

2020 National Census of Ferry Operators Methodology



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1. OVERVIEW

In 1998, the Transportation Equity Act for the 21st Century (TEA-21) (Pub. L. 105-178, Sec. 1207)¹ directed the Secretary of Transportation to conduct a study of ferry transportation in the United States (U.S.) and its possessions. In 2000, the Office of Intermodal and Statewide Planning at the Federal Highway Administration (FHWA) of the U.S. Department of Transportation (USDOT) conducted a survey of approximately 250 ferry operators to identify:² (1) existing ferry operations including the locations and routes served; (2) source and amount, if any, of funds derived from Federal, State, or local governments supporting ferry construction or operations; (3) potential domestic ferry routes in the U.S. and its possessions; and (4) the potential for use of high-speed ferry services and alternative-fueled ferry services.

In 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Pub. L. 109-59, Sec. 1801)³ required that the Secretary, acting through the Bureau of Transportation Statistics (BTS), shall establish and maintain a national ferry database regarding routes, vessels, passengers and vehicles carried, funding sources and such other information as the Secretary considers useful and update the database every two years.⁴ Accordingly, BTS established the National Census of Ferry Operators (NCFO) in 2006 to develop the National Ferry Database (NFD) and since then, conducted the NCFO on a biennial basis to update the NFD.

Although ferries have a long history of moving passengers and freight in America, less was known about this mode of transportation than any of the other modes. Routine collection and publication of ferry-related statistics such as the number of ferry operators and the number of passengers carried were not available at the national level prior to the establishment of the NCFO in 2006. Part of this knowledge gap was due to the industry's structure. State and local public transportation agencies operate some ferry systems, but others are privately owned and operated. Another complication is that many operators provide ferry services as well as dinner and sightseeing cruises, whale watching, and other types of excursions. As such, it is often difficult to separate these activities.

In 2012, Moving Ahead for Progress in the 21st Century Act (MAP-21) (Pub. L. 112-141, Sec. 1121)⁵ continued BTS mandate to maintain the NFD and also required that the FHWA use the NFD to set the specific formula for allocating federal ferry funds.⁶ The funding allocations were based on percentages of the number of passenger boardings, vehicle boardings, and route miles served. In 2015, the Fixing America's Surface Transportation Act (FAST) (Pub. L. 114-94, Sec. 1112)⁷ continued BTS mandate to maintain the NFD and extended the requirement that the FHWA use the NFD to set the specific formula for allocating federal ferry funds as required in MAP-21.⁸

¹ <https://www.govinfo.gov/content/pkg/COMPS-1431/pdf/COMPS-1431.pdf>.

² Pub. L. 105-178, Sec. 1207(c)(1).

³ <https://www.govinfo.gov/content/pkg/PLAW-109publ59/pdf/PLAW-109publ59.pdf>.

⁴ Pub. L. 109-59, Sec. 1801(e)(1), (2), (4).

⁵ <https://www.govinfo.gov/content/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf>.

⁶ Pub. L. 112-141, Sec. 1121(b).

⁷ <https://www.govinfo.gov/content/pkg/PLAW-114publ94/pdf/PLAW-114publ94.pdf>.

⁸ Pub. L. 114-94, Sec. 1112(g)(1).

The original data collection in 2000 was conducted because the existing data sources on ferry operations lacked some of the critical information. To obtain the lacking information, the FHWA contracted the Volpe National Transportation Center, a branch of the USDOT, to survey all known operators. Once the information was verified, it created an enumeration of all known ferry operators that was used for the first NCFO in 2006. Since then, BTS has conducted the NCFO and entered collected data into the NFD. At each data collection, BTS has updated the enumeration since existing ferry operators stop ferry services and new operators come to exist. Also, BTS made revisions to the census instrument to improve the nature of the data collected and maximize the usefulness of the NFD. The NFD has been used to inform the Secretary for the allocation of funds⁹ such as the ferry grant program of the FHWA.

The NCFO is a biennial census and BTS has conducted the NCFO in 2006, 2008, 2010, 2014, 2016, 2018, 2020, and 2023. It should be noted the year of the NCFO has indicated the data collection year and the data year has been its previous year until 2020 NCFO. For example of the 2020 NCFO, the data year was 2019 and the data collection year was 2020. From 2022 NCFO, the year indicates the data year, not the data collection year, and this change was made to align the NCFO with other BTS data products such as the Commodity Flow Survey and the Tank Car Report. Additionally, due to the COVID-19 pandemic, the NCFO was delayed by one year since ferry operations were disrupted by the shutdown. Thus, the change of the 2022 NCFO being the data collection year to the 2022 NCFO being the reference year means that the census data was collected in 2023. Future NCFO data collections will resume the biennial schedule with the next being the 2024 NCFO collecting data in 2025 for ferry operations in the calendar year 2024.

2. POPULATION OF INTEREST

The target population of the NCFO includes all ferry operators providing ferry services in the U.S. and its possessions (i.e., the 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, American Samoa, and the remaining territories, commonwealths, and other political units of the U.S.). This includes political units that are an unincorporated territory of the U.S., maintain a Compact of Free Association with the U.S., or are a commonwealth associated with or in political union with the U.S. In addition to ferry operators providing domestic service within the U.S. and its possessions, operators providing services from locations in the U.S. and its possessions to and from a foreign country are also to be included.

The specific types of ferry operations to be included within the scope of the NCFO are those providing itinerant, fixed route, common carrier passenger and/or vehicle roll-on, roll-off (RoRo) ferry service, as well as railroad car float operations. More specifically, the following types of operations should be included in the NCFO:

- Ferry or water taxi operations that have fixed routes between two or more different ports of call.
- Ferry or water taxi operations that provide service on a fixed schedule or on demand within a fixed window of time.
- Common carriers (e.g., for-hire carriers) who serve the general public at reasonable rates and without discrimination.

⁹ Pub. L. 114-94, Sec. 1112(a)(g)(1).

- Railroad car float operations that utilize a tug and barge combination having two to three parallel tracks, onto which rail cars are rolled for transit across a body of water.

The following types of operations should not be included in the NCFO:

- Non-itinerant ferry operations (e.g., “cruise-to-nowhere” services).
- Excursion services (e.g., whale watches, casino boats, day/dinner cruises, etc.).
- Passenger only water taxi services not operating on a fixed route.
- Lift-on, lift-off (LoLo) freight/auto carrier services.
- Long distance passenger only cruise ship services.

Efforts to enumerate ferry operations for the 2020 NCFO resulted in 246 operators active in the calendar year 2019. Table 1 shows the number of active operators in the last four censuses.

Table 1. Number of Active Ferry Operators in the Past 4 NCFOs

Census	2014 NCFO	2016 NCFO	2018 NCFO	2020 NCFO
Data Year	2013	2015	2017	2019
Number of Active Operators in Data Year	258	260	238	246

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *2020 NCFO Dataset*, *2018 NCFO Dataset*, *2016 NCFO Dataset*, and *2014 NCFO Dataset*, available at <https://www.bts.gov/NCFO> as of April 2024.

3. QUESTIONNAIRE DESIGN AND SURVEY INSTRUMENT

The content of the questionnaire was originally established by the legislation requiring the data collection. The content was then reviewed and modified by the Office of Data Development and Standards (ODDS) at BTS. A draft of the questionnaire was reviewed by staff within the Maritime Administration (MARAD), the FHWA, the Federal Transit Administration (FTA), the American Association of State Highway and Transportation Officials (AASHTO), and the Passenger Vessel Association (PVA).

In advance of the 2018 NCFO, a web-based survey instrument was developed and by the 2020 NCFO, the entire census was conducted online. BTS contracted with the Volpe National Transportation Center to develop the survey instrument and tested the instrument for validity of collecting and storing survey responses.

4. DATA COLLECTION

The NCFO population includes all known ferry operators specified in [Section 2. Population of Interest](#). Each ferry operator is asked to select the person or persons within the ferry operator organization who is most knowledgeable about the operation to complete the questionnaire. Thus, it is up to the operator to decide who the individual respondent will be. BTS sends an initial mailing via USPS mail to each operator to invite them to take part in the NCFO. This mailing includes a cover letter that contains a web link to the online questionnaire. After the mailing, an email is sent to all operators for whom we have an email address with a clickable link to the census. Non-respondents are then contacted by phone to ensure that they receive their questionnaire and to determine if they need any assistance in completing the census. These phone calls would then be followed up with actions specific to the operator to gain cooperation. In many cases the data are verified/collected over the phone. In other cases, updated contact information and additional survey materials are mailed out to the operator.

While the timing of mail and phone contacts may vary from census year to census year, the general pattern and process remains the same, with three waves of follow-up.

The questionnaire has many key fields pre-populated with data from the previous census since much of this data (e.g., vessel information, route information, etc.) are not expected to change from year to year. BTS simply asks the operator to review the pre-populated information for accuracy and either delete outdated information or add any new information that does not appear on their questionnaire. Respondents do fill in the information which is subject to change with each census, such as boarding counts.

5. DATA VERIFICATION AND EDITS

The reported data go through multiple layers of verifications and edits at different parts of questionnaires such as operator, segment, terminal and vessel. All completed NCFO operator information is entered into the database using the online data collection tool. The data collection tool contains built-in editing rules to ensure data collected the correct range and format as defined in the data schema. Additional verification of data is conducted based on information gathered from the ferry operators' websites. External database including the US Army Corps of Engineers (USACE) and U.S. Coast Guard (USCG) vessel database help verify the accuracy of the reported data and also add information not collected from respondents such as breadth and depth of a vessel.

For the 2020 NCFO, automated edit, *AutoEdit*, process was developed and deployed in 12 R programs that are executed sequentially. By executing the 12 programs, NCFO analysts check duplicates and crosscheck data items reported in different parts of the questionnaires. When the *AutoEdit* process indicates inconsistencies among the data items, NCFO analysts review the indicated items and if possible, correct inconsistent data values. After the reported data go through the edit process, analysts inspect the edited data using summary statistics and visualization to detect any remaining abnormality. The final data are released in five separate tables as shown in Table 2. The number of variables changes across the NCFOs since new variables are added and existing variables are removed as the NCFO evolves over years. The intent of the *AutoEdit* process is to institutionalize the edit process bringing rigor, consistency, and efficiency to the process.

Table 2. Five Tables of 2020 NCFO

Table	Description	Number of Variables
Operator	Contains information about ferry operators and details about their operation.	51
Operator-Segment	Contains information related to route segments such as segment length, average trip time, passenger boarding count, and season start and end dates.	42
Segment	Contain information about each route segment such as the terminals it connects, the type of geographic area it serves, and whether it serves a National Park Service location.	9
Terminal	Contains information about ferry terminals, access mode, and operation entity.	21
Vessel	Contains information about ferry vessels such as the passenger and/or vehicle capacity, speed, and fuel type.	35

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, 2020 NCFO Data Dictionary, available at <https://cms.bts.gov/surveys/national-census-ferry-operators-ncfo/2020-ncfo-data-dictionary> as of April 2024.

6. RESPONSE RATES

6.1. Unit Response

In 2020 NCFO, 246 active ferry operators in the frame were invited to the survey and 164 operators participated in the survey by submitting data. Among the 164 operators, there is a variation in amount and quality of the data reported and some of these operators left several questions unanswered. It was necessary to establish a definition of a “response” for calculating a response rate of NCFO.

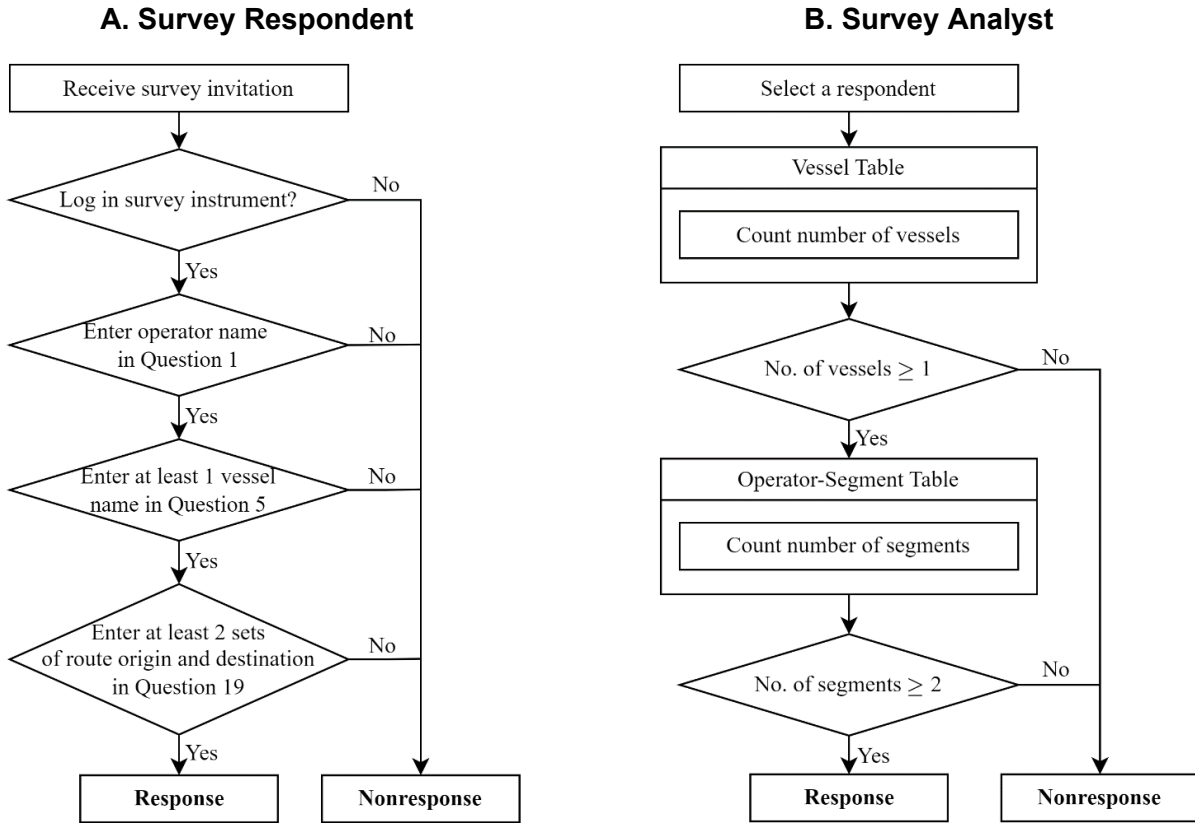
Before the 2020 NCFO, all ferry operators who submitted data to the census, regardless of how many questions were addressed, were determined as a “response”, and thus were counted in calculating the response rate of the census. This traditional “response” is called “participation” in the 2020 NCFO. As for the 2020 NCFO, a ferry operator is determined to be a “response” when the following three criteria are met:

- A respondent should enter the operator’s name.
- A respondent should report a minimum of two segments.
- A respondent should report a minimum of one vessel.

Figure 1 visualizes how “response” was determined from two perspectives: (a) a survey respondent and (b) a survey analyst. Figure 1-A shows the process of determining “response” for each respondent from a standpoint of a survey respondent filling out the NCFO questionnaire. Meanwhile, Figure 1-B shows the process from a standpoint of a survey analyst calculating a unit response rate of the NCFO. From the survey respondent’s standpoint (Figure 1-A), the respondent first logs in the survey instrument after receiving the survey invitation. When the respondent provides the ferry operator’s name in Question 1, at least one vessel name in Question 5, and at least two sets of origin and destination in Question 19, it was determined as “response.” It should be noted the operator’s name in Question 1 is pre-populated, yet a new operator that may have come into existence without BTS awareness needs to enter its name.

It is also noteworthy that there might be a case where the vessels and segments reported by a respondent may not be matched. Even in such a case, the operator was determined to be a “response” as long as the three criteria are met. For example, a certain respondent may report two vessels and two segments in operation. If the most used vessel reported for the two segments is not matched with any of the two reported vessels, the operator is still determined to be “response” since it satisfies the three criteria for “response” in the NCFO.

Figure 1. Determining Unit Response for the 2020 NCFO



Source: U.S. Department of Transportation, Bureau of Transportation Statistics, 2024.

Note: The order of vessel and segment elements can switch in part B

6.2. Unit Response Rate (URR)

The Unit Response Rate (URR) is the primary data quality metric of the NCFO and the most frequently used rate for a survey or census. The URR is typically expressed as a percentage ranging from 0% to 100% and a unit in NCFO is a ferry operator. The URR is the proportion of units that were eligible and responded to the survey (expressed as a percentage) and is computed using Equation 1:

$$URR = \left(\frac{R}{E + U} \right) \times 100\% \quad (1)$$

Where:

- R (Response) = the number of units that were eligible for data collection and determined to constitute a “response.” A unit was determined as a response when it satisfied the three criteria noted in [Section 6.1. Unit Response](#) and Figure 1 visualizes the determining process.
- E (Eligible) = the number of units that were eligible for data collection. These included chronic refusal units (e.g., eligible reporting units having notified BTS that they do not participate in the census).

- *U* (Unknown Eligibility) = the number of units for which eligibility could not be determined. For example, the email inviting to the census that was sent to a ferry operator was bounced back with a mail delivery failure notice such as “address not found” and BTS was not able to reach the operator in a follow-up contact via email and/or phone call. In such a case, the eligibility of the operator could not be determined. Also, the eligibility of a ferry operator for the NCFO could not be determined when an invitation email was successfully delivered but the respondent did not log into the online census instrument.

Unit “Participation” Rate (UPR) is also calculated, the proportion of units that were eligible and participated in the survey (expressed as a percentage), using Equation 2:

$$UPR = \left(\frac{P}{E + U} \right) \times 100\% \quad (2)$$

Where:

- *P* (Participation) = the number of units that were eligible for data collection and entered any data to the census.

E and *U* were defined in Equation (1) and $UPR \geq URR$. UPRs are typically higher than URRs.

Table 3 shows the URRs and UPRs of the past 4 NCFOs: 2014, 2016, 2018, and 2020 NCFOs: the UPRs are slightly higher than the URRs. The URR increased from 46.5% in 2014 NCFO, to 61.9% in 2016 NCFO, to 75.6% in 2018 NCFO, and dropped to 65% in 2020 NCFO. For 2020 NCFO, the data year was 2019 and the data collection year was 2020. Although the data year of 2019 was pre-pandemic, the data collection was performed during the pandemic. Thus, the UPR being lower than the previous census is believed to be attributable to the pandemic. It should be noted that the numbers of responding operators were calculated using the definition of “response” established for 2020 NCFO (i.e., the three criteria noted in [Section 6.1 Unit Response](#)). Thus, the URRs and UPRs in Table 3 are comparable across the four NCFOs.

Despite all efforts to locate all ferry operators eligible to be part of the frame, new operators may have come into existence without BTS awareness, so the true denominator may be greater than 246. For example, the frame used to invite ferry operators to 2020 NCFO included 245 operators, but two operators that were not found in the frame file eventually participated in the census and one operator in the frame was later found to be duplicate, resulting in a total of 246 invited operators for 2020 NCFO.

Table 3. Response Rates of the Past 4 NCFOs

Census	2014 NCFO	2016 NCFO	2018 NCFO	2020 NCFO
Data Year	2013	2015	2017	2019
Number of Active Operators in Data Year	258	260	238	246
Number of Responding Operators ¹	120	161	180	160
Number of Participating Operators ²	128	163	181	164
Unit Response Rate (URR) ³ (%)	46.5	61.9	75.6	65.0
Unit Participation Rate (UPR) ⁴ (%)	49.6	62.7	76.1	66.7

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *2020 NCFO Dataset*, *2018 NCFO Dataset*, *2016 NCFO Dataset*, and *2014 NCFO Dataset*, available at <https://www.bts.gov/NCFO> as of April 2024.

¹ Response was determined using the three criteria noted in [Section 6.1 Unit Response](#).

² Participation was determined when an operator entered any data to the census.

³ URR was calculated using Equation 1.

⁴ UPR was calculated using Equation 2.

7. MULTI-YEAR DATA

NCFO data have been collected and released since 2000¹⁰ and thus analyzing NCFO data of multiple years is possible. However, due to the variation in participating operators over the years, the analysis of multi-year NCFO data should be performed with great caution. Table 4 shows participation of ferry operators over the past four NCFOs based on the operator ID variable. A total of 227 operators were found to have participated in at least one of the four censuses. A total of 86 ferry operators (38%) participated in all four NCFOs, 53 in three NCFOs, 45 in two NCFOs and 43 in one NCFO. It is possible that operators having not participated in a census were, in fact, out of business in a corresponding data year, meaning they were ineligible to the NCFO.

¹⁰ U.S. Department of Transportation, Bureau of Transportation Statistics, *NCFO Previous Datasets*, available at <https://www.bts.gov/surveys/national-census-ferry-operators-ncfo/ncfo-previous-datasets> as of April 2024.

Table 4. Participation of Operators over the Past 4 NCFOs Based on Operator ID

NCFO				Number of Censuses	Number of Operators	
2014	2016	2018	2020			
O	O	O	O	4	86	86
X	O	O	O	3	53	36
O	X	O	O			8
O	O	X	O			2
O	O	O	X			7
X	X	O	O	2	45	16
X	O	X	O			3
X	O	O	X			14
O	O	X	X			10
O	X	O	X			2
O	X	X	O			0
X	X	X	O	1	43	13
X	X	O	X			12
X	O	X	X			5
O	X	X	X			13

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *2020 NCFO Dataset*, *2018 NCFO Dataset*, *2016 NCFO Dataset*, and *2014 NCFO Dataset*, available at <https://www.bts.gov/NCFO> as of April 2024.

There are 86 ferry operators that have consistently participated in all the four NCFOs. However, their characteristics might have changed over the years such as the number of segments served and the number of vessels utilized. Thus, a longitudinal analysis of the ferry operators participating consistently over years should be performed with caution.

8. CONFIDENTIALITY

Participation in the NCFO is strictly voluntary. According to 5 U.S.C., Sec. 552(b)(4), any confidential business information collected will be kept confidential and not be made public or shared outside of the USDOT. Under 18 U.S.C., Sec. 1905, employees and contractors working on the NCFO are subject to penalties if they make public any information that could reveal confidential business information. The data collected for the NCFO is protected under 49 C.F.R. Part 7. In accordance with this regulation, ferry operators are given the opportunity to identify information they deem to be business sensitive and include comments to support their position. However, information that the ferry operators release to the public on a routine basis or is in the public domain (e.g., ferry schedules posted on the operations web site), generally, does not qualify as confidential business information. Only statistical and non-sensitive business information is made available through publications and public use data files.

Questions regarding passenger and vehicle boardings have historically been deemed by operators to contain business sensitive information. A final question is included in the questionnaire so the operator can indicate which questions, if any, they deem to be asking for confidential business information. Any information that is not found in the public domain and the respondent justifies as containing business sensitive information is excluded from the final released data.