fishing trips offered, their prices, and the range of other services offered has largely gone unstudied. Systematic collection of these types of data are necessary to characterize the charter sector and document how it changes over time and in response to management actions, changes in demographic and economic conditions, and external factors like climate change. Additionally, an understanding of charter trip prices can facilitate estimation of charter sector revenues when used with available effort data. This can be important for analysts when trying to understand and compare effects of policies or external factors on the charter sector relative to the commercial fishing sector, for which revenue information is readily available. This report describes a pilot effort that develops a process for the systematic collection of data about the Alaska charter sector from charter business websites. The project included development of a database for storing the collected data from the Alaska charter business websites. In addition to data on price and trip offerings, a variety of other information presented on the websites were collected and used to characterize the types of businesses in the sector and their diversity across a range of characteristics. We note several differences between charter fishing businesses in International Pacific Halibut Commission (IPHC) Area 2C (Southeast Alaska) relative to Area 3A (Southcentral Alaska). This includes that average charter fishing trip prices in Area 2C are generally higher than in Area 3A for the same length trip.

CONTENTS

INTRODUCTION

Saltwater sport fishing is a popular outdoor recreational activity in Alaska. The Alaska

Department of Fish and Game (ADF&G) estimates that each year over 160,000 anglers fish in

saltwater in the state each year, accounting for over 400,000 fishing days per year.[1] There are

two main types of saltwater anglers: private (unguided) anglers and charter (guided or for-hire)

anglers. Private anglers generally fish in saltwater from shore or from a boat that is privately

owned (by them, family, friends, or acquaintances) or rented. Charter anglers, on the other hand,

pay a charter (for-hire) fishing business to provide a boat-based recreational fishing experience

with a guide. Charter fishing trips vary in length, target species, and the amenities and services

provided. Primary saltwater finfish species targeted by saltwater anglers in Alaska are Pacific

halibut and salmon, though rockfish are frequently targeted as well (Jennings et al. 2015). Pacific

halibut are managed by the International Pacific Halibut Commission (IPHC) in cooperation with

the North Pacific Fishery Management Council (NPFMC) and the National Marine Fisheries

Service (NMFS). Pacific salmon and other recreationally-caught fish are managed by the state of

Alaska through ADF&G.

According to ADF&G estimates, there were 571 charter fishing businesses offering

saltwater fishing in Alaska during 2014 (Powers and Sigurdsson 2016). The saltwater fishing

charter sector (henceforth referred to as the charter sector) primarily operates in IPHC

management areas 2C and 3A (Fig. 1), which roughly correspond to ADF&G's Southeast Alaska

and Southcentral Alaska management areas, respectively. Lew and Seung (2020) estimate that

---

[1] Based on estimates using the Statewide Harvest Survey Data provided by J. Bozzini (ADF&G Sport Division).

the Alaska charter sector contributed over $140 million (in 2013 dollars) each year to the economy during the period 2011-2015.
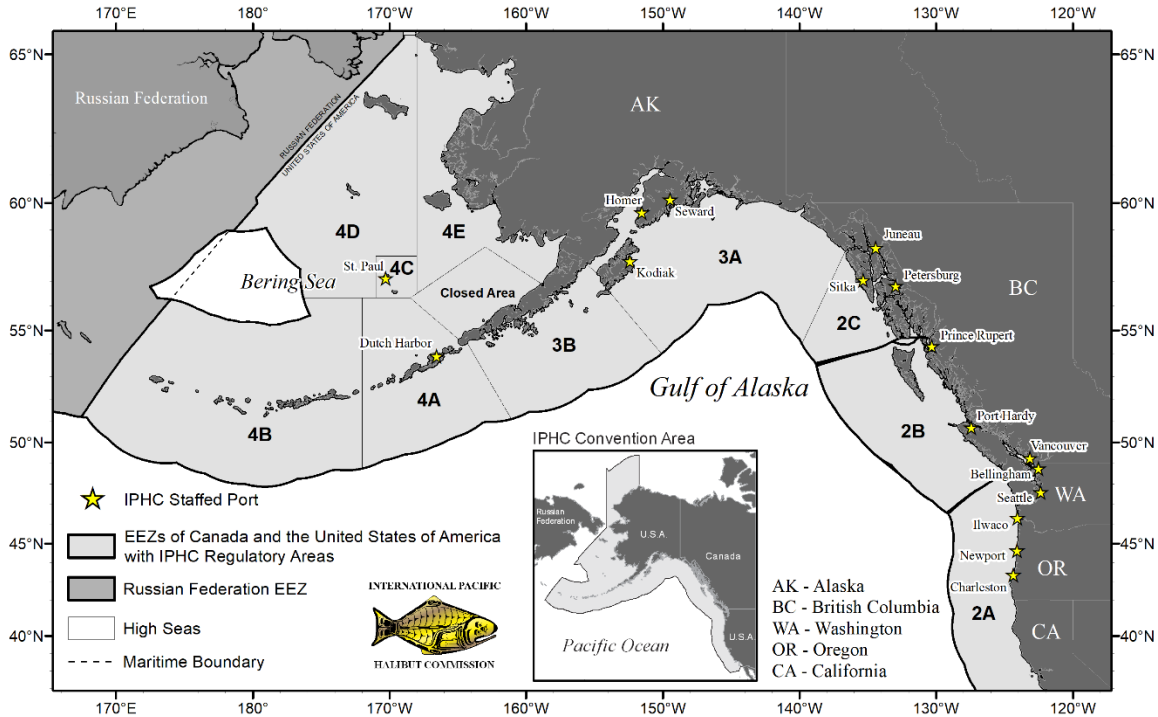
Figure 1. -- International Pacific Halibut Commission (IPHC) management areas. Source: IPHC.

The NMFS Alaska Regional Implementation Plan for the National Saltwater Recreational Fisheries Policy (https://media.fisheries.noaa.gov/dam-migration/ak-recreational-fisheries-plan-2016-17.pdf) identified several management and research objectives that either specifically require, or would substantially benefit from, improved economic information on the Alaska charter sector. NMFS' Alaska Fisheries Science Center (AFSC) has contributed to these efforts over the years, including a survey of recreational anglers (conducted in 2007, 2012, and 2017)

focused on angler expenditures and determinants of consumer demand for unguided and charter Alaska saltwater fishing experiences (Larson and Lew 2013; Lew and Larson 2015, 2017); a 2015 survey of Charter Halibut Permit holders to assess attitudes and preferences toward alternative management approaches for implementing the Pacific Halibut Catch Sharing Plan (Lew et al. 2016); and a series of surveys of charter businesses conducted between 2012 and 2018 to collect comprehensive cost and earnings data (Lew and Lee 2019).

For Alaska saltwater charter fishing, several effort-related aspects of fishing activity are reported at the trip-level through the ADF&G charter logbook program. The charter logbook data includes information on travel itineraries (timing and location), number of fishing and non-fishing clients, and retained- and released catch (reported by species, weight, and location). These data can be analyzed to provide several metrics of "production" at the charter vessel or firm level (Powers and Sigurdsson 2016). Apart from the aforementioned cost and earnings charter business surveys (Lew and Lee 2019), however, there is no system in place for capturing price and value data for the charter sector equivalent to that which exists for commercial fisheries landings in Alaska (i.e., fish ticket data). The range of qualitative attributes that differentiate one charter trip from another complicates the problem of effectively monitoring the value of services provided by charter operators. As such, elicitation of charter business sales, revenue, and pricing data has been a particular challenge in designing and conducting the charter business survey, constituting nearly 50% of the content of the survey instrument. To ensure that future survey efforts aimed at the for-hire recreational fishing sector produce data of sufficient quality to support analysis of management changes over time, alternative approaches to improving response rates and/or developing alternative data sources to reduce reporting burden are essential.

In this report, we describe efforts to systematically collect data from charter fishing businesses' websites as an alternative to collection through surveys. This public-facing information includes charter trip prices, which are useful for estimating revenues when used in combination with effort data. However, we also collect detailed information about the set of services each business offers and other information about the business that can be used to better understand the types of businesses that exist in the Alaska charter sector and the scope of their business activities. These data provide the means for characterizing the charter sector and the various business models that may be represented therein. To the extent collection of these data is regularly done, it will be possible to document how the charter sector changes over time and in response to management actions, demographic and economy-level changes, and external factors like climate change.

Due to funding and time limitations, we collected website data during 2022 only. Nevertheless, the process undertaken to collect the data is replicable, both in future years for the Alaska charter sector and potentially in other U.S. regions where there are significant for-hire recreational fisheries.[2] This report provides details of the methodology we employed to collect data from charter businesses' websites. We also describe and summarize the data collected. In so doing, we describe the charter sector in Alaska as represented from website data for 2022. We conclude with a set of caveats to the present data and analysis and with a discussion of the prospects and challenges of scaling and repeating this effort in Alaska and elsewhere in the United States.

---

[2] Similar efforts focused on trip prices have been done in the southeast United States (Carter 2015, 2016).

METHODOLOGY

There were five steps taken in this study to collect and process data from charter business websites. First, we identified the charter websites. Second, we developed a database and data collection protocols. Third, we collected the data. Fourth, the data were validated. The fifth and final step is for the data to be processed to generate datasets in a form that could be used for data analysis.

Step 1: Identifying charter websites

Identifying the set of charter websites from which to collect information was done by employing a crowdsourcing approach, specifically Amazon MTurk (https://www.mturk.com/).[3] Amazon MTurk is a marketplace that brings together those who have tasks that can feasibly be done virtually with a workforce of willing online workers.

In 2018, a human intelligence task (HIT) was developed that sought assistance from MTurk workers for identifying Alaska charter website URLs or web addresses. We began with a list of 564 saltwater charter businesses that were active in 2017 as identified from the ADF&G charter logbook data. The list had limited information about the businesses, primarily the name of the business owner, the business phone number, and the business name. Importantly, website information was not available from this list. The HIT involved MTurk workers using the owner and business information to find the URL associated with the business, if one existed. Figure 2 presents the form used by MTurk workers to report website address. After removing invalid URLs (i.e., URLs that did not open Alaska charter fishing websites), this process resulted in a

---

[3] We initially tried to collect a full set of information using Amazon MTurk. However, this effort proved unreliable for generating sufficiently accurate data for most types of information being sought. However, the crowdsourcing method did prove helpful for the less complex task of identifying websites associated with Alaska charter businesses.

total of 329 website URLs that were valid at the time (June 2018). This represented

approximately 60% of the 549 active Alaska charter businesses in 2018.[4]

Business name:	${business_name}
Owner name:	${owner_name}
Phone number(s) (if available):	${phone1}
	${phone2}

Website address:

http://

Figure 2. -- Amazon MTurk HIT data entry form.

It also represents the master list of charter websites from which to collect data. In

addition to the charter businesses identified in the master list, we uncovered two additional valid

Alaska saltwater charter websites in the course of data collection. These two additional websites

were added to the data after they were discovered.

Step 2: Database design

---

[4] These represent the websites that could be found through the MTurk process in 2018. It is unknown whether the other 40% of active Alaska charter businesses currently have websites or not.

The second step was to develop the database that would store the data. The database was developed as a series of Google Forms with accompanying spreadsheets. Unique identifiers (key fields) were used to provide a means for one-to-one and one-to-many linkages between the spreadsheets. This rather simple approach was chosen instead of a formal relational database for a couple reasons. Our research team included an undergraduate intern who conducted some of the data collection. The intern did not have access to or training in specialized database software, and we had limited ability to provide computer or software access, particularly given data collection was conducted remotely during the summer and fall of 2022. Thus, the broad accessibility of Google Forms made it ideal for a remote work environment. Second, Google Forms provides a simple data entry interface that can be easily understood by users without specialized experience. This provided the flexibility to use short-term employees (e.g., interns) without specialized knowledge or skills for data collection. And third, Google Forms allows rules to be imposed on the data entered to ensure they conform to a particular format. This helped minimize some types of data entry errors.

An initial step in the database design was to identify a candidate set of information to collect from websites and then evaluate and modify the list after assessing its completeness and appropriateness against a random sample of websites from the master list. This process was iterative -- as new types of information were found on websites new candidate variables (i.e., fields) were added, while in other cases candidate variables were modified to accommodate the range or type of values found on websites. For the purposes of this stage of the project, there is little meaningful distinction between "variables" and their "values", as much of the data could be stored in different formats that blur this distinction. For example, whether or not a saltwater

charter business offers freshwater fishing trips could be a Yes/No question that becomes its own variable or a broad "What other business services are offered?" set of checkboxes.

By generating a list of variables in this manner, we were able to consider the goals of the project and the type of data that would allow us to accomplish them without precluding types of data that are not commonly included on charter websites or not considered *a priori*. This "wish list" (included in the Appendix) was then augmented by reviewing a sampling of websites from the master list. This process helped identify a number of elements of charter businesses and their websites that we had not originally considered, including some business characteristics (e.g., does the business contract additional vessels/captains to meet demand in busy periods or for large groups?) and website elements (e.g., does the website feature photographs of children fishing?). The variables/values selected from these two steps were used for the creation of the first draft of the data entry forms.

As the data entry proceeded, there were several instances in which it became apparent that additional data needed to be collected. Data for these fields were added by re-reviewing websites that had already been covered. Some of the fields added in this late stage included minor "optional" fields such as allowing space for more than one phone number or email address, and important clarifications such as a distinction between cleaning/filleting the catch and processing (vacuum sealing and freezing).

The primary disadvantage of using Google Forms for data collection was that it is not a true relational database for which relational integrity between key variables across tables could be assured. As a result, a process was needed to check and rectify disparities or mismatched data. As with a relational database, we endeavored to minimize repetition in both data entry and storage.

There are four tables populated from the Google Forms, BASE, SNAPSHOT, TRIP PRICES, and TRIP SERVICES. Below is a brief description of their contents:

1. BASE: Consists of business information such as URL and business name, types of services offered, and the amount of archival information about the website contained in the Wayback Machine (part of the Internet Archive, a non-profit library of archived websites, books, movies, and other media).

2. SNAPSHOT: Contains details regarding the business and its website at a particular moment in time. This also includes business name and services, and additionally details such as ZIP code, city, phone number, business services, and what type of pictures/media were included on the website.

3. TRIP PRICES: Consists of details about the types of trips being offered and their prices. This table included trip-level details such as whether or not food and beverages were provided on the boat, if lodging was included in the rate, and the target species and length of time fishing.

4. TRIP SERVICES: Includes additional details regarding what elements were included in the price (lunch, other meals, lodging) and whether elements such as the target species, departure time, and other activities (wildlife viewing) were customizable.

For a detailed list of the specific variables, the data format, and description, see Appendix Tables A-1 (BASE), A-2 (SNAPSHOT), A-3 (TRIP PRICES), and A-4 (TRIP SERVICES). Note that the BASE and SNAPSHOT tables generally are a 1:1 match largely because the SNAPSHOT table was intended to be used to collect data from archived website data found at the Wayback Machine (www.archive.org). Although the additional structure was not necessary

at this time because data collection was limited to currently active websites, it provides the

framework and flexibility for collection of additional data in the future.

An important consideration when developing the database using Google Forms is

selecting the type/format for the data entry fields in the forms. Available options are the

following: short answer, paragraph, multiple choice, checkbox, dropdown menu, date, and

multiple-choice grids. The free entry text fields were avoided for as many variables as possible to

keep the data simple and consistent and avoid the need for excessive data processing post-

collection. Along these lines, built-in validation routines were applied for the URL field, email

address, phone number, and the number of snapshots on the Wayback Machine to simplify the

data management process and to enhance data integrity. These built-in validation routines

prevent invalid data from being saved in the form, with descriptions and details included in the

appendix (Appendix Tables A-5 through A-9). The multiple-choice and dropdown menu field

types functionally serve a similar role in limiting responses to specific pre-defined values, but for

consistency we primarily relied on the multiple-choice format. We used both checkboxes and

multiple-choice grids for a number of fields. The checkboxes produce a single variable with a

semi-colon separated list of affirmative responses, while the multiple-choice grid produced a

series of variables with Yes/No/Unknown answers. Because the checkboxes produced a single

variable with a long list requiring a series of dummy variables be created *ex post* for analysis, the

multiple-choice grid provides more "analysis ready" responses.

The final step in preparing the database in the Google Workspace was to implement code

that would append the URL for editing that particular response to the spreadsheet. We used code

for an app script[5] that had to be run on demand. However, this code came with the disadvantage

---

[5] https://gist.github.com/pierandrea/3fcccada803ca34c9e09.

that it could take up to 5 minutes to run on the larger tables because it ran on all entries, not just new ones. This slowed down data correction throughout the entry/data validation process (described below), but there do appear to be variations of this code[6] that run on submission of each form which would streamline the process and may be preferred for future projects.

Step 3: Data Entry

Data entry proceeded in two phases. The first was completing the BASE form for all websites on the master list. The second was entering the remaining data on the other three forms (SNAPSHOT, TRIP SERVICES, and TRIP PRICES) simultaneously for each valid charter site. Data entry was performed from June to December 2022 with the assistance from an undergraduate intern, who was primarily charged with data entry in the first phase, but also contributed to the second.

The BASE data entry had a lower complexity level and did not require much specific knowledge of fish and fisheries. The first question was simply "Is this a valid Alaska saltwater fishing charter website", and the intern was instructed to answer "Yes" or "Flag for review" so that no website was determined to be invalid without review from the project leads. Websites could be invalid due to location (not serving Alaska), offering exclusively freshwater charters, or not offering guided saltwater charter fishing.[7] Cases of uncertainty for the primary business services, the fishing grounds, and whether a vessel in their fleet is described on the website as a cruise/yacht were flagged for further review by other team members. A report was generated

---

[6] https://www.labnol.org/code/20540-edit-form-response-spreadsheet-url.
[7] Note that some of these invalid charters were initially recorded as valid but later revised based upon subsequent review.

regularly listing all of the websites and fields needing review, which allowed for flexibility in terms of when and by whom those issues were resolved.

The difficulty of data entry was affected by the diversity of Alaska charter business websites, which vary in complexity, organization, and design. Some websites are simple, having few if any webpages beyond the landing homepage and well-organized information, making locating relevant data straightforward. Others are more complex, including multi-level websites with less clear organization, which required considerable time to decipher and locate relevant information. Some websites provide details about trip offerings and their prices on the website, while others redirect visitors to a third-party website or require visitors contact them directly for the information. Additionally, not all websites were compatible with web browser search functions, which were employed frequently to find specific types of information in the websites. For example, this could occur in cases where textual information is embedded in graphics. These and other factors resulted in the data collection process taking longer than anticipated.

Step 4: Data Validation

To validate the data, we designed a series of external validity checks to ensure that the data were consistent and sensible. A complete listing of these are included in the appendix (Appendix Tables A-6 to A-9). We classified outcomes from these checks that required further attention as either "needs correction" or "needs verification", as many of these checks were intended to identify *potential* errors in the data. For example, a ZIP Code outside of the range of 99000 and 99950 means that the business mailing address is outside of Alaska. However, there are several businesses that have their business headquarter mailing address in another state,

which may not be a problem given the seasonal dimension of the charter sector and its participants but is something that needed to be looked into.

The first check for each form was to ensure completeness and consistency of the pseudo-relational database by comparing the key fields linking the tables. The BASE form was compared to the master list to ensure consistency of the URL information, and then the SNAPSHOT form URL was checked to ensure it matched with the BASE form's URL. Similar checks were done for other tables and key fields (ServiceID and Snapshot Date). This ensured that at the end of data entry, all of the forms could be merged together into a single complete analysis data set.[8]

The next class of data validation checks examined internal consistency with respect to the metadata. For example, the "Other amenities: Yes/No" field should be "Yes" if and only if information is input for the "Other amenities" free entry field. When there was an inconsistency found, it was flagged as "needs correction". Another type of internal consistency check was with respect to the data recorded across the forms. As an example, if the rate advertised on the website includes lodging, do the business services in the BASE and/or SNAPSHOT forms include lodging? When the answer was no, the test produced a "needs verification" flag because, in the example case it is possible that they contract for local lodging with a separate business. This flag initiated a review of the source website and entries to these fields in each table.

---

[8] Inconsistency in the entered URLs was revealed to be a significant problem during this step. However, this inconsistency was not purely data entry error. It is likely that between the initial collection of websites in 2018 and the collection of this data in 2022, websites transitioned from unsecured protocol "http://" to secured protocol "https://", or changed the hostname (e.g., "www.website.com" vs. "website.com" without www). Furthermore, the master list was not infallible, with data entry being subject to error as well. In addition to these inconsistencies between the master list and the entered data, we observed some internal inconsistencies within a given website. For example, the homepage may have "www." but the rates page does not, or the booking page is secure protocol while the homepage is not. In this case it was necessary to select one URL to use for the key field.

Finally, we had a number of additional logic checks to ensure the data looked the way we expected, and in the cases where they did not, flag them for review. Examples included having a business ZIP code/area code corresponding to Alaska. This simply provided additional assurances that these unexpected values are accurate and not the result of typos.

This data validation was implemented in R with SQL queries (*sqldf* package) selecting the observations that needed to be reviewed into a table, with the collection of tables saved to a spreadsheet for manual review. Each item was then reviewed in the spreadsheets; when necessary, actions were taken, documented, and reported. Multiple iterations of these validation check spreadsheets were generated, so an aggregate record of all the validity checks and actions taken was also generated. These pre-programmed validity checks were run on a regular basis during the summer, but more sporadically later.

As an additional validity check, and to guard against data entry concerns, we conducted an audit on the data collected for about 10% of websites to ensure responses entered by a different team member matched those originally entered. This process was done during the data collection period and allowed us to flag and then rectify issues early in the process.

Step 5: Creating Analysis Datasets

Once the data had passed all of the validity checks, they were loaded into R for additional processing with the aim of generating a dataset for analysis. The default variable names from Google Forms are long and not well-suited for coding, therefore the variables were renamed at this stage.[9] Some variables related to data management that were unnecessary for the data

---

[9] This data transformation could also be done prior to the validation checks.

analysis stage were dropped, such as the timestamp of data entry, email address of who entered the data, and the Edit URL.

Next, the four tables were merged into a single analysis dataset from which several changes and additions to the data were done to facilitate analysis. This included generating a series of dummy variables based on Checkbox fields, converting Yes/No/Unknown to 1/0/-9, respectively, and converting several free entry fields into dummy variables to indicate presence or absence. Some of this work was performed programmatically in R, while some of it was done manually in Excel using find-and-replace and formulas.

Out of 329 websites on the master list identified via the MTurk HIT in 2018, 277 were found to be active and meet the criteria for inclusion (i.e., they were "valid"). Of these, 268 websites contained information during the data collection period that could be recorded in the SNAPSHOT, TRIP PRICES, and TRIP SERVICES Google Forms. The merged dataset provides data for 257 websites and is summarized in this section. Using the ZIPCODE field, we identified 130 IPHC Area 2C (Southeast Alaska) charter business websites and 127 IPHC Area 3A (Southcentral Alaska) charter business websites.[10] Below, we summarize charter businesses in Area 2C, Area 3A, and all of Alaska in terms of the type of charter fishing trips and services offered, species targeted, amenities offered, rate details, and website features. We also provide summary statistics of charter fishing trip prices in Areas 2C and 3A.

Table 1 displays the percentage of charter websites in Area 2C, Area 3A, and in aggregate that refer to specific saltwater fish species anywhere on the website. Almost all (about 97% of) Area 3A websites mention Pacific halibut, while about 90% of Area 2C websites do. In contrast, almost all (99%) of Area 2C websites mention Chinook (king) salmon, while about 90% of Area 3A websites mention Chinook salmon. Other salmon were mentioned more often on Area 2C websites (65%) compared to Area 3A sites (44%). The majority of charter websites in each area mention lingcod, but sablefish (black cod) are mentioned on less than 10% of websites in each area. Rockfish are mentioned frequently, with almost 70% of Area 2C and 74% of Area 3A websites making mention of them.

---

[10] The main difference between ADF&G's Southeast Alaska area definition relative to IPHC's Area 2C is the inclusion of Yakutat in ADF&G's area definition. In the data, there are only four Yakutat-based businesses, which are unlikely to fundamentally alter the assessment of Area 2C and 3A differences and similarities if couched in terms of Southeast and Southcentral Alaska instead.

Table 1. -- Charter fishing species and on-board amenities.

Variable	Description	Alaska (n=257)	Area 2C (n=130)	Area 3A (n=127)
YACHT	Vessel is described as a yacht or cruise ship. "Motor yacht" was an exception, as this appeared to be applied to small vessels without living quarters.	9.7%	14.6%	4.7%
FISHHAL	The website includes references to Halibut	93.4%	90.0%	96.9%
FISHKING	The website includes references to King/Chinook salmon	94.6%	99.2%	89.8%
FISHCOHO	The website includes references to Silver/Coho salmon	91.4%	93.1%	89.8%
FISHOSAL	The website includes references to other salmon	54.1%	63.8%	44.1%
FISHLING	The website includes references to Lingcod	61.5%	56.2%	66.9%
FISHSABL	The website includes references to Sablefish/Black cod	7.8%	9.2%	6.3%
FISHROCK	The website includes references to Rockfish, Red Snapper, or Yelloweye rockfish	71.2%	68.5%	74.0%
FISHOTH	The website includes references to an OTHER unlisted species (both saltwater and freshwater species are included)	43.6%	40.0%	47.2%
AMENLIC	The website indicates fishing licenses can be purchased onboard the vessel or at the lodge	27.6%	39.2%	15.7%
AMENFOOD	The website indicates food (snacks and/or meals) are provided on the boat	56.0%	77.7%	33.9%
AMENDRNK	The website indicates beverages (e.g. water bottles, soda) are provided on the boat	58.0%	78.5%	37.0%
AMENRNGR	Yes/No/Unknown query if the website indicates raingear are provided to anglers	31.9%	46.9%	16.5%
AMENBEDS	The website indicates beds on the boat. This is primarily for vessels with overnight/multi-day trips, but some do offer a chance to nap on the trip to the fishing grounds	14.4%	12.3%	16.5%
AMENSHOW	The website indicates showers are available on the boat	9.3%	10.0%	8.7%
AMENENT	The website indicates entertainment (e.g. TV/DVD player, library, board games) is available on the boat	6.2%	6.2%	6.3%
AMENOTH	The website indicates on-board amenities that are not listed above	2.7%	3.1%	2.4%

Table 1 also presents information about the percentage of businesses offering various on-board amenities. The ability to purchase fishing licenses and providing food, drink, and raingear on board to customers were all offered by a higher percentage of businesses in Area 2C relative to 3A. Beds, showers, and entertainment options were offered at a small percentage of businesses in both areas (generally 10% or less except in the case of the availability of beds onboard). About 15% of Area 2C businesses referred to one of more vessels as a "yacht", compared to less than 5% of Area 3A businesses.

Table 2. -- Other business services and offerings.

Variable	Description	Alaska (n=257)	Area 2C (n=130)	Area 3A (n=127)
SERVFRSH	The business offers freshwater fishing trips	33.1%	32.3%	33.9%
SERVHUNT	The business offers GUIDED hunting trips	11.3%	8.5%	14.2%
SERVWILD	The business offers Wildlife Viewing/Sightseeing trips	48.6%	46.9%	50.4%
SERVLODG	The business offers Lodging that is SEPARATE from fishing packages	19.5%	14.6%	24.4%
SERVBOAT	The business clearly offers Whole Boat charters	66.9%	67.7%	66.1%
SERVUNGD	The business offers Unguided boat rentals	7.4%	11.5%	3.1%
SERVOUTF	The business also sells gear/equipment for hunting/fishing	2.7%	1.5%	3.9%
SERVTAXI	The business offers Water Taxi or Hunt Transport services	9.7%	5.4%	14.2%
SERVCRAB	The business offers Crabbing, even if it is a small part of a fishing trip	13.6%	21.5%	5.5%
SERVOTH	Other business services not described in other fields are offered	17.9%	13.1%	22.8%
CUSTCRZ	The business offers customizable cruises	10.1%	12.3%	7.9%

Some charter websites indicated that the business offered more than just charter fishing trips. Almost half of Alaska charter businesses offered wildlife viewing or sightseeing tours, about two out of three businesses offered whole boat charters, and a third offered freshwater fishing trips

(Table 2). About 14% of Area 3A charter businesses offered water taxi or hunt transport or guide services. Approximately 9% of Area 2C businesses offered guided hunting trips, and about 5% provide water taxi or transport services. Lodging as a separate service was offered by 15% of Area 2C businesses and almost a quarter of Area 3A businesses. Almost 12% of Area 2C businesses offered boat rentals, while only 3% of Area 3A businesses did. Crabbing in Area 2C is offered by about 22% of businesses, while it is less common in Area 3A (less than 6%).

Information about the rates charged and payment options was also collected (Table 3). Fishing trip rates sometimes included fish processing (vacuum packing and freezing) -- about 40% of Area 2C businesses' prices included this, while less than one-quarter did in Area 3A. However, a higher percentage of Area 3A businesses (74%) compared to 2C businesses (54%) included cleaning and filleting of fish in the price. There are some other notable differences between what was included in rates in Area 2C and in Area 3A. Transportation to the boat or lodge from the airport, hotel, or cruise ship is often included in Area 2C (46%) but not 3A (10%). Off-vessel lodging and meals are more often included in the price paid in Area 2C compared to 3A. A higher proportion of Area 2C businesses included the price of a fishing license in the rate (13% compared to 4%). Fuel surcharges were charged by about 18% of Area 3A charter businesses but only 6% of Area 2C businesses. Fewer than 8% of charter websites indicated the rates included taxes. Acceptable payment types were not mentioned on the majority of websites, but the payment options most frequently mentioned on websites were Visa and Mastercard (about 39%), followed by other credit cards types, check, and cash.

Table 3. -- Payment types accepted and included amenities.

Variable	Description	Alaska	Area 2C	Area 3A
PAYVISA	The business accepts Visa	38.9%	33.1%	44.9%
PAYMC	The business accepts MasterCard	38.5%	32.3%	44.9%
PAYAMEX	The business accepts American Express	33.1%	29.2%	37.0%
PAYDISC	The business accepts Discover	30.0%	26.2%	33.9%
PAYCHCK	The business accepts Check	25.3%	25.4%	25.2%
PAYCASH	The business accepts Cash	23.3%	21.5%	25.2%
PAYCRYP	The business accepts Cryptocurrency	0.0%	0.0%	0.0%
PAYTRAN	The business accepts Transfer services such as PayPal, Venmo, Zelle	2.3%	2.3%	2.4%
PAYUNK	The website does not indicate which payment methods are accepted	56.0%	60.0%	52.0%
FSURCHG	The business charges fuel surcharges	12.1%	6.2%	18.1%
INCLTAX	Rate includes taxes	6.9%	7.6%	6.3%
INCLLIC	Rate includes fishing license fees	8.2%	13.1%	3.8%
INCLFILL	Rate includes Filleting/Cleaning	64.2%	53.6%	73.7%
INCLAIR	Rate includes shipping fish boxes to the airport	2.6%	4.7%	0.7%
INCLSHIP	Rate includes shipping fish boxes to home address	0.0%	0.0%	0.0%
INCLONBD	Rate includes lodging onboard the vessel	5.3%	5.1%	5.4%
INCLLODG	Rate includes lodging off the fishing vessel	37.1%	43.3%	31.4%
INCLLNCH	Rate includes lunch	34.3%	51.2%	19.0%
INCLMEAL	Rate includes breakfast and/or dinner	28.1%	38.5%	18.8%
INCLTRAN	Rate includes transportation to the lodge/boat from the airport/cruise ship/etc	26.6%	45.5%	9.5%
INCLOTH	Rate includes another service not described in the options	8.8%	11.5%	6.3%
INCLPROC	Rate includes processing in addition to filleting (vacuum-packing, freezing)	31.1%	39.4%	23.6%

Table 4. -- Other website features.

Variable	Description	Alaska (n=257)	Area 2C (n=130)	Area 3A (n=127)
TGTCRUZ	Appears to target marketing towards cruise ship passengers	16.3%	32.3%	0.0%
VIDEO	Contains video, either built in or embedded YouTube	42.8%	37.7%	48.0%
KIDPICS	Contains photos of children fishing or posing with the catch	58.8%	58.5%	59.1%
SETPICS	Has photos of anglers and their catch with a set-piece. A set piece is defined as something for hanging the fish which contains identifiable marketing (Business name, City/Port name, etc)	38.1%	23.8%	52.8%
SCENPICS	Contains photos of scenery	78.6%	80.8%	76.4%
WILDPICS	Has photos of other wildlife (excl. ones of hunters w/catch)	77.0%	80.8%	73.2%

Additional information about Alaska charter websites presented in Table 4 were collected in part to understand the marketing strategies (e.g., target market) of these businesses. For example, about a third of Area 2C charter websites seemed to cater information on the website towards potential customers from cruise ships, while no websites for Area 3A businesses did. The majority of websites included pictures of children fishing or posing with their catch (59%), and at least three-quarter of websites included photos of scenery or of wildlife. A larger percentage of Area 3A (48%) websites contained video embedded on the website compared to those in Area 2C (38%). Another difference between websites in the two regions is the inclusion of "set-piece" photos of anglers and their catch, which is exemplified by anglers posing next to the caught fish hanging from a structure with signage indicating the business name, port, or location. Over half of Area 3A websites had one of these set-piece photos, while less than a quarter of Area 2C websites did.

Charter fishing trip prices

One of the key pieces of information collected from websites was the rate charged for charter fishing trips. These charter fishing trip prices varied by fishing trip length, species targeted, and, as discussed above, what amenities and services are included. Charter fishing trip prices are often charged on a per-person basis, but other rates were also present on some websites (e.g., hourly rate or prices for different sized groups including whole boat rates). Some fishing trip prices are specific to different times of the year (e.g., off-peak vs. peak season), while others were valid for the entire year. Most charter websites provided rate information for multiple types of trips. In this report, we do not attempt to analyze every possible subset of prices. Rather, we present the overall price distribution for all per-person charter fishing trip prices for trips targeting any species (Table 5) and for halibut-focused charter fishing trip prices (Table 6).

Table 5 presents the descriptive statistics for per-person charter fishing trip prices for the four most common fishing trip lengths: a half-day trip (~4 hours), three-quarter day trip (~6 hours), full-day trip (~8-10 hours), and multi-day trip (2+ days). Charter fishing trip prices for full-day trips in Area 3A and multi-day trips in both areas were the most common on charter websites, but half-day and three-quarter day trips were found on dozens of websites in each area. Average prices in Area 2C tended to be higher than in Area 3A regardless of trip duration, but this difference was only statistically significant for trips longer than a half-day. The mean price for a half-day charter fishing trip in Area 2C was $244 (standard error [s.e.] = $9.30) and $222 (s.e. = $5.25) in Area 3A, with ranges between $125 and $400. For a three-quarter day charter fishing trip, the mean prices were $317 (s.e. = $13.00) in Area 2C and $269 (s.e. = $10.88) in Area 3A. Three-quarter day prices ranged from a low of $170 to a high of $525. For full-day trips, the means were $410 (s.e. = $12.10) in Area 2C and $351 (s.e. = $3.77) in Area 3A, with a

maximum full-day price of $700 per-person in Area 2C and $500 in Area 3A. Multi-day prices had the widest range (from a low of $675 to a high of over $13,000), likely due in part to these prices not distinguishing the different lengths of trips that are pooled in this category. In Area 2C, the multi-day mean trip price is $4,017 (s.e. = $123.73). In Area 3A, it is $3,192 (s.e. = $110.11).

Table 5. -- Per-person charter fishing trip prices (in US dollars) by trip length (any species).

Half-Day

	Mean	Median	Std Dev	Min	Max	Count
Alaska	237.04	225.00	62.78	125.00	400.00	89
Area 2C	243.98	240.00	72.65	125.00	400.00	61
Area 3A	221.90	225.00	27.77	175.00	299.00	28

Three-Quarter Day

	Mean	Median	Std Dev	Min	Max	Count
Alaska	293.88	295.00	74.51	170.00	525.00	69
Area 2C	316.78	315.00	78.04	170.00	525.00	36
Area 3A	268.91	250.00	62.49	170.00	395.00	33

Full-Day

	Mean	Median	Std Dev	Min	Max	Count
Alaska	361.46	350.00	70.63	175.00	700.00	321
Area 2C	410.35	400.00	89.71	250.00	700.00	55
Area 3A	351.35	350.00	61.53	175.00	500.00	266

Multi-Day

	Mean	Median	Std Dev	Min	Max	Count
Alaska	3,653.32	3,300.00	1,952.70	675.00	13,310.00	511
Area 2C	4,016.62	3,597.00	2,092.49	800.00	13,310.00	286
Area 3A	3,191.54	2,895.00	1,651.64	675.00	9,995.00	225

As Pacific halibut is a federally-managed species in Alaska, we provide summary statistics for the subset of per-person charter fishing trip prices that target halibut. These trips include both trips that solely target halibut and those that target halibut along with other species on the same trip. As Table 6 displays, these halibut charter fishing trip prices follow similar patterns to those in Table 5. For each trip length charter trip type, the mean per-person prices for halibut charter trips are of the same magnitude as those calculated across all charter fishing trips.

Table 6. -- Per-person charter fishing trip prices (in US dollars) by trip length (targeting halibut, including combo trips).

Half-Day						
	Mean	Median	Std Dev	Min	Max	Count
Alaska	231.76	200.00	81.23	130.00	400.00	33
Area 2C	248.45	200.00	98.74	130.00	400.00	20
Area 3A	221.90	200.00	31.32	175.00	299.00	13
Three-Quarter Day						
	Mean	Median	Std Dev	Min	Max	Count
Alaska	273.68	247.50	81.95	170.00	525.00	34
Area 2C	322.50	307.50	97.86	170.00	525.00	14
Area 3A	239.50	232.50	46.11	170.00	350.00	20
Full-Day						
	Mean	Median	Std Dev	Min	Max	Count
Alaska	346.37	350.00	80.63	175.00	700.00	122
Area 2C	436.67	400.00	103.78	250.00	700.00	21
Area 3A	327.60	335.00	60.36	175.00	486.00	101
Multi-Day						
	Mean	Median	Std Dev	Min	Max	Count
Alaska	3,700.80	3,200.00	2,344.19	675.00	13,310.00	191
Area 2C	4,378.66	3,600.00	2,588.09	895.00	13,310.00	96
Area 3A	3,015.81	2,545.00	1,842.41	675.00	8,700.00	95

DISCUSSION AND CONCLUSIONS

In this report, we described the development and implementation of a project to collect detailed information about Alaska saltwater charter fishing businesses and their trip offerings. We also described the website data collected during 2022 and compared some similarities and differences between charter fishing businesses in IPHC Areas 2C and 3A in terms of their fishing trip and other services offered, amenities, and fishing trip prices.

In so doing, we were able to observe a few things of note. First, as expected Pacific halibut is the key target species emphasized by Area 3A charter businesses, while Pacific salmon -- and particularly Chinook or king salmon -- is emphasized more in Area 2C. However, other saltwater target species are frequently mentioned on websites in both areas. Second, Alaska saltwater charter fishing businesses often offer more than just charter fishing trip services, most frequently wildlife viewing or sightseeing trips and freshwater fishing trips. Whole boat charters were also frequently offered in both areas. Third, Area 2C websites tended to indicate more amenities were included with the charter fishing experience compared to those in Area 3A. Fourth, fishing trip prices in Area 2C typically included more in the rate -- food and beverages, lodging, and transportation services were often bundled in the price. This could account for some of the price differential found between overall per-person charter fishing trip prices, where prices for charter trips longer than a half-day tended to be on average higher in Area 2C than in Area 3A. However, to fully understand the effect the included services and amenities have on the overall price of a charter fishing trip, a hedonic price regression analysis is needed (e.g., Carter 2015, 2016). This type of analysis is currently underway but is not included in this report.

A few things are important to mention about this project and the data collected from it. First, a challenge in interpreting the data is the temporal attribution problem. That is, to which fishing season does the website information apply? We collected data from active (and in a few cases archived) websites during the latter half of 2022. The main saltwater fishing season in Alaska generally runs between Memorial Day (end of May) and Labor Day (beginning of September). As a result, some of those websites may have outdated information (e.g., last season's information) or represent a business that is no longer active (e.g., one website had information suggesting it was several years old and the owner was retiring). In addition, many businesses book up most of their season months ahead of time (Lew and Lee 2019). Those businesses may then have had information valid for the upcoming (2023), rather than current (2022), season on their websites during the data collection period. As a result, it is difficult to know whether the data summaries should be interpreted to represent the Alaska charter sector in 2022 or 2023. Likely, it is mixed. This also points to the need to carefully consider when to collect website data in future data collections.

Second, we identified Alaska charter fishing websites from a list of URLs that were collected through crowdsourcing methods in 2018. This list would miss any new charter business websites that were created in the interim period prior to data collection. While we did find and add a couple additional websites in the course of data collection, the master list should be re-evaluated in any future iterations of this project.

Third, the data collected represent a snapshot of information about the Alaska charter sector, but continuing to collect these data on a regular basis in the future is necessary to gain a fuller understanding of how the sector changes over time in the midst of regulatory, demographic, macroeconomic, and environmental changes. The original project was scoped in a

way that intended to also collect past website data, such as historical prices that had been posted on earlier iterations of the websites. For this, we had intended to use Archive.org's Wayback Machine, which is one of several internet archives that stores snapshots of parts of the World Wide Web. These snapshots are obtained through various web crawlers and other contributors, including when making queries within the Wayback Machine itself. Since the snapshots were not of the entire internet and are not done at specific and regular intervals, it became clear that a snapshot date may not provide sufficient information about when the website information was valid. This posed a problem since the original plan was to use data collected from historical website snapshots to be able to examine how fishing trips and prices, services and amenities, and other characteristics of charter businesses change over time. It is also problematic because of the number of snapshots. In this study, the average number of snapshots charter businesses in this study had is 130 with the lowest number of snapshots being 3 and the largest 782. A further wrinkle in the intended use of the Wayback Machine for capturing changes in the business model and pricing was the observed inconsistency in the crawls across sub-pages within a given website. It was observed that even if the homepage may have a snapshot from one year, the most recent snapshot of a "Rates" page may be from much earlier. This meant that it may not be possible to make a temporal match between business information such as captain, boats, and other offered business services and trip prices. As a result, we leave for future exploration investigating ways of using and validating the Wayback Machine or other internet archive data for tracking past changes in the Alaska charter sector.

Fourth, manual data collection of the sort described in this report is labor intensive and thus can be expensive. While future implementations of this project for Alaska will require less funding due to the now-developed database, protocols, and validation tools, there remain the

need for a team to collect, validate, process, and analyze the data. Moreover, to the extent there are changes in what information charter businesses provide on their websites, there will be a need to modify the database and validation checks.

Fifth, while the project described here was developed and implemented to collect website data for Alaska charter businesses, the general approach can be applied in other U.S. regions. Charter fishing businesses in other U.S. regions generally will have different target species and provide different non-fishing services and amenities. This report outlines steps that can be taken to build an appropriate database for collecting charter website data in those regions, but it is likely that the specific variables/fields used here are not portable to these other regions.

Finally, an alternative approach to the one described here would be to automate the data collection process through webscraping. Webscraping, or web harvesting, refers to using software or bots to collect information from websites. A difficulty of this type of approach noted earlier is the diversity of the types and quality of Alaska charter fishing websites. However, modern artificial intelligence (AI) tools may provide a means to circumvent these obstacles. We leave exploration of this alternative approach for future research. However, we note that it will be important to evaluate data collected from any such AI-driven webscraping process with manual methods like the one described in this report to ensure data accuracy and validity.

ACKNOWLEDGMENTS

CITATIONS

Carter, D. W. 2015. The prices for for-hire marine fishing trips in the southeastern U.S. collected from websites: 2011-2013. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-682, 28 p.

Carter, D. W. 2016. The prices for for-hire marine fishing trips in the southeastern U.S. collected from websites: 2014 and 2015. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-694, 25 p.

Grothendieck, G. 2017. _sqldf: Manipulate R Data Frames Using SQL_. R package version 0.4-11, <https://CRAN.R-project.org/package=sqldf>.

Jennings, G. B., Sundet, K., and, Bingham, A. E. 2015. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2011. Alaska Department of Fish and Game, Fishery Data Series No. 15-04, Anchorage.

Larson, D. M., and Lew, D. K. 2013. How do harvest rates affect angler trip patterns? Marine Resource Economics 28(2): 155-173.

Lew, D. K., and Larson, D. M. 2015. Stated preferences for size and bag limits of Alaska charter boat anglers. Marine Policy 61: 66-76.

Lew, D. K., and Larson, D. M. 2017. Stated preferences of Alaska resident saltwater anglers for contemporary regulatory policies. Marine Fisheries Review 79(3-4): 12-25.

Lew, D. K., and Lee, J. 2019. Costs, earnings, and employment in the Alaska saltwater sport fishing charter sector, 2017. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-398, 59 p. + Appendices.

Lew, D. K., Putman, D., and Larson, D. M. 2016. Attitudes and preferences toward Pacific halibut management alternatives in the saltwater sport fishing charter sector in Alaska: Results from a survey of charter halibut permit holders. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-AFSC-326, 58 p.

Lew, D. K., and Seung, C. K. 2020. Measuring economic contributions of the marine recreational charter fishing sector using a resampling approach. ICES Journal of Marine Science 77(6): 2285-2294.

Powers, B., and Sigurdsson, D. 2016. Participation, effort, and harvest in the sport fish business/guide licensing and logbook programs, 2014. Alaska Department of Fish and Game, Fishery Data Series No. 16-2, Anchorage.

APPENDIX

Potential variables to collect from websites

Data entry information

1. URL (web address)
2. Who entered this data? (your e-mail)
3. When was the data entered? (date entered)
4. Date of website information (recall that we will also be entering data for past versions of webpages from archive.org)
5. Valid Alaska charter fishing website? (yes/no)

General business/website information

1. Name of business
2. Business location information (city, town, or borough or other named place they operate from)
3. Contact information (e-mail address, phone number, mailing address)
4. Captain(s) listed
5. Owner(s) listed
6. Number of boats/vessels
7. U.S. Coast Guard license number
8. ADF&G business license number
9. Other license/permit identifier(s) (specify)
10. Business operation dates and any restrictions (e.g., only on weekends)
11. Targets cruise ship anglers?
12. Does the site mention a charter halibut permit (CHP)?
13. Primarily operates as a fishing lodge?
14. Does the site mention fishing regulations (daily bag limits or size restrictions)?

Vessel/boat information (used in saltwater fishing)

1. Length/size of vessel
2. Vessel capacity (# anglers/passengers it can accommodate)
3. On-board amenities listed
4. Coast Guard vessel ID

Services offered (general)

1. Saltwater fishing trips (ocean, bays, inside passage)
2. Freshwater fishing trips (rivers, streams)
3. Hunting trips
4. Ecotour/wildlife viewing trips
5. Lodging
6. Whole boat charter

7. Boat rentals
8. Fishing guide services
9. Hunting guide services
10. Other guide services
11. Yacht trips
12. Water taxi services
13. Other (specify)

SALTWATER Fishing-related services and prices

1. Details of each trip offering
   a. Base price trip offered
   b. Rate includes/excludes taxes
   c. Year the rate applies
   d. Length/duration (e.g., 4-, 6-, 8- hour, overnight, multi-day)
   e. Rate type (individual: adult, child, senior citizen, military, etc.; group rate: #persons; full boat rate)
   f. Species targeted/listed (Pacific halibut, king/Chinook salmon, silver/coho salmon, other salmon, lingcod, black cod/sablefish, rockfish)
   g. Combination fishing and other activity (hunting, wildlife viewing, etc.)
   h. Timing (weekend rate, peak season rate, etc.)
   i. What's included? (transportation to boat, fishing equipment/gear, bait/tackle/ice, food/meals, snacks, drinks, on-board overnight accommodations, shore-based lodging, fish processing, other services like whale watching, crabbing/crab pots)
2. Add-ons (include costs when available)
   a. Fuel surcharge (e.g., for certain trips to more distant locations)
   b. Fish processing
   c. Transportation to/from boat (e.g., hotel pick-up)
   d. Lodging
   e. Food/drinks
   f. Credit card surcharge
3. Discounts available
   a. Child discount rate
   b. Military rate
   c. Senior citizen rate
   d. Group rates
   e. AAA rate
   f. Cash payments
   g. Other (specify)
4. Refund policy for cancellations
   a. Full refund available by date for cancellation?
   b. Partial refund available for cancellation?
   c. No refunds for cancellations
   d. Credit for future trip

Appendix Table A-1. -- BASE variables.

Variable	Data Entry Format	Data Format	Description
URL	Free	Text	URL of the website homepage. Some websites are not internally consistent with respect to "http(s)" and "www." so we used the homepage.
SnapshotDate	Calendar	Date	The Wayback Machine snapshot date for the website OR the date of data entry. If the most recent Wayback Machine snapshot had prices that differed from the website the date of data entry was used.
ValidSaltCharter	Radio Buttons	Text	Does the site offer GUIDED SALTWATER charter fishing trips in ALASKA? Yes/No
Name	Free	Text	Business name according to the master list (compiled by Mechanical Turk in 2018)
PrimaryServices	Checkboxes + Other	Text	Business services offered according to the website. The definition we used for primary business services was "Something that can be purchased separately OR is an integral part of packages." We were likely inconsistent in applying the definition of "primary services".
Email	Free	Text	Contact email address on website (if available)
Phone	Free	Text	Contact phone number on website (if available)
WaybackIterations	Free	Numeric	Number of iterations stored on Wayback Machine as of date of BASE data entry. Possibly updated subsequently.
MostRecentUpdate	Calendar	Date	Most recent iteration stored on Wayback Machine as of date of BASE data entry. Possibly updated subsequently.
Update1996	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 1996
Update1997	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 1997
Update1998	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 1998
Update1999	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 1999
Update2000	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2000
Update2001	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2001

	Radio		
Update2002	Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2002
Update2003	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2003
Update2004	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2004
Update2005	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2005
Update2006	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2006
Update2007	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2007
Update2008	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2008
Update2009	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2009
Update2010	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2010
Update2011	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2011
Update2012	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2012
Update2013	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2013
Update2014	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2014
Update2015	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2015
Update2016	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2016
Update2017	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2017
Update2018	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2018
Update2019	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2019

Update2020	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2020
Update2021	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2021
Update2022	Radio Buttons	Text	Yes/No flag if the Wayback Machine has a snapshot from 2022
FirstIteration	Calendar	Date	First iteration stored on Wayback Machine.
BaseNotes	Free	Text	Notes/Comments on the website related to the data at a broad scale.
AddtlPhone	Free	Text	Additional contact phone number on website (if available)
ArchiveDate	Calendar	Date	WaybackMachine Website archive date IF website is not currently live.
AreaCode	Calculated	Text	Area code extracted from phone number
tollfree	Calculated	Text	True/False flag if the Area Code is one of 800, 822, 833, 844, 855, 866, 877, 888

Appendix Table A-2. – SNAPSHOT variables

Variable	Data Entry	Data Format	Description
CurrentFlag.x	Radio Buttons	Text	Yes/No flag if the Website Snapshot Data is taken from the Current site or a Wayback Machine snapshot
MatchesMaster	Radio Buttons	Text	Yes/No flag if the business name matches the business name from the master list. "No" answers are related to both significant name changes from mergers and to typos or other minor errors in the master list.
Location	Free	Text	City or port of the business
ZIPCode	Free	Numeric	Mailing ZIP code of the business (may not be the ZIP code the business is located)
FishingGrounds	Free	Text	Description of where the business fishes (e.g., Kachemak Bay, Cook Inlet, Prince of Wales Island). We were inconsistent in recording this for cities such as Seward which are synonymous with good fishing.
Captain	Free	Text	Name(s) of captains recorded on website
Owner	Free	Text	Name(s) of owners recorded on website
NumBoats	Free	Text	Number of boats indicated on website (may contain non-numeric information)
ContractExternal	Radio Buttons	Text	Yes/No flag if the business coordinates with other captains/vessels for added capacity
VesselNames	Free	Text	Name(s) of vessels recorded on website
YachtFlag	Radio Buttons	Text	Yes/No flag if the vessel is described as a yacht or cruise ship. "Motor yacht" was an exception, as this appeared to be applied to small vessels without living quarters.
VesselCapacity	Free	Text	Stated capacity of vessels. This may be 1:1 with vessel names, or just a general description of what capacity vessels are available.

FishHalibut	Radio Buttons	Text	Yes/No flag if the website includes references to Halibut
FishKing	Radio Buttons	Text	Yes/No flag if the website includes references to King/Chinook salmon
FishCoho	Radio Buttons	Text	Yes/No flag if the website includes references to Silver/Coho salmon
FishOthSalmon	Radio Buttons	Text	Yes/No flag if the website includes references to other salmon
FishLingcod	Radio Buttons	Text	Yes/No flag if the website includes references to Lingcod
FishSablefish	Radio Buttons	Text	Yes/No flag if the website includes references to Sablefish/Black cod
FishRockfish	Radio Buttons	Text	Yes/No flag if the website includes references to Rockfish, Red Snapper, or Yelloweye rockfish
FishOtherFlag	Radio Buttons	Text	Yes/No flag if the website includes references to an OTHER unlisted species (both saltwater and freshwater species are included)
FishOther	Free	Text	OTHER unlisted species (both saltwater and freshwater species are included)
AmenLic	Radio Buttons	Text	Yes/No/Unknown query if the website indicates Licenses can be purchased onboard the vessel or at the lodge
AmenFood	Radio Buttons	Text	Yes/No/Unknown query if the website indicates food (snacks and/or meals) are provided on the boat
AmenDrinks	Radio Buttons	Text	Yes/No/Unknown query if the website indicates beverages (e.g. water bottles, soda) are provided on the boat
AmenRaingear	Radio Buttons	Text	Yes/No/Unknown query if the website indicates raingear are provided to anglers
AmenBeds	Radio Buttons	Text	Yes/No/Unknown query if the website indicates beds on the boat. This is primarily for vessels with overnight/multi-day trips, but some do offer a chance to nap on the trip to the fishing grounds

AmenShowers	Radio Buttons	Text	Yes/No/Unknown query if the website indicates showers are available on the boat
AmenEntertainment	Radio Buttons	Text	Yes/No/Unknown query if the website indicates entertainment (e.g. TV/dvd player, library, board games) is available on the boat
AmenOthFlag	Radio Buttons	Text	Yes/No query if the website indicates on-board amenities that are not described in the preceding questions
AmenOther	Free	Text	Decription of other on-board amenities
ServFresh	Radio Buttons	Text	Yes/No flag if the business offers freshwater fishing trips
ServHunt	Radio Buttons	Text	Yes/No flag if the business offers GUIDED hunting trips
ServWild	Radio Buttons	Text	Yes/No flag if the business offers Wildlife Viewing/Sightseeing trips
ServLodg	Radio Buttons	Text	Yes/No flag if the business offers Lodging SEPARATE from fishing packages
ServWholeBoat	Radio Buttons	Text	Yes/No flag if the business clearly offers Whole Boat charters
ServUnguided	Radio Buttons	Text	Yes/No flag if the business offers Unguided boat rentals
ServOutfit	Radio Buttons	Text	Yes/No flag if the business also sells gear/equipment for hunting/fishing
ServTaxi	Radio Buttons	Text	Yes/No flag if the business offers Water Taxi or Hunt Transport services
ServCrab	Radio Buttons	Text	Yes/No flag if the business offers Crabbing, even if it is a small part of a fishing trip
ServOthFlag	Radio Buttons	Text	Yes/No flag if other business services not described in other fields are offered
ServOther	Free	Text	Other unlisted business services
PayVisa	Radio Buttons	Text	Yes/No flag if the business accepts Visa

PayMasterCard	Radio Buttons	Text	Yes/No flag if the business accepts MasterCard
PayAmEx	Radio Buttons	Text	Yes/No flag if the business accepts American Express
PayDiscover	Radio Buttons	Text	Yes/No flag if the business accepts Discover
PayCheck	Radio Buttons	Text	Yes/No flag if the business accepts Check
PayCash	Radio Buttons	Text	Yes/No flag if the business accepts Cash
PayCrypto	Radio Buttons	Text	Yes/No flag if the business accepts Cryptocurrency
PayTransfer	Radio Buttons	Text	Yes/No flag if the business accepts Transfer services such as PayPal, Venmo, Zelle
PayUNK	Radio Buttons	Text	Yes/No flag if thewebsite does not indicate which payment methods are accepted
CreditSurcharge	Free	Text	Description of any surcharge on credit card payments
ReqdDeposit	Free	Text	Description of the deposit required to secure your reservation
PaymentDue	Free	Text	Description of when the full payment is due
RefundPolicy	Free	Text	Full description of the business' cancellation/refund policy (copy-and-paste)
FuelSurcharge	Radio Buttons	Text	Yes/No/Unknown flag if the business charges any fuel surcharges
Discounts	Free	Text	Description of available discounts (e.g. Children, Seniors, Military, large groups)
TargetCruise	Radio Buttons	Text	Yes/No flag if the website appears to target marketing towards cruise ship passengers
Video	Radio Buttons	Text	Yes/No flag if the website contains video, either built in or embedded YouTube
PhotoKids	Radio Buttons	Text	Yes/No flag if the website contains photos of children fishing or posing with the catch

PhotoSet	Radio Buttons	Text	Yes/No flag if the website contains photos of anglers and their catch with a set-piece. A set pieces is defined as something for hanging the fish which contains identifiable marketing (Business name, City/Port name, etc)
PhotoScenery	Radio Buttons	Text	Yes/No flag if the website contains photos of scenery
PhotoWildlife	Radio Buttons	Text	Yes/No flag if the website contains photos of other wildlife (excluding pictures of hunters with their kill)
Notes	Free	Text	Other notes/comments related to the website snapshot
PricesOnSite	Radio Buttons	Text	Are the prices of fishing trips a) available on the website snapshot, b) available only by contact, c) not available due to issues with the snapshot
ServCruise	Radio Buttons	Text	Yes/No flag if the business offers customizable cruises
NameNew	Free	Text	The updated business name when MatchesMaster is NO

Appendix Table A-3. Trip Prices variables

Variable	Data Entry	Data Format	Description
ServiceID	Free	Text	Identifier unique to the URL for the suite of services
CurrentFlag.y	Radio Buttons	Text	Yes/No flag if the Price Data is taken from the Current site or a Wayback Machine snapshot
TargetSpecies	Radio Buttons + Other	Text	Target species for the trip(s). Marking more than one species indicates same price for single-species trips.
TripType	Radio Buttons	Text	Categorical description of the trip length
TripDuration	Free	Text	Length of trip in hours or days/nights
Price	Free	Text	Reported price for the trip
PriceUnits	Radio Buttons	Text	Units of the price for the trip. "Per person" and "Per group" were the default options. Additional units that appeared also include "Per person per day"
PriceLimitations	Free	Text	Are there any limitations to the trip/price combo, such as particular classes of customers (children, returning customers), calendar timing (peak or off-peak season), or a particular boat in the fleet. This was a free-entry field.
PriceNotes	Free	Text	Any additional notes/comments on the trip price.
MultiSpecies	Radio Buttons + Other	Text	A list of the multi-species targets/options in the trip. Lingcod and Rockfish may be listed even if they are not explicitly targeted but are referenced on the website with respect to common catches.

Snap_date	Calculated	Date	Date formatted version of snapshot date
year	Calculated	Numeric	Year extracted from Snap_date
PriceNum	Calculated	Numeric	Numeric version of price
TargetHalibut	Calculated	Numeric	Dummy variable for whether the single OR multi-species trip targets halibut
TargetSalmon	Calculated	Numeric	Dummy variable for whether the single OR multi-species trip targets salmon
TargetRockfish	Calculated	Numeric	Dummy variable for whether the single OR multi-species trip targets Rockfish/Red Snapper
TargetLingcod	Calculated	Numeric	Dummy variable for whether the single OR multi-species trip targets Lingcod
TargetMulti	Calculated	Numeric	Dummy variable for whether the trip is multi-species

Appendix Table A-4. – Trip Services variables

Variable	Data Entry	Data Format	Description
RateTaxes	Radio Buttons	Text	Yes/No/Unknown for if rate includes taxes
RateLic	Radio Buttons	Text	Yes/No/Unknown for if rate includes License fees
RateFillet	Radio Buttons	Text	Yes/No/Unknown for if rate includes Filleting/Cleaning
RateShipAirport	Radio Buttons	Text	Yes/No/Unknown for if rate includes shipping fish boxes to the airport
RateShipHome	Radio Buttons	Text	Yes/No/Unknown for if rate includes shipping fish boxes to home address
RateLodgingOnboard	Radio Buttons	Text	Yes/No/Unknown for if rate includes lodging onboard the vessel
RateLodging	Radio Buttons	Text	Yes/No/Unknown for if rate includes lodging off the fishing vessel
RateLunch	Radio Buttons	Text	Yes/No/Unknown for if rate includes lunch
RateMeals	Radio Buttons	Text	Yes/No/Unknown for if rate includes breakfast and/or dinner
RateTransport	Radio Buttons	Text	Yes/No/Unknown for if rate includes transportation to the lodge/boat from the airport/cruise ship/etc.
RateOtherFlag	Radio Buttons	Text	Yes/No for if rate includes another service not described in the options
RateOther	Free	Text	Description of other things included in the rate
TripFuelSurcharge	Radio Buttons	Text	Yes/No/Unknown for it the trip includes a fuel surcharge. May or may not be trip-specific.

ServiceNotes	Free	Text	Other notes/comments related to the services
CustomFishing	Radio Buttons	Text	Yes/No flag for if the trip allows for customer input into the target species
CustomScheduling	Radio Buttons	Text	Yes/No flag for if the trip allows for customer input into the timing (departure and/or return)
CustomActivities	Radio Buttons	Text	Yes/No flag for if the trip allows for customer input into additional non-fishing activities (wildlife viewing, kayaking, etc.)
RateProcessing	Radio Buttons	Text	Yes/No/Unknown for if rate includes processing in addition to filleting (vacuum-packing, freezing)

<u>Validity Checks</u>

Appendix Table A-5. -- Google Forms – Response Validation Details.

Field	Validation Type	Details
URL	Regular expression	matches https?\:\/\/[a-zA-Z0-9\-\.]+\.[a-zA-Z]{2,}/
Phone number	Regular expression	matches \d{3}-\d{3}-\d{4}
Contact email	Text	Email
Number of snapshots	Number	Greater than or equal to 1
Zip code	Number	Between 00001 and 99950

Appendix Table A-6. -- BASE Form Validity Checks.

Check Number	Check Description	Code/Logic	Action
B0	Key variables must be unique	URL must be unique	Correct
B1	Entered URL must match a Master List URL	Entered URL contained in Master List URLs	Correct
B2	All Master List URLs must be accounted for	Check for URLs in Master List but not in Entered URLs	Correct
B3	Entered business name must match the business name for the same website	Entered Business Name = Business Name from master list for matching URL	Correct/Verify
B4	Contact email should have a domain that matches the website (or be a common email provider)	Entered email domain = Entered URL domain (or Gmail, Hotmail, AOL, Yahoo)	Verify
B5	Phone number should have an Alaska area code.	Entered phone number area code = 907	Verify
B6	Number of iterations on Wayback Machine must be an integer	Entered number is an integer	Correct
B7	Number of iterations on Wayback Machine is likely to be less than 300	Entered number is <300	Verify
B8	First Iteration corresponds to year Y/N entries	Entered first iteration year matches the year Yes/No entries	Correct
B9	Most recent update corresponds to year Y/N entries	Entered most recent update matches the year Yes/No entries	Correct
B10	Most recent update and first iteration are equal if and only if there is only 1 iteration on Wayback Machine		Correct
B11	Most recent update must be prior to entry date	Entered most recent update is before entry timestamp	Correct

Appendix Table A-7. -- SNAPSHOT Form Validity Checks.

Check Number	Check Description	Code/Logic	Action
S0	Key variables must be unique	URL and Snapshot Date must be unique	Correct
S1	URL must match Base Data	Entered URL appears in Base Data	Correct
S2	All URLs must be accounted for	Every valid saltwater fishing URL from the base data should be present	Correct
S3	Snapshot date should coincide with snapshot ranges	Entered date is between first and last iteration in base data. Only mandatory if it is not the current website information.	Verify (DEPRECATED)
S4	Current website data should coincide with most recent update	If YES to current data, then the date equals most recent update in base data. (Except if snapshot appears in S3…to avoid double counting)	Verify (DEPRECATED)
S5	Zip code should be in Alaska	ZIP between 99501 and 99950	Verify
S6	"Other species" should be entered if and only if "Other" is yes	Other = Yes IFF Other Species is not null	Correct
S7	"Other amenities" should be entered if and only if "Other" is yes	Other = Yes IFF Other Amenities is not null	Correct
S8	"Other business services" should be entered if and only if "Other" is yes	Other = Yes IFF Other Business Services is not null	Correct
S9	Payment method not indicated if and only if all others are no	Not indicated on website = YES IFF all other payment methods are NO	Correct
S10	Credit card surcharge should only be entered if they accept credit cards (or not indicated)	Credit card surcharge is entered IFF one of Visa, MasterCard, AmEx, Discover accepted OR Payment Methods not indicated	Correct
S11	Freshwater fishing is yes if and only if Base Data indicates Freshwater fishing business services	Freshwater fishing = YES IFF Base Services includes Freshwater fishing	Verify
S12	Hunting trips is yes if and only if Base Services include hunting	Hunting trips = YES IFF Base Services includes Hunting guide	Verify

S13	Wildlife/nature excursions if and only if base data services include wildlife viewing	Wildlife Excursions = YES IFF Base Services includes Wildlife excursions	Verify
S14	If Lodging is YES then Base Data services should include lodging	If Lodging = YES then Base Services include Lodging	Correct
S15	If prices are available on website, then price records should exist	If Prices = AVAILABLE ON WEBSITE then there exists VALID Price observations for that URL, snapshot date	Correct
S16	If prices are only available by contact, then price records should have "PRICE UPON REQUEST"	If Prices = AVAILABLE ONLY BY REQUEST then price records should all have "PRICE UPON REQUEST"	Correct
S17	If prices are not available on website snapshot then price records should not exist	If prices = NOT AVAILABLE DUE TO BROKEN LINKS then there should not be records with that URL and snapshot date	Correct
S18	If customizable cruises is yes then Base form Cruise should be yes		Correct
S19	If customizable cruises is yes then ship being cruise ship/yacht should be yes		Verify
S20	Number of vessels should match the number of vessel names		Verify
S21	Unguided boat rentals is yes if and only if Base Services include unguided boat rentals		Verify
S22	Catching crab is yes if and only if Base Services include catching crab		Verify
S23	Harvesting clams is listed in OTHER if and only if Base Services include harvesting clams		Verify
S24	Kayaking listed in OTHER if and only if Base Services include Kayaking		Verify
S25	Diving listed in OTHER if and only if Base Services include		Verify
S26	Water taxi is yes if and only if Base Services include Water Taxi		Verify

Appendix Table A-8. -- Trip Services Form Validity Checks.

Check Number	Check Description	Code/Logic	Action
TS0	Key variables must be unique	URL and Services ID should be unique	Correct
TS1	Services ID is used in Prices data	Records exist with URL, Services ID in price data	Correct
TS2	Lodging off-boat is yes if and only if Lodging is indicated in Base Data	Lodging off-boat = YES IFF base data services include lodging	Verify
TS3	Other "Rate Includes" is YES if and only if other included services is non-empty	Other = YES IFF Other Included services is not empty	Correct

Appendix Table A-9. Trip Prices Form Validity Checks.

Check Number	Check Description	Code/Logic	Action
TP0	Key variables must be unique	URL, Snapshot Date, species, duration, price, and price restrictions should be unique	Correct
TP1	URL and Snapshot date must match snapshot data	Entered URL and snapshot date appear in Snapshot data	Correct
TP2	Services ID has a match	Is the URL, services ID present in Services data	Correct
TP3	Current website data flag should match snapshot data	"Is this current" same for snapshot of same URL & Date	Correct
TP4	Multi-species targets should be entered if and only if target is multi-species	Multi-Species is yes IFF multispecies is non-empty	Correct
TP5	Trip duration matches trip type	(Manually executed)	Verify