



NOAA Technical Memorandum NMFS-XXX-##

# SAP Production Data Documentation

Shellfish Assessment Program Survey Team

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northwest Fisheries Science Center



**NOAA  
FISHERIES**

# SAP Production Data Documentation

Shellfish Assessment Program Survey  
Team<sup>1,\*</sup>

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**Part I.**

# **Welcome**

## *AFSC Bottom Trawl Surveys*

Report run date: Tuesday, October 15, 2024

### **AFSC Bottom Trawl Surveys**

AFSC bottom trawl surveys are conducted by the AFSC's Groundfish Assessment Program and Shellfish Assessment Program and are conducted in the Gulf of Alaska, Aleutian Islands, Eastern Bering Sea Slope, Eastern Bering Sea Shelf, and Northern Bering Sea. Each survey is a multispecies survey that collects data on the distribution, abundance, and biological characteristics of fish, crab, and other resources to inform groundfish stock assessment and management. These fishery-independent surveys are conducted in the summer aboard contracted commercial fishing vessels. Specifics regarding each of the surveys can be found below.



Figure 1.: Sorting and weighing fish on deck on the 2022 Bering Sea groundfish survey aboard the F/V Alaska Knight. Credit: Emily Markowitz/NOAA Fisheries.

## *Documentation Objective*

### **Documentation Objective**

As part of our commitment to open science, reproducibility, and transparency, we provide this metadata guide to compliment our public-domain data.

Please consider this resource to be a **Living Document**. The code in this repository is regularly being updated and improved. Please refer to releases for finalized products and project milestones.

At this time, these master production and AKFIN tables are **provisional and we are welcoming feedback before the 2024 survey season**. We look forward to hearing from you. Do not hesitate to reach out (to us at either nmfs.afsc.gap.metadata@noaa.gov or GitHub issues, especially if you find discrepancies in the data or want to suggest improvements to infrastructure. Thank you in advance for your collaboration and partnership with us as we develop our future data universe.

### **User Resources**

- Groundfish Assessment Program Bottom Trawl Surveys
- AFSC's Resource Assessment and Conservation Engineering Division
- All AFSC Research Surveys
- Survey code books
- Publications and Data Reports
- Research Surveys conducted at AFSC

### **Cite this data**

Use the below bibtext citations, as cited in our group's citation repository for citing the data created and maintained in this repository. Add "note = {Accessed: mm/dd/yyyy}" to append the day this data was accessed. Included here are AFSC RACE Groundfish and Shellfish Assessment Program's:

- Design-Based Production Data internal (NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Program, 2024).

## *Access Constraints*

```
[1] "@misc{GAPPProducts,"  
[2] " author = {{NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Prog  
[3] " year = {2024}, "  
[4] " title = {AFSC Goundfish Assessment Program Design-Based Production Data}, "  
[5] " howpublished = {https://www.fisheries.noaa.gov/alaska/science-data/groundfish-assess  
[6] " publisher = {{U.S. Dep. Commer.}}, "  
[7] " copyright = {Public Domain} "  
[8] "}"
```

- AFSC RACE Groundfish Data for AKFIN (Alaska Fisheries Information Network (AKFIN), 2024).

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[1] "@misc{GAPakfin,"  
[2] " author = {{Alaska Fisheries Information Network (AKFIN)}}, "  
[3] " institution = {{NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessmen  
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[6] " howpublished = {https://akfinbi.psmfc.org/analytics/}, "  
[7] " url = {https://www.psmfc.org/program/alaska-fisheries-information-network-akfin}, "  
[8] " publisher = {{U.S. Dep. Commer.}}, "  
[9] " copyright = {Public Domain} "  
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- Public Data hosted on the Fisheries One Stop Shop (FOSS) Data Platform (NOAA Fisheries Alaska Fisheries Science Center, 2024).

```
[1] "@misc{FOSSAFSCData,"  
[2] " author = {{NOAA Fisheries Alaska Fisheries Science Center}}, "  
[3] " year = {2024}, "  
[4] " title = {Fisheries One Stop Shop Public Data: RACE Division Bottom Trawl Survey Data}, "  
[5] " howpublished = {https://www.fisheries.noaa.gov/foss}, "  
[6] " publisher = {{U.S. Dep. Commer.}}, "  
[7] " copyright = {Public Domain} "  
[8] "}"
```

## **Access Constraints**

There are no legal restrictions on access to the data. They reside in public domain and can be freely distributed.

### *Suggestions and comments*

**User Constraints:** Users must read and fully comprehend the metadata and code of conduct prior to use. Data should not be used beyond the limits of the source scale. Acknowledgement of AFSC Groundfish Assessment Program, as the source from which these data were obtained, in any publications and/or other representations of these data, is suggested.

## **Suggestions and comments**

If the data or metadata can be improved, please create a pull request, submit an issue to the GitHub organization or submit an issue to the code's repository.

## **NOAA README**

This repository is a scientific product and is not official communication of the National Oceanic and Atmospheric Administration, or the United States Department of Commerce. All NOAA GitHub project code is provided on an 'as is' basis and the user assumes responsibility for its use. Any claims against the Department of Commerce or Department of Commerce bureaus stemming from the use of this GitHub project will be governed by all applicable Federal law. Any reference to specific commercial products, processes, or services by service mark, trademark, manufacturer, or otherwise, does not constitute or imply their endorsement, recommendation or favoring by the Department of Commerce. The Department of Commerce seal and logo, or the seal and logo of a DOC bureau, shall not be used in any manner to imply endorsement of any commercial product or activity by DOC or the United States Government.

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# **1. Survey Background**

## **1.1. What we do**

## **1.2. Who is conducting the research?**

Scientists from the Alaska Fisheries Science Center's Groundfish Assessment Program (GAP) conduct these bottom trawl surveys with participation from the Alaska Department of Fish & Game (ADF&G), the International Pacific Halibut Commission (IPHC), universities, and other organizations. This research is conducted primarily on chartered fishing vessels.

## **1.3. What is the research objective?**

Learn more about the program. The objectives of these surveys are to:

- monitor the population and environmental trends in the marine ecosystem of the Bering Sea, Aleutian Islands, and Gulf of Alaska,
- produce fishery-independent biomass (weight) and abundance (number) estimates for commercially important fish and crab species, and
- collect other biological and environmental data for use in ecosystem-based fishery management.

## **1.4. Who is conducting the research?**

Scientists from the Alaska Fisheries Science Center conduct these bottom trawl surveys with participation from the Alaska Department of Fish & Game (ADF&G), the International Pacific Halibut Commission (IPHC), and universities. This research is conducted on chartered fishing vessels.

## 1. Survey Background

### 1.5. Bottom trawl surveys and regions

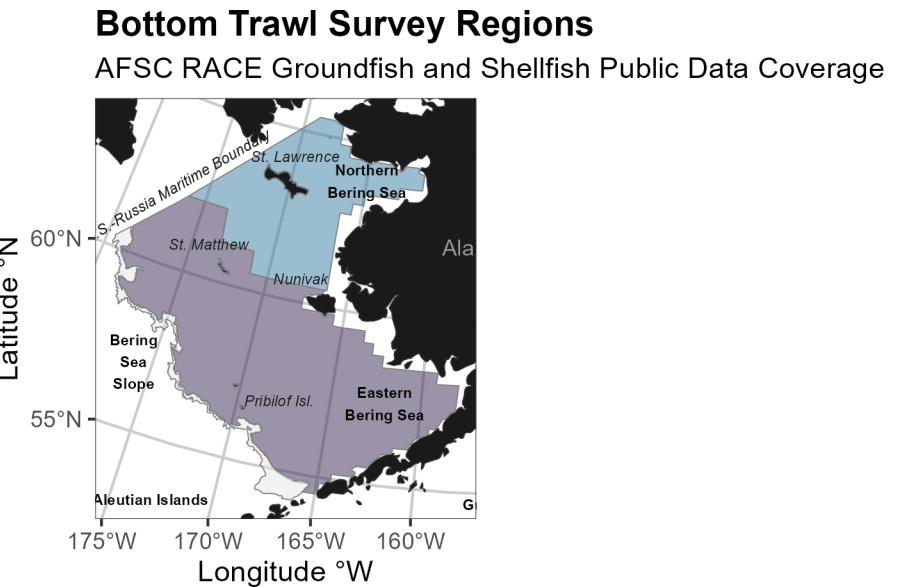


Figure 1.1.: Strata used in the all surveys.

Each survey conducted by the Groundfish Assessment Program are multispecies bottom trawl surveys. We collect environmental and biological data to assess how climate variability and loss of sea ice are affecting bottom-dwelling marine life on the Bering Sea shelf. We monitor trends in the distribution (location and movement patterns) and abundance of groundfish and crab species as well as oceanographic data (e.g., water temperature, depth). We collect biological information such as organism weight, length, stomachs to learn about diets, and otoliths to determine fish ages. We use this information in annual stock assessments and to assess the state of the ecosystem. This research is conducted on fishing industry contract vessels.

Table 1.1.: Survey summary stats

| Survey                               | Survey Definition Years ID | Depth (m) | Area (km <sup>2</sup> ) | # Statistical Areas | # Possible Stations |
|--------------------------------------|----------------------------|-----------|-------------------------|---------------------|---------------------|
| Aleutian Islands Bottom Trawl Survey | 52 2024 - 1991 (14)        | 1 - 500   | 64,415.0                | 80                  | 1,312               |

## 1. Survey Background

| Survey   | Survey Definition ID | Years            | Depth (m)   | Area (km2) | Statistical Areas | #  | # Possible Stations |
|--|----------------------|------------------|-------------|------------|-------------------|----|---------------------|
| Eastern Bering Sea Slope Bottom Trawl Survey   | 78                   | 2016 - 2002 (6)  | 201 - 1,200 | 32,861.3   |                   | 37 |                     |
| Eastern Bering Sea Crab/Groundfish Bottom Trawl Survey                                 | 98                   | 2024 - 1982 (42) | 1 - 200     | 492,989.9  |                   | 28 | 515                 |
| Gulf of Alaska Bottom Trawl Survey   | 47                   | 2023 - 1990 (16) | 1 - 1,000   | 313,784.9  |                   | 37 | 6,939               |
| Northern Bering Sea Crab/Groundfish Survey - Eastern Bering Sea Shelf Survey Extension | 143                  | 2023 - 2010 (6)  | 1 - 100     | 198,866.8  |                   | 4  | 144                 |

### 1.5.1. Aleutian Islands

Most recent data report: (Von Szalay et al., 2023)

- Upper Continental Slope of the Aleutian Islands from Unimak Pass to Stalemate Bank
- Triennial (1990s)/Biennial since 2000 in even years, since 1992
- Modified Index-Stratified Random of Successful Stations Survey Design
- Important commercial fish species include Atka mackerel, Pacific ocean perch, walleye pollock, Pacific cod, sablefish, and other rockfish species.

### 1.5.2. Gulf of Alaska

Most recent data report: (Siple et al., 2024)

- Continental Shelf and Upper Slope of the Gulf of Alaska extending from the Islands of Four Mountains 2,300 km east to Dixon Entrance
- Triennial (1990s)/Biennial since 2001 in odd years, since 1991
- Stratified Random Survey Design

## 1. Survey Background

### AI Bottom Trawl Survey Region AFSC RACE Groundfish and Shellfish Public Data Coverage

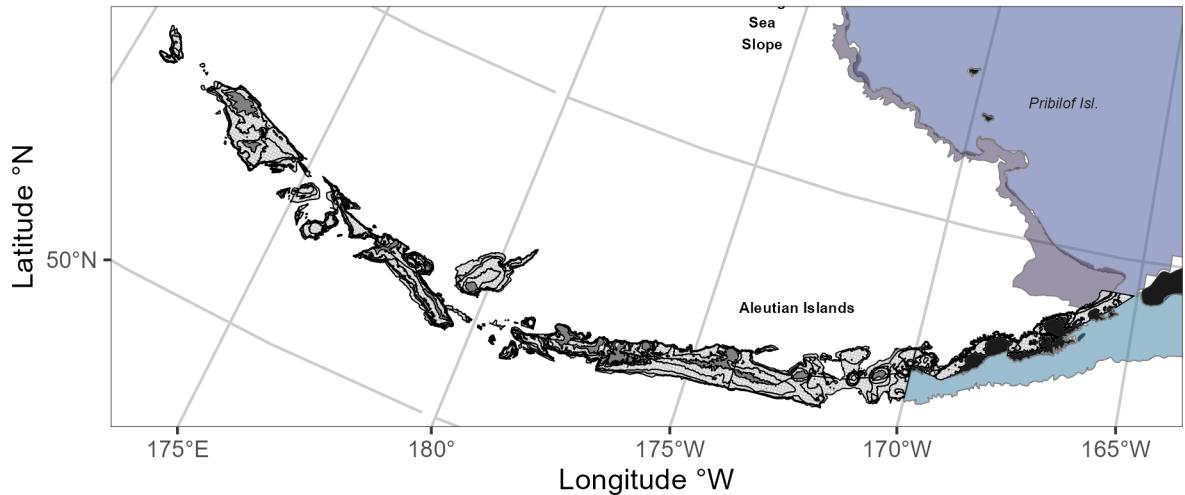


Figure 1.2.: Strata used in the Aleutian Islands bottom trawl survey.

- Important commercial species in the Gulf of Alaska include Pacific ocean perch, walleye pollock, Pacific cod, flatfish, and other rockfish species.

#### 1.5.3. Eastern Bering Sea Shelf

Most recent data report: (Markowitz et al., 2024)

- The continental shelf of the eastern Bering Sea from the Aleutian Islands to the Bering Strait
- Conducted annually since 1982.
- Uses a stratified systematic sampling survey design with fixed stations at center of 20 x 20 nm grid.
- Similar in design to the northern Bering Sea shelf bottom trawl survey.
- Focus species for the Bering Sea include walleye pollock, Pacific cod, Greenland turbot, yellowfin sole, northern rock sole, red king crab, and snow and Tanner crabs.

#### 1.5.4. Northern Bering Sea

Most recent data report: (Markowitz et al., 2024)

## 1. Survey Background

### GOA Bottom Trawl Survey Region

AFSC RACE Groundfish and Shellfish Public Data Coverage

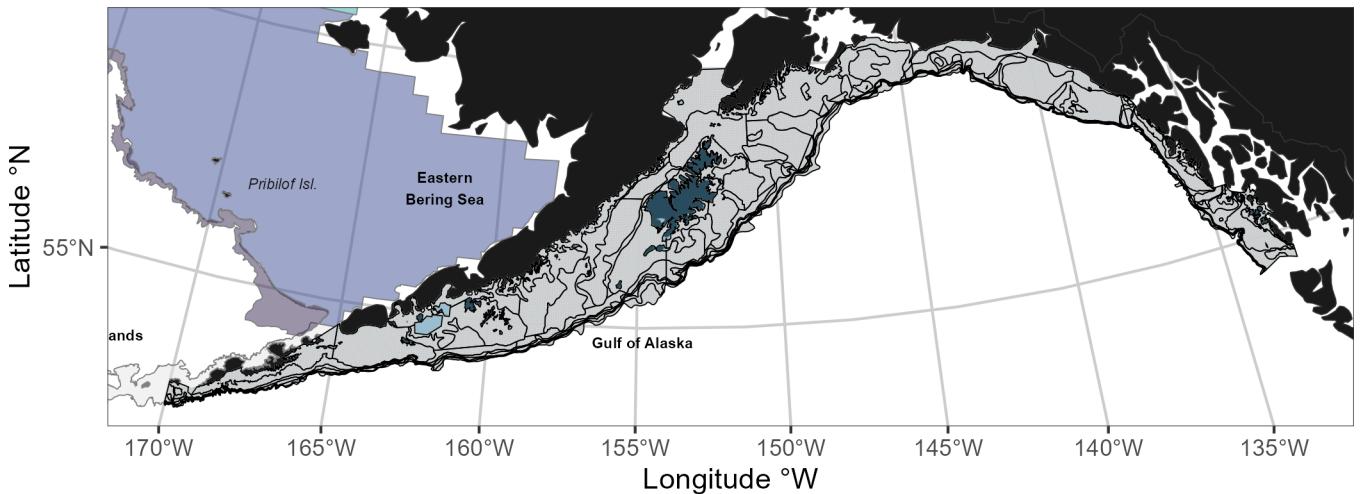


Figure 1.3.: Strata used in the Gulf of Alaska bottom trawl survey.

### EBS Bottom Trawl Survey Region

AFSC RACE Groundfish and Shellfish Public Data Coverage

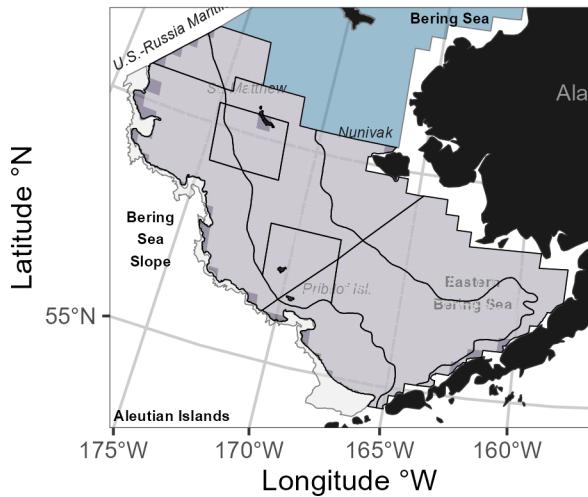


Figure 1.4.: Strata used in the Eastern Bering Sea bottom trawl survey.

## 1. Survey Background

- The continental shelf of the northern Bering Sea, including the area north of St. Lawrence Island and Norton Sound
- Biennial/Annual; conducted intermittently since 2010
- Uses a stratified systematic sampling survey design with fixed stations at center of 20 x 20 nm grid.
- Similar in design to the eastern Bering Sea shelf bottom trawl survey.

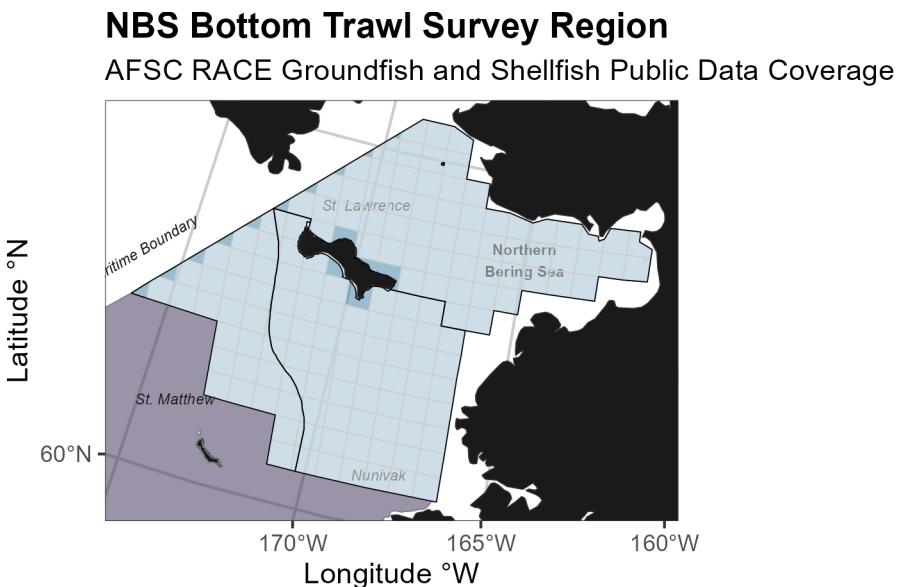


Figure 1.5.: Strata used in the Northern Bering Sea bottom trawl survey.

### 1.5.5. Eastern Bering Sea Upper Continental Slope

Most recent data report: (Hoff, 2016)

- The eastern Bering Sea upper continental slope survey area extends from Unalaska and Akutan Islands to the U.S.-Russian Maritime Boundary at 61° N near the International Date Line (166° E to 180° W) at depths from 200 to 1,200 m
- Conducted intermittently since 2002 (funding dependent)
- Modified Index-Stratified Random of Successful Stations Survey Design
- Focus species for the Bering Sea slope include giant grenadier, Pacific ocean perch, popeye grenadier, walleye pollock, and arrowtooth flounder.

## 1. Survey Background

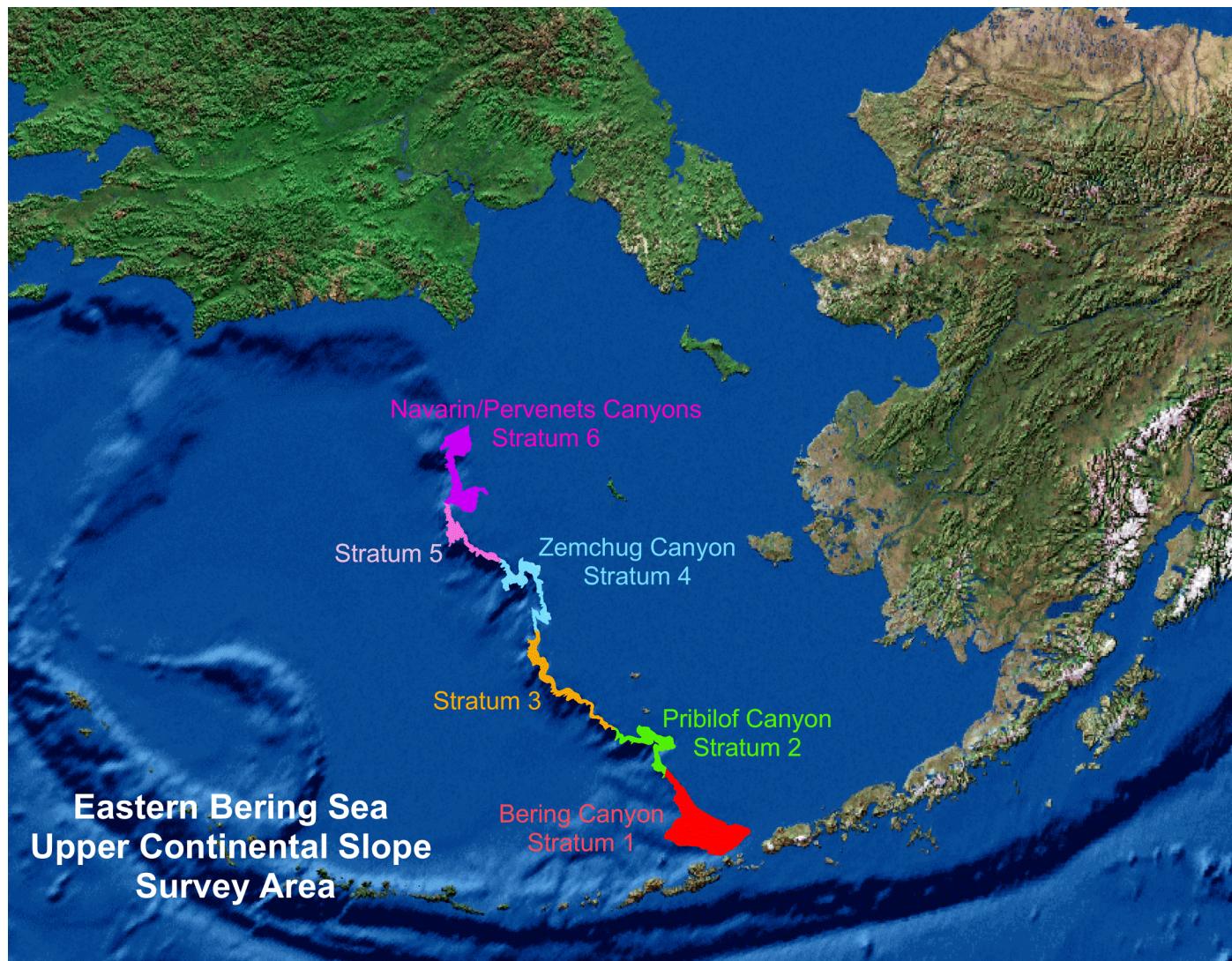


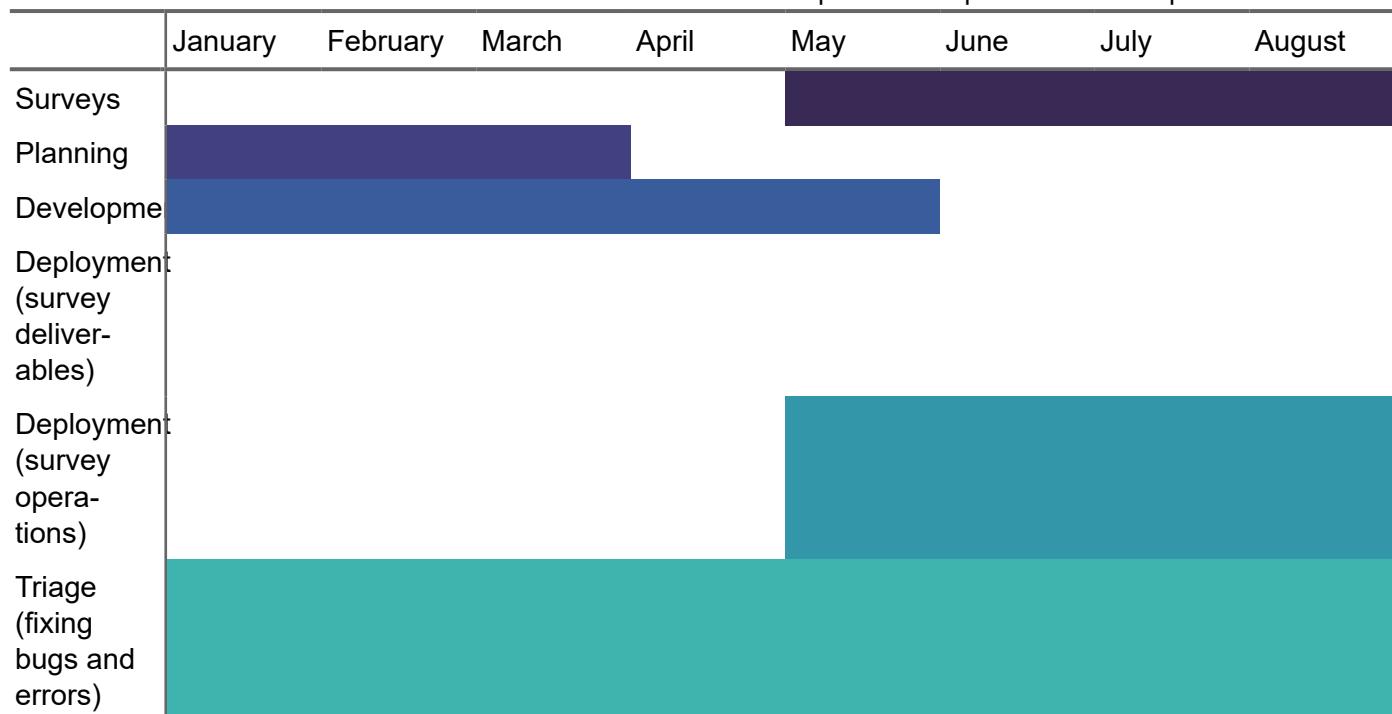
Figure 1.6.: Strata used in the Bering Sea Slope bottom trawl survey.

## 2. Workflow

### 2.1. Operational Product Development Timeline

Over the course of the year, the survey team is developing a variety of different data products. Planning and preparation for surveys happens in the late winter and spring, surveys occur in the summer, data validation takes place over the course of the survey and after the survey, and data products are produced through fall and late winter.

Table 2.1.: Operational product development timeline.



## 2. Workflow

|                                  | January | February | March | April | May | June | July | August |
|----------------------------------|---------|----------|-------|-------|-----|------|------|--------|
| User feedback and brain-storming |         |          |       |       |     |      |      |        |

## 2.2. Data workflow from boat to production

Organisms first need to be collected aboard the vessel before data can be entered into tablets.

The objective of this process is to take raw data, QA/QC and clean these data, curate standard data products for these survey. Please note, through this process we are not providing “data” (what we consider lower level data material; see the data levels section below) but “data products”, which is intended to facilitate the most fool-proof standard interpretation of the data. These data products only use data from standard and validated hauls, and has undergone careful review.

**Once survey data collected on the vessel has been checked and validated**, the gap\_products/code/run.R script is used to orchestrate a sequence of programs that calculate the standard data products resulting from the NOAA AFSC GAP bottom trawl surveys. Standard data products are the CPUE, BIOMASS, SIZECOMP, and AGECOMP tables in the GAP\_PRODUCTS Oracle schema. The tables are slated to be updated twice a year: once after the survey season following finalization of that summer’s bottom trawl survey data to incorporate the new catch, size, and effort data and once prior to an upcoming survey to incorporate new age data that were processed after the prior summer’s survey season ended. This second pre-survey production run will also incorporate changes in the data due to the specimen voucher process as well as other post-hoc changes in the survey data.

The data from these surveys constitute a **living data set** so we can continue to **provide the best available data to all partners, stakeholders, and fellow scientists**.

During each data product run cycle:

1. Versions of the tables in GAP\_PRODUCTS are locally imported within the gap\_products repository to compare with the updated production tables. Any

## *2. Workflow*

changes to a production table will be compared and checked to make sure those changes are intentional and documented.

2. Use the gapindex R package to calculate the four major standard data products: CPUE, BIOMASS, SIZECOMP, AGECOMP. These tables are compared and checked to their respective locally saved copies and any changes to the tables are vetted and documented. These tables are then uploaded to the GAP\_PRODUCTS Oracle schema.
3. Calculate the various materialized views for AKFIN and FOSS purposes. Since these are derivative of the tables in GAP\_PRODUCTS as well as other base tables in RACEBASE and RACE\_DATA, it is not necessary to check these views in addition to the data checks done in the previous steps.

## **3. News**

### **3.1. News/change logs**

- SAP\_PRODUCTS ChangeLog (last produced on 2024-10-15), initial development & template: Run completed by: Emily Markowitz (GAP)

## **4. Code of Conduct**

### **4.1. What are Codes of Conduct?**

Codes of Conduct are voluntary sets of rules that assist creators, developers, and users of code and data with data protection compliance and accountability in specific sectors or relating to particular processing operations.

Codes can help organizations to ensure all participants follow best practices and rules designed specifically for their sector or processing operations, thus enhancing compliance and collaboration. They are developed and managed by an association or other body (the 'Code Owner') which is representative of a sector (or category of data controllers or processors), with the expert and sectoral knowledge of how to enhance data protection in their area.

#### **4.1.1. Code of Conduct from the nmfs-opensci GitHub.**

## **5. NOAA Fisheries Open Science Code of Conduct**

This code of conduct was developed and adapted from the Atom code of conduct in October 2021.

### **5.1. Our Pledge**

In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, gender identity and expression, level of experience, nationality, personal appearance, race, religion, or sexual identity and orientation.

### **5.2. Our Standards**

Examples of behavior that contributes to creating a positive environment include:

- Using welcoming and inclusive language
- Being respectful of differing viewpoints and experiences
- Gracefully accepting constructive criticism
- Focusing on what is best for the community
- Showing empathy towards other community members

Examples of unacceptable behavior by participants include:

- The use of sexualized language or imagery and unwelcome sexual attention or advances
- Trolling, insulting/derogatory comments, and personal or political attacks
- Public or private harassment

## *5. NOAA Fisheries Open Science Code of Conduct*

- Publishing others' private information, such as a physical or electronic address, without explicit permission
- Other conduct which could reasonably be considered inappropriate in a professional setting

### **5.3. Our Responsibilities**

Project maintainers are responsible for clarifying the standards of acceptable behavior and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behavior.

Project maintainers have the right and responsibility to remove, edit, or reject comments, commits, code, wiki edits, issues, and other contributions that are not aligned to this Code of Conduct, or to ban temporarily or permanently any contributor for other behaviors that they deem inappropriate, threatening, offensive, or harmful.

### **5.4. Scope**

This Code of Conduct applies both within project spaces and in public spaces when an individual is representing the project or its community. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

### **5.5. Enforcement**

Instances of abusive, harassing, or otherwise unacceptable behavior may be reported by contacting the project team. All complaints will be reviewed and investigated and will result in a response that is deemed necessary and appropriate to the circumstances. Further details of specific enforcement policies may be posted separately.

5. NOAA Fisheries Open Science Code of Conduct

## 5.6. Attribution

This Code of Conduct is adapted from the Contributor Covenant, version 1.4, available at <https://contributor-covenant.org/version/1/4>

**Part II.**

**GAP Production Data**

## **Data Description**

The Resource Assessment and Conservation Engineering Division (RACE) Groundfish Assessment Program (GAP) of the Alaska Fisheries Science Center (AFSC) conducts fisheries-independent bottom trawl surveys to monitor the condition of the demersal fish and crab stocks of Alaska. These data are developed to describe the temporal distribution and abundance of commercially and ecologically important groundfish species, examine the changes in the species composition of the fauna over time and space, and describe the physical environment of the groundfish habitat. These data are created using the gapindex R package v2.1.0.

Users must read and fully comprehend the metadata prior to use. Data should not be used beyond the limits of the source scale. Acknowledgement of NOAA, as the source from which these data were obtained, in any publications and/or other representations of these data, is suggested. These data are compiled and approved annually after each summer survey season. The data from previous years are unlikely to change substantially once published. Some survey data are excluded, such as non-standard stations, surveys completed in earlier years using different/non-standard gear, and special tows and non-standard data collections.

## **Cite this data**

Use the below bibtext citation, as cited in our group's citation repository for citing the data created and maintained in this repository. Add "note = {Accessed: mm/dd/yyyy}" to append the day this data was accessed.

```
[1] "@misc{GAPPProducts,"  
[2] "  author = {{NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Prog  
[3] "  year = {2024}, "  
[4] "  title = {AFSC Goundfish Assessment Program Design-Based Production Data}, "  
[5] "  howpublished = {https://www.fisheries.noaa.gov/alaska/science-data/groundfish-assess  
[6] "  publisher = {{U.S. Dep. Commer.}}, "  
[7] "  copyright = {Public Domain} "  
[8] "}"
```

## 6. Data description

### 6.1. Data tables

#### 6.1.1. STRATUM\_NSTATIONS

Number of stations for each stratum and other metadata. Tables are provided by the Resource Assessment and Conservation Engineering Division (RACE) Shellfish Assessment Program (SAP) of the Alaska Fisheries Science Center (AFSC). There are legal restrictions on access to the data. These data are not intended for public dissemination and should not be shared without the explicit written consent of the data managers and owners (NOAA Fisheries). The GitHub repository for the scripts that created this code can be found at ([https://github.com/EmilyMarkowitz-NOAA/sap\\_products](https://github.com/EmilyMarkowitz-NOAA/sap_products)).

Number of columns: 7

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

## *6. Data description*

### **6.1.2. TEST**

NA

Number of columns: 1

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **6.1.3. XCRAB\_SPECIES**

Crab specific SPECIES\_ID for crab ids. Tables are provided by the Resource Assessment and Conservation Engineering Division (RACE) Shellfish Assessment Program (SAP) of the Alaska Fisheries Science Center (AFSC). There are legal restrictions on access to the data. These data are not intended for public dissemination and should not be shared without the explicit written consent of the data managers and owners (NOAA Fisheries). The GitHub repository for the scripts that created this code can be found at ([https://github.com/EmilyMarkowitz-NOAA/sap\\_products](https://github.com/EmilyMarkowitz-NOAA/sap_products)).

Number of columns: 3

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

## *6. Data description*

test

test

test

test

test

### **6.1.4. XSTOCK**

Stock district lookup table. Tables are provided by the Resource Assessment and Conservation Engineering Division (RACE) Shellfish Assessment Program (SAP) of the Alaska Fisheries Science Center (AFSC). There are legal restrictions on access to the data. These data are not intended for public dissemination and should not be shared without the explicit written consent of the data managers and owners (NOAA Fisheries). The GitHub repository for the scripts that created this code can be found at ([https://github.com/EmilyMarkowitz-NOAA/sap\\_products](https://github.com/EmilyMarkowitz-NOAA/sap_products)).

Number of columns: 2

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

## 7. Universal Column Metadata

This table is used to string together the various field comments for the tables in GAP\_PRODUCTS. This table was created by the Resource Assessment and Conservation Engineering Division (RACE) Groundfish Assessment Program (GAP) of the Alaska Fisheries Science Center (AFSC). The GitHub repository for the scripts that created this code can be found at ([https://github.com/afsc-gap-products/gap\\_products](https://github.com/afsc-gap-products/gap_products)). There are no legal restrictions on access to the data. Last updated on 12 September 2024.

Table 7.1.: Universal stock metadata that users can use to document their table columns.

| Column name from data | Descriptive column Name          | Units   | Oracle data type | Column description  |
|-----------------------|----------------------------------|---------|------------------|---|
| ABUNDANCE HAUL        | Design-based index approved haul | logical | VARCHAR(2 BYTE)  | Logical, describing if this haul was conducted in a standard manner and thus used for design-based index estimates (TRUE) or not (FALSE). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                  | Units       | Oracle data type   | Column description   |
|-----------------------|--|-------------|--------------------|--|
| ACCESSORIES           | Type of gear accessories used on the net | ID key code | NUMBER(38,0)       | Type of accessories used on net. For a complete list of accessories ID key codes, [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| ACTION                | Database action                          | text        | VARCHAR2(2 BYTE)   | Standard action taken to alter current database record   |
| ACTIVE                | Vessel active/inactive                   | logical     | VARCHAR2(255 BYTE) | Logical, describing if a vessel is active (TRUE) or not (FALSE).   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units   | Oracle data type | Column description   |
|-----------------------|-------------------------|---------|------------------|--|
| AGE                   | Taxon age bin (yrs)     | integer | NUMBER(3)        | Age bin of taxon. Age bin of a taxon in years estimated by the age comp estimate. Age -9 indicates unaged lengths for a particular sex because no otoliths were collected for that sex/length combination. Age -99 indicates a case where no lengths were collected within a stratum for a species/year even though catch numbers were recorded. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name  | Units            | Oracle data type       | Column description  |
|-----------------------|--------------------------|------------------|------------------------|---|
| AGENCY_-ACRONYM       | Acronym of listed Agency | text abbreviated | VARCHAR2(255)<br>BYTE) | Abbreviated agencies that are affiliated with the Alaska bottom trawl survey. |
| AGENCY_-JOIN          | Agency ID                | ID key code      | NUMBER(3)              | Affiliated agency ID key code.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type   | Column description   |
|-----------------------|-------------------------|-------|--------------------|--|
| AGENCY_LONG           | Official name of agency | text  | VARCHAR2(255 BYTE) | <p>Full official name of affiliated agencies to the Alaska bottom trawl survey.</p> <p>The VARCHAR2(255 BYTE) column agency_long is associated with the agency_acronym and agency_short columns.</p> |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type  | Column description  |
|-----------------------|-------------------------|-------|-------------------|---|
| AGENCY_SHORT          | Agency shorthand name   | text  | VARCHAR2(32 BYTE) | A sort version of the full official name of affiliated agencies to the Alaska bottom trawl survey. The column agency_short is associated with the agency_acronym and agency_long columns. |

## 7. Universal Column Metadata

| Column name from data         | Descriptive column Name  | Units       | Oracle data type | Column description   |
|-------------------------------|--------------------------|-------------|------------------|--|
| AGE_DE-TERMINA-TION_-METHOD   | Aging method             | ID key code | NUMBER(10,0)     | Numeric code corresponding to the method of age determination. For a complete list of age determination codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| AGE_DE-TERMINA-TION_-METH-ODS | Age determination method | ID key code | NUMBER(3)        | A unique ID used to identify this age determination method.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type | Column description   |
|-----------------------|-------------------------|-------|------------------|--|
| AGE_YEAR              | Age bin of taxon        | year  | NUMBER(38,0)     | Age bin of a taxon in years<br>Estimated by the age comp estimate. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| AREAJOIN              | Area polygon ID         | ID key code | NUMBER(3)        | A call sign is a designated sequence of letters and numbers that are assigned when a vessel, whether it be a sailing yacht, motor yacht, rib or commercial vessel, receives its Ship Radio Licence. The vessel also receives its MMSI number, so that each vessel is uniquely identified. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description   |
|-----------------------|-------------------------|-------------|------------------|--|
| AREA_ID               | Area ID                 | ID key code | NUMBER(38,0)     | Area ID key code for each statistical area used to produce production estimates (e.g., biomass, population, age comps, length comps). Each area ID is unique within each survey. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units              | Oracle data type   | Column description  |
|-----------------------|-------------------------|--------------------|--------------------|---|
| AREA_ID_FOOTPRINT     | Survey Footprint        | text               | VARCHAR2(255 BYTE) | Survey footprint, usually equivalent to the SURVEY_DEFINITION_-ID with the exception of the AREA_ID_FOOTPRINT survey footprints in the Eastern Bering Sea shelf bottom trawl survey |
| AREA_KM2              | Area (km2)              | kilometers squared | NUMBER(38,3)       | Area in square kilometers.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units      | Oracle data type | Column description  |
|-----------------------|-------------------------|------------|------------------|---|
| AREA_NAME             | Area ID name            | text       | VARCHAR(255)     | Descriptive name of each AREA_ID. These names often identify the region, depth ranges, or other regional information for the area ID. |
| AREA_SWEPT_KM2        | Area swept (km)         | kilometers | NUMBER(38,6)     | The area the net covered while the net was fishing (kilometers squared), defined as the distance fished times the net width.          |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units                | Oracle data type | Column description   |
|-----------------------|-------------------------|----------------------|------------------|--|
| AREA_TYPE             | Area ID type            | category description | VARCHAR2(BYTE)   | The type of stratum that AREA_ID represents. Types include: STRATUM (the smallest building-block unit of area in these surveys), REGION, DEPTH, SUB-AREA, INPFC BY DEPTH, INPFC, SUBAREA BY DEPTH, REGULAR-TORY AREA, NMFS STATISTICAL AREA. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name              | Units           | Oracle data type | Column description   |
|-----------------------|--------------------------------------|-----------------|------------------|--|
| BIOMASS_MT            | Estimated biomass                    | numeric         | NUMBER(38,6)     | The estimated total biomass.   |
| BIOMASS_VAR           | Estimated biomass variance           | numeric         | NUMBER(38,6)     | The estimated variance associated with the total biomass.                                |
| BOTTOM_TEMPERATURE_C  | Bottom temperature (degrees Celsius) | degrees Celsius | NUMBER(38,6); NA | Bottom temperature (tenths of a degree Celsius); NA indicates removed or missing values. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name   | Units       | Oracle data type   | Column description  |
|-----------------------|---------------------------|-------------|--------------------|---|
| BOTTOM_TYPE           | Seafloor bottom type code | ID key code | NUMBER(3)          | Bottom type on sea floor at haul location. For a complete list of bottom type ID key codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| CATALOG_NUM           | Catalog number            | text        | VARCHAR2(255 BYTE) | Museum catalog number associated with record  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name             | Units       | Oracle data type   | Column description  |
|-----------------------|-------------------------------------|-------------|--------------------|---|
| CATCHJOI              | Catch observation ID                | ID key code | NUMBER(3)          | Unique integer ID assigned to each survey, vessel, year, and catch observation combination. |
| CLASSIFICATION        | Taxonomic classification rank group | category    | VARCHAR2(255 BYTE) | Phylogenetic classification rank for a given species.                                       |
| CLASS_-TAXON          | Class phylogenetic rank             | category    | VARCHAR2(255 BYTE) | Phylogenetic latin rank of class of a given species.  |
| COLLECTED BY          | Person who collected specimen       | text        | VARCHAR2(255 BYTE) | Initials of person collected specimen in the field  |
| COMMENT               | Comments                            | text        | VARCHAR2           | Comments regarding row observation.   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units                          | Oracle data type   | Column description  |
|-----------------------|-------------------------|--------------------------------|--------------------|---|
| COMMON_NAME           | Taxon common name       | text                           | VARCHAR2(255 BYTE) | The common name of the marine organism associated with the scientific_name and species_code columns. For a complete species list, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| COUNT                 | Taxon count             | count, whole number resolution | NUMBER(3)          | Total whole number of individuals caught in haul or samples collected.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units                 | Oracle data type | Column description  |
|-----------------------|-------------------------|-----------------------|------------------|---|
| COUNTRY_ID            | Country code            | ID key code           | NUMBER(38,0)     | Country ID key code of where a vessel, for example, may be from. For a complete list of country ID [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| CPUE_KGHA             | Weight CPUE (kg/ha)     | kilograms per hectare | NUMBER(3         | Catch weight (kilograms) per unit effort (area swept by the net, units hectares).   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units                            | Oracle data type | Column description   |
|-----------------------|-------------------------|----------------------------------|------------------|--|
| CPUE_-KGKM2           | Weight CPUE (kg/km2)    | kilograms per kilometers squared | NUMBER(38,6)     | Catch weight (kilograms) per unit effort (area swept by the net, units square kilometers).           |
| CPUE_-KGKM2_-MEAN     | Mean weight CPUE        | kilograms per kilometers squared | NUMBER(3)        | The mean catch weight (kilograms) per unit effort (area swept by the net, units squared kilometers). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name          | Units                            | Oracle data type | Column description  |
|-----------------------|----------------------------------|----------------------------------|------------------|---|
| CPUE_-KGKM2_-VAR      | Variance of the mean weight CPUE | kilograms per kilometers squared | NUMBER(38,6)     | The variance of mean catch weight (kilograms) per effort (area swept by the net, units squared kilometers). |
| CPUE_-NOHA            | Number CPUE (no/ha)              | count per hectare                | NUMBER(38,6)     | Numerical catch per unit effort (area swept by the net, units hectares).                                    |
| CPUE_-NOKM2           | Number CPUE (no/km2)             | count per kilometers squared     | NUMBER(38,6)     | Numerical catch per unit effort (area swept by the net, units square kilometers).                           |

## 7. Universal Column Metadata

| Column name from data     | Descriptive column Name                       | Units                              | Oracle data type     | Column description   |
|---------------------------|---|------------------------------------|----------------------|--|
| CPUE_-<br>NOKM2_-<br>MEAN | Mean<br>numeric<br>CPUE                       | count per<br>kilometers<br>squared | NUMBER(3<br>8,0,0,0) | The mean of numerical catch per unit effort (area swept by the net, units square kilometers).          |
| CPUE_-<br>NOKM2_-<br>VAR  | Variance<br>of the<br>mean<br>numeric<br>CPUE | count per<br>kilometers<br>squared | NUMBER(3<br>8,0,0,0) | The variance of mean numerical catch per unit effort (area swept by the net, units square kilometers). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name     | Units       | Oracle data type | Column description  |
|-----------------------|-----------------------------|-------------|------------------|---|
| CRS                   | Coordinate reference system | ID key code | VARCHAR2 (BYTE)  | The coordinate reference system (CRS) that shapefiles were created in or areas (like AREA_KM2) are calculated in, as defined by <a href="https://spatialreference.org/">https://spatialreference.org/</a> (e.g., "+proj=longlat", "EPSG:3338"). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| CRUISE                | Cruise Name             | ID key code | NUMBER(3,0)      | This is a six-digit integer identifying the cruise number of the form: YYYY99 (where YYYY = year of the cruise; 99 is sequential; 01 denotes the first cruise that vessel made in this year, 02 is the second, etc.). |
| CRUISEJO              | Cruise ID               | ID key code | NUMBER(3)        | Unique integer ID assigned to each survey, vessel, and year combination.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type   | Column description   |
|-----------------------|-------------------------|-------------|--------------------|--|
| DATABASE              | Database source         | category    | VARCHAR2(255 BYTE) | Taxonomic database either ITIS or WoRMS.                             |
| DATABASE_ID           | Species ID in database  | ID key code | VARCHAR2(255 BYTE) | Species ID key code of a species in the taxonomic "DATABASE" source. |
| DATE                  | Date                    | YYYY-MM-DD  | DATE               | The date (YYYY-MM-DD) of the event (e.g., cruise).                   |
| DATE-END              | End date                | YYYY-MM-DD  | DATE               | The date (YYYY-MM-DD) of the end of the event (e.g., cruise).        |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units          | Oracle data type | Column description  |
|-----------------------|-------------------------|----------------|------------------|---|
| DATE_-START           | Start date              | YYYY-MM-DD     | DATE             | The date (YYYY-MM-DD) of the beginning of the event (e.g., cruise).   |
| DATE_-TIME            | Date and time           | MM/DD/YY HH:MM | DATE             | The date (MM/DD/YYYY) and time (HH:MM) of the haul. All dates and times are in Alaska time (AKDT) of Anchorage, AK, USA (UTC/GMT -8 hours). |

## 7. Universal Column Metadata

| Column name from data     | Descriptive column Name | Units                | Oracle data type | Column description  |
|---------------------------|-------------------------|----------------------|------------------|---|
| DATE_-<br>TIME_-<br>END   | End date and time       | MM/DD/YYYY<br>HH::MM | TIMESTAMP        | The date (MM/DD/YYYY) and time (HH:MM) of the end of the haul.<br>All dates and times are in Alaska time (AKDT) of Anchorage, AK, USA (UTC/GMT -8 hours).       |
| DATE_-<br>TIME_-<br>START | Start date and time     | MM/DD/YY<br>HH::MM   | TIMESTAMP        | The date (MM/DD/YYYY) and time (HH:MM) of the beginning of the haul.<br>All dates and times are in Alaska time (AKDT) of Anchorage, AK, USA (UTC/GMT -8 hours). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name   | Units           | Oracle data type | Column description  |
|-----------------------|---------------------------|-----------------|------------------|---|
| DEPTH_GEAR_M          | Depth of gear (m)         | degrees Celsius | NUMBER(3,2)      | Depth of gear (meters).   |
| DEPTH_M               | Depth (m)                 | degrees Celsius | NUMBER(3,2)      | Bottom depth (meters).  |
| DEPTH_MAX_M           | Area ID maximum depth (m) | meters          | NUMBER(3,2)      | Maximum depth (meters).   |
| DEPTH_MIN_M           | Area ID minimum depth (m) | meters          | NUMBER(3,2)      | Minimum depth (meters).   |
| DESCRIPTION           | Description text          |                 | VARCHAR2(4000)   | Description of row observation.   |
| DESIGN_YEAR           | Design year               | year            | NUMBER(1)        | Year ID associated with a given value AREA_ID. This field describes the changes in the survey design over time. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name       | Units           | Oracle data type | Column description   |
|-----------------------|-------------------------------|-----------------|------------------|--|
| DISTANCE_FISHED_KM    | Distance fished (km)          | degrees Celsius | NUMBER(38,9)     | Distance the net fished (km) in degrees Celsius. (8.999999999999999e-004). Hundreds of kilometers. |
| DUMMY                 | dummy                         | dummy           | VARCHAR2(1 BYTE) | dummy  |
| DURATION_HR           | Tow duration (decimal hr)     | hours           | NUMBER(38,9)     | This is the elapsed time between start and end of a haul (decimal hours).                          |
| FAMILY_TAXON          | Family phylogenetic rank      | category        | VARCHAR2(1 BYTE) | Phylogenetic latin rank of family of a given species.  |
| FIELD_ID              | Field specimen identification | text            | VARCHAR2(255)    | Field identification for the vouchered specimen  |
| FREQUENCY             | Count of observation          | count           | NUMBER(38,9)     | Frequency, or count, of an observation.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name      | Units       | Oracle data type | Column description  |
|-----------------------|------------------------------|-------------|------------------|---|
| GEAR                  | Type of gear used on the net | ID key code | NUMBER(3,0)      | Type of gear used on net. For a complete list of gear ID key codes, review the <a href="https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual">code books](https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual)</a> . |
| GEAR_DEPTH_M          | Gear depth                   | meters      | NUMBER(3,0)      | Depth gear was deployed at (tenths of a meter). Gear depth plus net height equals bottom depth.   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name            | Units           | Oracle data type | Column description   |
|-----------------------|------------------------------------|-----------------|------------------|--|
| GEAR_ID               | Gear ID                            | ID key code     | NUMBER(38,0)     | Type of trawl or gear deployed. For a complete list of vessel gear type ID key review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| GEAR_TEMPERATURE_C    | Gear temperature (degrees Celsius) | degrees Celsius | NUMBER(3)        | Temperature recorded by net gear (tenths of a degree Celsius); NA indicates removed or missing values.   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units    | Oracle data type   | Column description                                   |
|-----------------------|-------------------------|----------|--------------------|--|
| GENUS_-TAXON          | Genus phylogenetic rank | category | VARCHAR2(255 BYTE) | Phylogenetic latin rank of genus of a given species. |
| GONAD_-G              | Weight of gonads (g)    | grams    | NUMBER(3)          | Weight of specimen gonads (grams).                   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| GROUP_CODE            | Species or Complex ID   | ID key code | NUMBER(38,0)     | Equivalent to the SPECIES_CODE if the taxon is reported as a single taxon in GAP_-PROD-UCTS, otherwise denotes a SPECIES_CODE of a higher taxonomic group to which the taxon is aggregated in the GAP_-PROD-UCTS CPUE and BIOMASS tables. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| HAUL                  | Haul number             | ID key code | NUMBER(3)        | This number uniquely identifies a sampling event (haul) within a cruise. It is a sequential number, in chronological order of occurrence. |
| HAULJOIN              | Haul ID                 | ID key code | NUMBER(38,0)     | This is a unique numeric identifier assigned to each (vessel, cruise, and haul) combination.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name      | Units       | Oracle data type   | Column description   |
|-----------------------|------------------------------|-------------|--------------------|--|
| HAUL_TYPE             | Haul sampling type           | ID key code | NUMBER(3)          | Type of haul sampling method. For a complete list of haul type ID key codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| ID_RANK               | Lowest taxonomic rank        | text        | VARCHAR2(255 BYTE) | Lowest taxonomic rank of a given species entry.  |
| INFRACLASS_TAXON      | Infraclass phylogenetic rank | category    | VARCHAR2(255 BYTE) | Infraclass phylogenetic rank. Phylogenetic latin rank of infraclass of a given speices.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                                      | Units           | Oracle data type   | Column description   |
|-----------------------|--|-----------------|--------------------|--|
| INFRAORDER TAXON      | Infraorder phylogenetic rank                                 | category        | VARCHAR2(255 BYTE) | Infraorder phylogenetic rank. Phylogenetic latin rank of infraorder of a given species.  |
| ITIS                  | Integrated taxonomic information system (ITIS) serial number | ID key code     | NUMBER(3)          | Species code as identified in the Integrated Taxonomic Information System ( <a href="https://itis.gov/">https://itis.gov/</a> ). |
| KINGDOM TAXON         | Kingdom phylogenetic rank                                    | category        | VARCHAR2(255 BYTE) | Phylogenetic latin rank of kingdom of a given species.   |
| LATITUDE DD           | Latitude (decimal degrees)                                   | decimal degrees | NUMBER(3)          | Latitude (one hundred thousandth of a decimal degree).   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name          | Units           | Oracle data type | Column description   |
|-----------------------|----------------------------------|-----------------|------------------|--|
| LATITUDE_DD_END       | End latitude (decimal degrees)   | decimal degrees | NUMBER(3,0)      | Latitude (one hundred thousandths of a decimal degree) of the end of the haul.   |
| LATITUDE_DD_START     | Start latitude (decimal degrees) | decimal degrees | NUMBER(3,0)      | Latitude (one hundred thousandths of a decimal degree) of the start of the haul. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name   | Units       | Oracle data type | Column description   |
|-----------------------|---|-------------|------------------|--|
| LENGTH_MM             | Length of a specimen  | millimeters | NUMBER(10,0)     | Length bin in millimeters. A length of -9 indicates cases where no lengths were selected within a stratum for a species/year, even though catch numbers were recorded. |
| LENGTH_MM_MEAN        | Mean length at age weighted by numbers at length                  | numeric     | NUMBER(3,0)      | Mean length (millimeters)  |
| LENGTH_MM_SD          | Standard deviation of length at age weighted by numbers at length | numeric     | NUMBER(3,0)      | Variance of mean length.   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name     | Units           | Oracle data type | Column description   |
|-----------------------|-----------------------------|-----------------|------------------|--|
| LENGTH_TYPE           | Length type                 | ID key code     | NUMBER(3)        | How the taxon was measured (e.g., fork length, carapace width). For a complete list of length_type ID key codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| LONGITUDE_DD          | Longitude (decimal degrees) | decimal degrees | NUMBER(3,6)      | Longitude (one hundred sandth of a decimal degree).  |

## 7. Universal Column Metadata

| Column name from data  | Descriptive column Name           | Units           | Oracle data type    | Column description  |
|------------------------|-----------------------------------|-----------------|---------------------|---|
| LONGITUDE_DD_END       | longitude (decimal degrees)       | decimal degrees | NUMBER(3,3)         | Longitude (one hundred thousandths of a decimal degree) of the end of the haul.   |
| LONGITUDE_DD_START     | Start longitude (decimal degrees) | decimal degrees | NUMBER(3,3)         | Longitude (one hundred thousandths of a decimal degree) of the start of the haul. |
| MATURITY_CODE          | Specimen maturity code            | ID key code     | NUMBER(3)           | The maturity code or the condition identified by the maturity code.               |
| METADATA_COL_NAME      | Column name                       | text            | VARCHAR2(4000 BYTE) | Name of the column in a table.  |
| METADATA_COL_NAME_DESC | Column description                | text            | VARCHAR2(4000 BYTE) | Description of the column.  |

## 7. Universal Column Metadata

| Column name from data  | Descriptive column Name | Units    | Oracle data type    | Column description   |
|------------------------|-------------------------|----------|---------------------|--|
| METADATA_COL_NAME_LONG | Column name spelled out | text     | VARCHAR2(4000 BYTE) | Long<br>VARCHAR2(4000 for the column.  |
| METADATA_DATATYPE      | Oracle datatype code    | text     | VARCHAR2(4000 BYTE) | Oracle data type of data column.   |
| METADATA_SENTENCE      | Sentence                | text     | VARCHAR2(4000 BYTE) | Table metadata sentence.   |
| METADATA_SENTENCE_NAME | Metadata sentence name  | text     | VARCHAR2(4000 BYTE) | Name of table metadata sentence.   |
| METADATA_SENTENCE_TYPE | Sentence type           | text     | VARCHAR2(4000 BYTE) | Type of sentence to have in table metadata.  |
| METADATA_UNITS         | Units                   | category | VARCHAR2(4000 BYTE) | Units of the column.   |
| NET_HEIGHT_M           | Net height (m)          | meters   | NUMBER(38,1)        | Measured or estimated distance (meters)<br>Between footrope and headrope of the trawl. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name     | Units       | Oracle data type | Column description  |
|-----------------------|-----------------------------|-------------|------------------|---|
| NET_MEASURED          | Net measured during haul    | logical     | BINARY_DOUBLE    | Logical, describing if the net was measured (TRUE) or not (FALSE) by wheelhouse and marport programs during the haul. |
| NET_WIDTH_M           | Net width (m)               | meters      | NUMBER(38)       | Measured or estimated distance (meters) between wingtips of the trawl.  |
| NEW_ID                | New specimen identification | text        | VARCHAR2(BYTE)   | Confirmed taxonomist identification of the vouchered specimen   |
| NEW_SPECIES_CODE      | New species code            | ID key code | NUMBER(10,0)     | Species code associated with new species name   |

## 7. Universal Column Metadata

| <b>Column name from data</b> | <b>Descriptive column Name</b> | <b>Units</b> | <b>Oracle data type</b> | <b>Column description</b>                              |
|------------------------------|--------------------------------|--------------|-------------------------|--|
| NEW_SPECIES_NAME             | New species name               | text         | VARCHAR2(255 BYTE)      | Updated taxonomic name                                 |
| N_COUNT                      | Hauls with taxon counts        | numeric      | NUMBER(38,0)            | Total number of hauls with positive count data.        |
| N_HAUL                       | Valid hauls                    | count        | NUMBER(38,0)            | Total number of hauls.                                 |
| N_LENGTH                     | Hauls with taxon lengths       | count        | NUMBER(38,0)            | Total number of hauls with length data.                |
| N_SAMPLE                     | Hauls with sample              | count        | NUMBER(38,0)            | Total number of hauls with positive sample collection. |
| N_SPECIMENS                  | Number of specimens in the lot | count        | NUMBER(38,0)            | Number of specimens in the voucher lot                 |
| N_WEIGHT                     | Hauls with catch               | count        | NUMBER(38,0)            | Total number of hauls with positive catch biomass.     |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type   | Column description                                   |
|-----------------------|-------------------------|-------------|--------------------|--|
| OLD_-SPECIES_-CODE    | Old species code        | ID key code | NUMBER(10,0)       | Species code associated with old species name        |
| OLD_-SPECIES_-NAME    | Old species name        | text        | VARCHAR2(255 BYTE) | Taxonomic name previously used in the database       |
| ORDER_-TAXON          | Order phylogenetic rank | category    | VARCHAR2(255 BYTE) | Phylogenetic latin rank of order of a given species. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name  | Units    | Oracle data type   | Column description   |
|-----------------------|--------------------------|----------|--------------------|--|
| PERFORM               | Haul performance code    | category | NUMBER(3)          | This denotes what, if any, issues arose during the haul. For more information, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| PHYLUM_-TAXON         | Phylum phylogenetic rank | category | VARCHAR2(255 BYTE) | Phylogenetic latin rank of phylum of a given species.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description   |
|-----------------------|-------------------------|-------------|------------------|--|
| POLYGON_WKB           | Polygon binary string   | code string | VARCHAR2(BYTE)   | Well-known binary (WKB) representation of geometry for a AREA_JOIN polygon. WKB is used to transfer and store the same information in a more compact form convenient for computer processing but that is not human-readable. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type   | Column description  |
|-----------------------|-------------------------|-------------|--------------------|---|
| POLYGON_WKT           | Polygon well known text | code string | VARCHAR2(255 BYTE) | Well-known text (WKT) representation of geometry for a AREA_JOIN polygon. WKT is a text markup language for representing vector geometry objects. |
| POPULATIONCOUNT       | Estimated population    | numeric     | NUMBER(3)          | The estimated population caught in the survey for a species, group, or total for a given survey.  |

## 7. Universal Column Metadata

| Column name from data  | Descriptive column Name        | Units   | Oracle data type   | Column description  |
|------------------------|--------------------------------|---------|--------------------|---|
| POPULATION_VAR         | Estimated population variance  | numeric | NUMBER(38,6)       | The estimated population variance caught in the survey for a species, group, or total for a given survey. |
| PRESERVATION           | Chemical specimen stored in    | text    | VARCHAR2(255 BYTE) | Chemical specimen currently stored in   |
| PRINCIPAL_INVESTIGATOR | Principle investigator         | text    | VARCHAR2(255 BYTE) | First and last name of principal investigator for a project.  |
| PROJECT_TITLE          | Title of special project       | text    | VARCHAR2(255 BYTE) | Special project title.  |
| PROJECT_TITLE_SHORT    | Short title of special project | text    | VARCHAR2(255 BYTE) | Special project short title (short version of PROJECT_TITLE).   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name     | Units    | Oracle data type   | Column description   |
|-----------------------|-----------------------------|----------|--------------------|--|
| RANK_ID               | Taxonomic rank              | category | VARCHAR2(255 BYTE) | The taxonomic rank of a taxon identification.  |
| REASON                | Reason for taxonomic change | text     | VARCHAR2(255 BYTE) | Reason for taxonomic change; pulled directly from online database (i.e. WoRMS or ITIS) |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| SAMPLE_TYPE           | - Sample type           | ID key code | NUMBER(3)        | Sampling information on how the taxon was sampled. For a complete list of length_type ID key codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type   | Column description   |
|-----------------------|-------------------------|-------------|--------------------|--|
| SCIENTIFIC_NAME       | Taxon scientific name   | text        | VARCHAR2(255 BYTE) | The scientific name of the organism associated with the common_name and species_code columns. For a complete taxon list, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a> ). |
| SEX                   | Sex of a specimen       | ID key code | NUMBER(3)          | Sex of a specimen where "1" = "Male", "2" = "Female", "3" = Unsexed.   |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                    | Units       | Oracle data type   | Column description  |
|-----------------------|--|-------------|--------------------|---|
| SPECIES_CODE          | SPECIES_-Taxon code                        | ID key code | NUMBER(38,0)       | The species code of the organism associated with the common_-name and scientific_-name columns. |
| SPECIES_NAME          | Scientific name of species                 | text        | VARCHAR2(255 BYTE) | Scientific name of species.   |
| SPECIES_NAME_ACCEPTED | Scientific name used in taxonomic database | text        | VARCHAR2(255 BYTE) | Scientific name of species used in taxonomic "DATABASE" column.                                 |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name             | Units       | Oracle data type  | Column description  |
|-----------------------|-------------------------------------|-------------|-------------------|---|
| SPECIES_NAME_SURVEY   | Scientific name used in survey data | text        | VARCHAR(255 BYTE) | Scientific name of species historically or currently used in the survey.  |
| SPECIMEN_ID           | Specimen unique ID                  | ID key code | NUMBER(38,0)      | Each individual examined must have a number assigned to it that is unique within haul (0001 to 9999), though specimen numbers may be repeated between hauls |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| SPECIMEN_SAM-PLE-TYPE | Specimen sample type    | ID key code | NUMBER(3)        | The specimen sample type ID key code as defined in the RACE_-DATA.SPECIMEN_-SAM-PLE_-TYPES table. For a complete list of Specimen sample type ID key codes, review the [code books]( <a href="https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual</a> ). |

## 7. Universal Column Metadata

| Column name from data       | Descriptive column Name   | Units       | Oracle data type | Column description  |
|-----------------------------|---------------------------|-------------|------------------|---|
| SPECIMEN_SUBSAM-PLE_-METHOD | Specimen subsample method | ID key code | NUMBER(38,0)     | For a complete list of specimen subsample method ID key codes, review the [specie books](https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units            | Oracle data type | Column description   |
|-----------------------|-------------------------|------------------|------------------|--|
| SRVY                  | Survey abbreviation     | text abbreviated | VARCHAR2(2 BYTE) | Abbreviated survey names. The column srvy is associated with the survey and survey_definition_id columns. Northern Bering Sea (NBS), Southeastern Bering Sea (EBS), Bering Sea Slope (BSS), Gulf of Alaska (GOA), Aleutian Islands (AI). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name           | Units       | Oracle data type   | Column description   |
|-----------------------|-----------------------------------|-------------|--------------------|--|
| STANDARD_LENGTH_MM    | Standard length of specimens (mm) | numeric     | VARCHAR2(255 BYTE) | Standard length of specimen or range of lengths if multiple specimens in lot; measured by taxonomists in lab |
| STATION               | Station ID                        | ID key code | VARCHAR2(255 BYTE) | Alpha-numeric designation for the station established in the design of a survey.                             |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name    | Units       | Oracle data type | Column description   |
|-----------------------|----------------------------|-------------|------------------|--|
| STRATUM               | Stratum ID                 | ID key code | NUMBER(10,0)     | RACE database statistical area for analyzing data.<br>Strata were designed using bathymetry and other geo-graphic habitat-related elements. The strata are unique to each survey region. Stratum of value 0 indicates experimental tows. |
| SUBCLASS TAXON        | Subclass phylogenetic rank | category    | VARCHAR2( BYTE)  | Phylogenetic latin rank of subclass of a given species.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name      | Units      | Oracle data type   | Column description   |
|-----------------------|------------------------------|------------|--------------------|--|
| SUBFAMILY TAXON       | Subfamily phylogenetic rank  | category   | VARCHAR2(255 BYTE) | Phylogenetic latin rank subfamily of a given species.                          |
| SUBMISSION DATE       | Date                         | YYYY-MM-DD | DATE               | Date special projects were due to be submitted for the upcoming survey season. |
| SUBORDER TAXON        | Suborder phylogenetic rank   | category   | VARCHAR2(255 BYTE) | Phylogenetic latin rank suborder of a given species.                           |
| SUBPHYLUM TAXON       | Subphylum phylogenetic rank  | category   | VARCHAR2(255 BYTE) | Phylogenetic latin rank subphylum of a given species.                          |
| SUPERCLASS TAXON      | Superclass phylogenetic rank | category   | VARCHAR2(255 BYTE) | Phylogenetic latin rank superclass of a given species.                         |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name               | Units           | Oracle data type          | Column description   |
|-----------------------|---------------------------------------|-----------------|---------------------------|--|
| SUPERFAMILY_TAXON     | Superfamily phylogenetic rank         | category        | VARCHAR2(255 BYTE)        | Phylogenetic latin rank of superfamily of a given species.                                   |
| SUPERORDER_TAXON      | Superorder phylogenetic rank          | category        | VARCHAR2(255 BYTE)        | Phylogenetic latin rank superorder of a given species.                                       |
| SURFACE_TEMPERATURE_C | Surface temperature (degrees Celsius) | degrees Celsius | NUMBER(3) Celsius);<br>NA | Surface temperature (tenths of a degree Celsius);<br>NA indicates removed or missing values. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type   | Column description   |
|-----------------------|-------------------------|-------|--------------------|--|
| SURVEY                | Survey name             | text  | VARCHAR2(255 BYTE) | Name and description of survey.<br>The column survey is associated with the srvy and survey_definition_id columns. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description   |
|-----------------------|-------------------------|-------------|------------------|--|
| SURVEY_DEFINITION_ID  | Survey ID               | ID key code | NUMBER(3)        | The survey definition ID key code is an integer that uniquely identifies a survey region/survey design. The column survey_definition_id is associated with the survey and survey columns. Full list of survey definition IDs are in RACE_DATA.SURVEY_DEFINITIONS and in the [code books]( <a href="https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-species-code-manual-and-data-codes-manual</a> ). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description   |
|-----------------------|-------------------------|-------------|------------------|--|
| SURVEY_ID             | Survey ID raw           | ID key code | NUMBER(38,0)     | The survey ID uniquely identifies a survey instance.                                 |
| SURVEY_NAME           | Survey name official    | text        | VARCHAR2(BYTE)   | Long name of the survey conducted  |
| SURVEY_SPECIES        | Species used in survey  | logical     | BINARY_DOUBLE    | Designates whether or not species name is accepted/actively used in the RACE surveys |
| TAXONOMY              | Taxonomist text         |             | VARCHAR2(BYTE)   | Taxonomist(s) who re-identified specimen(s)  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type | Column description   |
|-----------------------|-------------------------|-------|------------------|--|
|                       |                         |       |                  | <p>Confidence in the ability of the survey team to correctly identify the taxon to the specified level, based solely on identification skill (e.g., not likelihood of a taxon being caught at that station on a location-by-location basis).</p> <p>Quality codes follow:</p> <p>**High**: High confidence and consistency. Taxonomy is stable and reliable at this level, and field identification characteristics are well known and reliable.</p> <p>**Moderate**: </p> |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type | Column description  |
|-----------------------|-------------------------|-------|------------------|---|
|                       |                         |       |                  | <p>Confidence in the ability of the survey team to correctly identify the taxon to the specified level, based solely on identification skill (e.g., not likelihood of a taxon being caught at that station on a location-by-location basis). Quality codes follow:</p> <p>**High**: High confidence and consistency. Taxonomy is stable and reliable at this level, and field identification characteristics are well known and reliable.</p> <p>**Moderate**: </p> |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units   | Oracle data type | Column description   |
|-----------------------|-------------------------|---------|------------------|--|
| TRAWLABLE             | Trawlable stations      | logical | BINARY_DOUBLE    | Logical, describing if stations are trawlable (TRUE) or not (FALSE). |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description  |
|-----------------------|-------------------------|-------------|------------------|---|
| VESSEL_CALLSIGN       | Vessel call sign        | ID key code | NUMBER(3)        | A call sign is a designated sequence of letters and numbers that are assigned when a vessel, whether it be a sailing yacht, motor yacht, rib or commercial vessel, receives its Ship Radio Licence. The vessel also receives its MMSI number, so that each vessel is uniquely identified. |

## 7. Universal Column Metadata

| Column name from data                    | Descriptive column Name            | Units       | Oracle data type | Column description  |
|--|------------------------------------|-------------|------------------|---|
| VESSEL_-<br>COAST_-<br>GUARD_-<br>NUMBER | Vessel<br>coast<br>guard<br>number | ID key code | NUMBER(38,0)     | Official Identification number as defined by <a href="http://www.dco.uscg.mil">www.dco.uscg.mil</a> .<br>The Official Number (O/N) is the 6 or 7 digit number awarded to the vessel at the time it is first documented with the US Coast Guard. This number remains with the vessel indefinitely and should be marked in accordance with 46 CFR 67.121. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units       | Oracle data type | Column description   |
|-----------------------|-------------------------|-------------|------------------|--|
| VESSEL_ID             | Vessel ID               | ID key code | NUMBER(3)        | <p>ID number of the vessel used to collect data for that haul. The column <code>vessel_id</code> is associated with the <code>vessel_name</code> column. Note that it is possible for a vessel to have a new name but the same vessel id number. For a complete list of vessel ID key codes, review the [code books](<a href="https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource-survey-species-code-manual-and-data-codes-manual</a>).</p> |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                           | Units       | Oracle data type | Column description   |
|-----------------------|---|-------------|------------------|--|
| VESSEL_IMO            | Vessel international maritime organization number | ID key code | NUMBER(38,0)     | The International Maritime Organization (IMO) number consists of the letters "IMO" followed by a seven-digit number: the pattern is "NNNNNNN", where N is a single-digit number, e.g., "1234567" |
| VESSEL_LENGTH_M       | Vessel length (m)                                 | meters      | NUMBER(3,0)      | The length of vessel in meters.  |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                   | Units       | Oracle data type | Column description   |
|-----------------------|---|-------------|------------------|--|
| VESSEL_-MMSI          | Vessel maritime mobile service identities | ID key code | NUMBER(30,0)     | Maritime Mobile Service Identities (MMSIs) are nine-digit numbers used by maritime digital selective calling systems (AIS) and certain other equipment to uniquely identify a ship or a coast radio station. |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name | Units | Oracle data type   | Column description  |
|-----------------------|-------------------------|-------|--------------------|---|
| VESSEL_NAME           | Vessel name             | text  | VARCHAR2(255 BYTE) | <p>Name of the vessel used to collect data for that haul. The column vessel_name is associated with the vessel_id column. Note that it is possible for a vessel to have a new name but the same vessel id number. For a complete list of vessel ID key codes, review the [code books](<a href="https://www.fisheries.noaa.gov/resource/survey-species-code-manual-and-data-codes-manual">https://www.fisheries.noaa.gov/resource/survey-species-code-manual-and-data-codes-manual</a>).</p> |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name     | Units       | Oracle data type   | Column description  |
|-----------------------|-----------------------------|-------------|--------------------|---|
| VESSEL_- OWNER        | Vessel owner                | text        | VARCHAR2(255 BYTE) | Name of owner or company.   |
| VESSEL_- TONNAGE      | Vessel tonnage              | metric tons | NUMBER(3)          | The tonnage of vessel in metric tons.                               |
| VOUCHER               | Voucher number              | numeric     | NUMBER(3,0)        | The voucher number of specimen within a single haul                 |
| WEIGHT_- G            | Specimen weight (g)         | grams       | NUMBER(3)          | Weight of specimen (grams).   |
| WEIGHT_- KG           | Sample or taxon weight (kg) | kilograms   | NUMBER(3,3)        | Weight (thousands of a kilogram) of individuals in a haul by taxon. |
| WIRE_- LENGTH_- M     | Trawl wire length           | meters      | NUMBER(3)          | Length of wire deployed during a given haul in meters.              |

## 7. Universal Column Metadata

| Column name from data | Descriptive column Name                  | Units                                  | Oracle data type | Column description  |
|-----------------------|--|--|------------------|---|
| WORMS                 | World register of marine species (WoRMS) | ID key (WoRMS) taxonomic serial number | NUMBER(38,0)     | Species code as identified in the World Register of Marine Species (WoRMS) ( <a href="https://www.marinespecies.org/">https://www.marinespecies.org/</a> ). |
| YEAR                  | Survey year                              | year                                   | NUMBER(1)        | Year the observation (survey) was collected.  |
| YEAR_CHANGED          | Year changed                             | numeric                                | DATE             | Year change implemented in database   |

**Part III.**

**AKFIN**

## *The Alaska Fisheries Information Network*

These data are used directly by stock assessors and are provided to The Alaska Fisheries Information Network (AKFIN).

## **The Alaska Fisheries Information Network**

The Alaska Fisheries Information Network (AKFIN) is a regional program that consolidates and supports the processing, analysis, and reporting of fisheries data for Alaskan fisheries. AKFIN integrates this information into a single data management system using consistent methods and standardized formats. The resulting data enables fishery managers, scientists, and associated agencies to supervise fisheries resources more effectively and efficiently. The AKFIN database contains much of the data needed to complete stock assessments, including GAP trawl survey data. .

## **Data Access Options**

Direct database connection If you are an AFSC employee you may access the AKFIN oracle database directly while on the NOAA network or VPN. Note that this is a separate database from the AFSC oracle database referenced above, and requires separate credentials. If you do not already have an AKFIN account you can request one here. NOAA IT will need to add AKFIN access to your tnsnames.ora file (They do this frequently). Once your connection is established data may be accessed through SQL queries using SQL developer, R, or python.

## **AKFIN Answers**

(AKFIN Answers)[<https://akfin.psmfc.org/akfin-answers/>] is an Oracle BI tool used for distributing data to stock assessors and other users. Usernames and passwords are distinct from AKFIN direct database credentials. The distribution of GAP\_PRODUCTS on AKFIN Answers is planned but not yet implemented. The RACE Survey tab on the stock assessment dashboard contains reports generated from now depreciated tables that predated the GAP\_PRODUCTS tables. AKFIN will keep these reports for reference but they will not be updated 2024 onward.

## AKFIN Answers

The screenshot displays the AKFIN Business Intelligence platform, specifically the Stock Assessment section. The top navigation bar includes links for Home, Catalog, Favorites, Dashboards, New, Open, and Signed In As Matt Callahan. A search bar is also present.

**RACE Survey Reports**

**Common RACE Survey Data**

**Shared RACE Data Tables**

- Catch by Haul**: Q001 Catch for each haul broken down by species for the AI, GOA, EBS\_SHELF, EBS\_SLOPE and NBS survey areas.
- CPUE by Haul**: Q002 Catch per unit effort (CPUE) for each haul broken down by species for the AI, GOA, EBS\_SHELF, EBS\_SLOPE and NBS survey areas. CPUE calculations are based on a subset of hauls with acceptable performance levels.
- Haul Descriptions**: Q003 Descriptions of each haul.
- Size Composition by Haul**: Q004 Size composition data for each haul broken down by species for the AI, GOA, EBS\_SHELF, EBS\_SLOPE and NBS survey areas.
- Specimen Data**: Q005 Data for individual fish when additional data was collected or samples were taken for the AI, GOA, EBS\_SHELF, EBS\_SLOPE and NBS survey areas.

**Lookup Tables and Translations**

- Gear Accessory Codes**: Q006 Gear accessory code descriptions.
- Gear Codes**: Q007 Gear code descriptions.
- Haul Type Codes**: Q008 Haul type code descriptions.
- Species Codes**: Q009 Descriptions of species codes.
- Stratum Descriptions**: Q010 Descriptions of each stratum.
- Survey/Cruise Information**: Q011 Biennial survey/cruise information

**Survey Specific RACE Data**

**Aleutian Islands**

- AI - Age Composition Totals**: Q012 Calculated age composition numbers in the Aleutian Islands survey area at age by year
- AI - Biomass by Stratum**: Q013 Biomass and population numbers by stratum in the Aleutian Islands survey area
- AI - Biomass by NMFS Reporting Area**: Q014 Biomass and population numbers in the Aleutian Island survey area by NMFS reporting area
- AI - Biomass by NMFS Reporting Area and Summary Depth**: Q015 Biomass and population numbers by NMFS reporting area and summary depth
- AI - Biomass by Regulatory Area**: Q016 Biomass and population numbers by regulatory area
- AI - Biomass by Summary Depth**: Q017 Biomass and population numbers by summary depth
- AI - Size Composition by Stratum**: Q018 Size composition for each stratum broken down by species
- AI - Total Biomass**: Q019 Biomass and population numbers for region

**Gulf of Alaska**

- GOA - Age Composition Totals**: Q020 Calculated age composition numbers in the Gulf of Alaska survey area at age by year
- GOA - Biomass By Stratum**: Q021 Biomass and population numbers by stratum in the Gulf of Alaska survey area
- GOA - Biomass by NMFS Reporting Area**: Q022 Biomass and population numbers in the Gulf of Alaska survey area by NMFS reporting area
- GOA - Biomass by NMFS Reporting Area and Summary Depth**: Q023 Biomass and population numbers by NMFS reporting area and summary depth
- GOA - Biomass by Regulatory Area**: Q024 Biomass and population numbers by regulatory area
- GOA - Biomass by Summary Depth**: Q025 Biomass and population numbers by summary depth for the Gulf of Alaska survey area
- GOA - Size Composition by Stratum**: Q026 Size composition for each stratum broken down by species for the Gulf of Alaska survey area

**Eastern Bering Sea - Shelf**

- EBS Shelf - Age Composition - Standard**: Q027 Calculated age composition numbers in the Eastern Bering Sea shelf survey area at age by year
- EBS Shelf - Age Composition - Plus NW Area**: Q028 Calculated age composition numbers in the Eastern Bering Sea shelf survey area plus the northwest area at age by year
- EBS Shelf - Biomass By Stratum Plus NW Area**: Q029 Biomass and population numbers by stratum in the Eastern Bering Sea shelf plus NW survey area
- EBS Shelf - Biomass for Grouped Species by Stratum Plus NW Area**: Q030 Biomass and population numbers for grouped species by stratum in the Eastern Bering Sea plus NW shelf survey area
- EBS Shelf - Biomass By Stratum - Standard**: Q031 Biomass and population numbers for species by stratum in the Eastern Bering Sea shelf survey area
- EBS Shelf - Biomass for Grouped Species By Stratum - Standard**: Q032 Biomass and population numbers for grouped species by stratum in the Eastern Bering Sea shelf survey area
- EBS Shelf - CPUE by Haul**: Q033 Catch per unit effort (CPUE) for each haul broken down by species for the EBS shelf survey area

**Eastern Bering Sea - Slope**

- EBS Slope - Biomass By Stratum**: Q034 Biomass and population numbers by stratum in the Eastern Bering Sea slope survey area
- EBS Slope - Length Frequencies by Stratum - Standard Area**: Q035 Length frequencies for each stratum broken down by species for the Eastern Bering Sea slope survey area

**Northern Bering Sea**

- NBS - Age Composition by Strata**: Q036 Calculated age composition numbers in the Northern Bering Sea survey area at age by year
- NBS - Biomass by Strata**: Q037 Biomass and population numbers by stratum in the Northern Bering Sea survey area
- NBS - Size Composition by Strata**: Q038 Size composition by stratum in the Northern Bering Sea survey area

Figure 7.1.: AKFIN platfrom.

## **Web Service**

AKFIN has developed web services (apis) to distribute GAP data. Like the GAP\_PRODUCTS schema, these are under active development. These do not require VPN or an oracle connection but they are protected by Oracle authentication, please contact matt.callahan@noaa.gov for information on how to get an api token to use this option.

The url structure is “[https://apex.psmfc.org/akfin/data\\_marts/gap\\_products/gap-\[base table name\]](https://apex.psmfc.org/akfin/data_marts/gap_products/gap-[base table name])” . For example “[https://apex.psmfc.org/akfin/data\\_marts/gap\\_products/gap\\_biomass](https://apex.psmfc.org/akfin/data_marts/gap_products/gap_biomass)” is the base url to get data from the akfin\_biomass table. Web services linked to large tables have mandatory parameters to reduce data download size. For example to get agecomp data for Bering Sea pollock in area\_id 10 in 2022 you would use “[https://apex.psmfc.org/akfin/data\\_marts/gap\\_products/gap\\_biomass?survey\\_definition\\_id=98&area\\_id=10&species\\_code=21740&start\\_year=2022&end\\_year=2022](https://apex.psmfc.org/akfin/data_marts/gap_products/gap_biomass?survey_definition_id=98&area_id=10&species_code=21740&start_year=2022&end_year=2022)”.

If you’re using R to pull data through web services you might find the akfingapdata (pronounced akfin-gap-data not ak-eff-ing-app-data) R package helpful.

## **Cite this data**

Use the below bibtext citation, as cited in our group’s citation repository for citing the data created and maintained in this repository. Add “note = {Accessed: mm/dd/yyyy}” to append the day this data was accessed.

```
[1] "@misc{GAPakfin,"  
[2] "  author = {{Alaska Fisheries Information Network (AKFIN)}}, "  
[3] "  institution = {{NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Program}}, "  
[4] "  year = {2024}, "  
[5] "  title = {AFSC Goundfish Assessment Program Design-Based Production Data}, "  
[6] "  howpublished = {https://akfinbi.psmfc.org/analytics/}, "  
[7] "  url = {https://www.psmfc.org/program/alaska-fisheries-information-network-akfin}, "  
[8] "  publisher = {{U.S. Dep. Commer.}}, "  
[9] "  copyright = {Public Domain} "  
[10] "}"
```

## **8. Data description**

AKFIN Answers is an Oracle BI tool used for distributing data to stock assessors and other users. Usernames and passwords are distinct from direct AKFIN database credentials.

# 9. NEW TABLES

## 9.1. Data tables

### 9.1.1. AKFIN\_AREA

Lookup table for which area are contained within a given AREA\_ID for each DESIGN\_YEAR. This table can be used in tandem with the GAP\_PRODCUTS.STARTUM\_GROUPS or AKFIN\_STARTUM\_GROUPS tables. Tables are provided by the Resource Assessment and Conservation Engineering Division (RACE) Shellfish Assessment Program (SAP) of the Alaska Fisheries Science Center (AFSC). There are legal restrictions on access to the data. These data are not intended for public dissemination and should not be shared without the explicit written consent of the data managers and owners (NOAA Fisheries). The GitHub repository for the scripts that created this code can be found at ([https://github.com/EmilyMarkowitz-NOAA/sap\\_products](https://github.com/EmilyMarkowitz-NOAA/sap_products)).

Number of columns: 9

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

## *9. NEW TABLES*

### **9.1.2. AKFIN\_STATION**

NA

Number of columns: 8

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **9.1.3. XAKFIN\_STRATUM\_GROUP0**

NA

Number of columns: 7

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

*9. NEW TABLES*

test

# 10. OLD TABLES

## 10.1. Data tables

### 10.1.1. NBS\_BIOMASS

NA

Number of columns: 24

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.2. NBS\_NORTON\_CRABHAUL\_RKC**

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.3. CRABHAUL\_BAIRDI**

NA

Number of columns: 47

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

## *10. OLD TABLES*

test

### **10.1.4. CRABHAUL\_BKC**

NA

Number of columns: 47

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.5. CRABHAUL\_EI**

NA

Number of columns: 47

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

## *10. OLD TABLES*

test  
test  
test

### **10.1.6. CRABHAUL\_HYBRID**

NA  
Number of columns: 47  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

### **10.1.7. CRABHAUL\_OPILIO**

NA  
Number of columns: 47  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description

## *10. OLD TABLES*

test  
test  
test  
test  
test

### **10.1.8. CRABHAUL\_RKC**

NA  
Number of columns: 47  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

### **10.1.9. EBSCRAB\_ABUNDANCE BIOMASS**

Final datamart/fact table that stores all abundance and biomass estimates by year, species, district, and size grouping, populated by the EBSCRAB\_ANALYSIS\_PKG.ABUNDANCE\_BIOMASS\_PRC procedure

Number of columns: 20

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.10. EBSCRAB\_DISTRICT**

Lookup/dimension table that stores the individual DISTRICT\_CODE values used for analysis and related to the EBSCRAB\_CPUE and EBSCRAB\_ABUNDANCE\_BIOMASS tables

Number of columns: 6

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

## *10. OLD TABLES*

test  
test  
test

### **10.1.11. EBSCRAB\_SIZE\_GROUP**

Lookup table that translates to SIZE\_GROUP based on species, shell size, and shell condition

Number of columns: 15

Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test  
test

### **10.1.12. EBSCRAB\_SIZE\_GROUP\_DISTRICT**

Lookup/dimension table that stores the valid combinations of SIZE\_GROUP and DISTRICT for reporting crab estimates used for analysis and related to the EBSCRAB\_CPUE and EBSCRAB\_ABUNDANCE BIOMASS tables

Number of columns: 10  
Column.name.from.data  
Descriptive.column.Name  
Units

## *10. OLD TABLES*

Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

### **10.1.13. EBSCRAB\_SIZE\_GROUP\_DISTRICT\_LU**

NA  
Number of columns: 7  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

#### **10.1.14. EBSCRAB\_SIZE\_GROUP\_LOOKUP**

NA

Number of columns: 7

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

#### **10.1.15. EBSCRAB\_SPECIES**

Lookup/dimension table that stores the individual SPECIES\_CODE and name used for analysis and related to the EBSCRAB\_CPUE and EBSCRAB\_ABUNDANCE BIOMASS tables

Number of columns: 5

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

## *10. OLD TABLES*

test

test

### **10.1.16. EBSCRAB\_WEIGHT\_REGRESSION**

Lookup table that applies weight regression variables based on species, weight area, and clutch size

Number of columns: 15

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.17. NBS\_CRABHAUL\_BAIRDI**

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

## *10. OLD TABLES*

test

test

test

test

### **10.1.18. NBS\_CRABHAUL\_BKC**

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.19. NBS\_CRABHAUL\_EI**

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

## *10. OLD TABLES*

Column.description

test

test

test

test

test

### **10.1.20. NBS\_CRABHAUL\_HYBRID**

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### 10.1.21. NBS\_CRABHAUL\_OPILIO

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### 10.1.22. NBS\_CRABHAUL\_RKC

NA

Number of columns: 46

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

## *10. OLD TABLES*

test

### **10.1.23. NBS\_STRATA\_BKC\_2017\_NBS**

NA

Number of columns: 7

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.24. NBS\_STRATA\_NBS\_2017**

NA

Number of columns: 10

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

## *10. OLD TABLES*

test  
test  
test

### **10.1.25. NBS\_STRATA\_RKC\_2017\_NBS**

NA  
Number of columns: 11  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

### **10.1.26. STRATA\_BAIRDI\_BETW166173\_NEWTS**

NA  
Number of columns: 11  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description

## *10. OLD TABLES*

test  
test  
test  
test  
test

### **10.1.27. STRATA\_BAIRDI\_NEWTIMESERIES**

NA  
Number of columns: 11  
Column.name.from.data  
Descriptive.column.Name  
Units  
Oracle.data.type  
Column.description  
test  
test  
test  
test  
test

### 10.1.28. STRATA\_BKC\_NEWTIMESERIES

NA

Number of columns: 11

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### 10.1.29. STRATA\_EI\_NEWTIMESERIES

NA

Number of columns: 11

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

## *10. OLD TABLES*

test

### **10.1.30. STRATA\_HYBRID\_NEWTIMESERIES**

NA

Number of columns: 11

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

### **10.1.31. STRATA\_OPILIO\_NEWTIMESERIES**

NA

Number of columns: 11

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

## *10. OLD TABLES*

test

test

test

### **10.1.32. STRATA\_RKC\_NEWTIMESERIES**

NA

Number of columns: 11

Column.name.from.data

Descriptive.column.Name

Units

Oracle.data.type

Column.description

test

test

test

test

test

**Part IV.**

**Public Data (FOSS)**

### *Cite this data*

The final, validated survey data are publicly accessible soon after surveys are completed on the Fisheries One Stop Shop (FOSS) platform. This data includes catch, haul, and environmental data collected at each station. On the FOSS data platform, users can interactively select, view, and download data. Descriptive documentation and user-examples are available on the metadata page.

This data contains all of the catch, environmental, and haul data from the fisheries-independent Groundfish and Shellfish Assessment Program surveys in the Bering Sea, Aleutian Islands, and Gulf of Alaska. This data is sought after by the general public, private entities, and NOAA partners alike, including tribal organizations, K-12 classrooms, academic institutions, for-profit groups, and non-profit groups. This data is compiled and approved once a year after each summer survey season and is available for open access.

**Learn more about our data available on FOSS on the Groundfish Assessment Program's data products website.**

### **Cite this data**

Use the below bibtext citation, as cited in our group's citation repository for citing the data created and maintained in this repository. Add "note = {Accessed: mm/dd/yyyy}" to append the day this data was accessed.

```
[1] "@misc{FOSSAFSCData,"  
[2] "  author = {{NOAA Fisheries Alaska Fisheries Science Center}},"  
[3] "  year = {2024}, "  
[4] "  title = {Fisheries One Stop Shop Public Data: RACE Division Bottom Trawl Survey Data},  
[5] "  howpublished = {https://www.fisheries.noaa.gov/foss}, "  
[6] "  publisher = {{U.S. Dep. Commer.}}, "  
[7] "  copyright = {Public Domain} "  
[8] "}"
```

**Part V.**

**Data Products & Tools**

To accompany these data, we also produce data products to make using our data more accessible and straightforward. Information on these data products are coming soon.

## **Part VI.**

### **Contact us**

*This code is primarally maintained by:*

Thank you for using our data guide!

This code is always in development. Find code used for various reports in the code releases.

## **This code is primarally maintained by:**

**Emily Markowitz** (Emily.Markowitz AT noaa.gov; @EmilyMarkowitz-NOAA)

**Zack Oyafuso** (Zack.Oyafuso AT noaa.gov; @zoyafuso-NOAA)

**Sarah Friedman** (Sarah.Friedman AT noaa.gov; @SarahFriedman-NOAA)

Alaska Fisheries Science Center,

National Marine Fisheries Service,

National Oceanic and Atmospheric Administration,

Seattle, WA 98195

**General questions and more specific data requests** can be sent to nmfs.afsc.gap. metadata@noaa.gov or submitted as an issue on our GitHub Organization. The version of this data used for stock assessments can be found through the Alaska Fisheries Information Network (AKFIN). For questions about the eastern Bering Sea surveys, contact Duane Stevenson (Duane.Stevenson@noaa.gov). For questions about the Gulf of Alaska or Aleutian Islands surveys, contact Ned Laman (Ned.Laman@noaa.gov). For questions specifically about crab data in any region, contact Mike Litzow (Mike.Litzow@noaa.gov), the Shellfish Assessment Program lead.

For questions, comments, and concerns specifically about the Fisheries One Stop Shop (FOSS) platform, please contact us using the Comments page on the FOSS webpage.

## **11. Production run notes**

Report run date: Tuesday, October 15, 2024

## 12. R Version Metadata

```
R version 4.4.1 (2024-06-14 ucrt)
Platform: x86_64-w64-mingw32/x64
Running under: Windows 10 x64 (build 19045)

Matrix products: default

locale:
[1] LC_COLLATE=English_United States.utf8
[2] LC_CTYPE=English_United States.utf8
[3] LC_MONETARY=English_United States.utf8
[4] LC_NUMERIC=C
[5] LC_TIME=English_United States.utf8

time zone: America/Los_Angeles
tzcode source: internal

attached base packages:
[1] stats      graphics   grDevices utils      datasets   methods    base

loaded via a namespace (and not attached):
[1] compiler_4.4.1    fastmap_1.2.0    cli_3.6.3       tools_4.4.1
[5] htmltools_0.5.8.1 rstudioapi_0.16.0  yaml_2.3.10    rmarkdown_2.28
[9] knitr_1.48        jsonlite_1.8.9   xfun_0.47     digest_0.6.37
[13] rlang_1.1.4       evaluate_1.0.1
```

### 12.0.1. NOAA README

This repository is a scientific product and is not official communication of the National Oceanic and Atmospheric Administration, or the United States Department of Commerce. All NOAA GitHub project code is provided on an ‘as is’ basis and the user assumes responsibility for its use. Any claims against the Department of Commerce or

## *12. R Version Metadata*

Department of Commerce bureaus stemming from the use of this GitHub project will be governed by all applicable Federal law. Any reference to specific commercial products, processes, or services by service mark, trademark, manufacturer, or otherwise, does not constitute or imply their endorsement, recommendation or favoring by the Department of Commerce. The Department of Commerce seal and logo, or the seal and logo of a DOC bureau, shall not be used in any manner to imply endorsement of any commercial product or activity by DOC or the United States Government.

### **12.0.2. NOAA License**

Software code created by U.S. Government employees is not subject to copyright in the United States (17 U.S.C. §105). The United States/Department of Commerce reserve all rights to seek and obtain copyright protection in countries other than the United States for Software authored in its entirety by the Department of Commerce. To this end, the Department of Commerce hereby grants to Recipient a royalty-free, nonexclusive license to use, copy, and create derivative works of the Software outside of the United States.

## **13. Acknowledgments**

## **14. Community Acknowledgments**

We would like to thank the many communities of Alaska and their members who have helped contribute to this body of work. The knowledge, experiences, and insights have been instrumental in expanding the scope of our science and knowledge to encompass the many issues that face this important ecosystem. We appreciate feedback from those residing in the region that are willing to share their insights and participation in an open dialog about how we can improve our collective knowledge of the ecosystem and the region.

## **15. Land Acknowledgements**

We would like to thank the many communities of the Bering Strait region and their members who have helped contribute to this document. The knowledge, experiences, and insights of the people of the Bering Strait region have been instrumental in expanding the scope of our science and knowledge to encompass the many issues that face this important ecosystem. We appreciate feedback from those residing in the region that are willing to share their insights, including the local names used for the species covered by this document, identifying species of interest or concern that should be included in this document, and participation in an open dialog about how we can improve our collective knowledge of the ecosystem and the region.

NOAA Fisheries Alaska Fisheries Science Center's work is conducted in the waters and along the coastlines of Alaska, which include the traditional home lands and waters of the Inupiat, Yupiit, Siberian Yupiit, Unangax, Alutiiq/Sugpiaq, Eyak, Dena'ina Athabascan, Tlingit, Haida, and Tsimshian who have stewarded their lands and waters since time immemorial. We are indebted to these peoples for their wisdom and knowledge of their lands and waters.

This document was prepared in the greater Seattle area, which are the traditional lands of the Coast Salish people, including the Duwamish people, past and present. We are grateful for their continued sharing of vision, wisdom, values, and leadership.

# **16. Technical Acknowledgments**

This quarto book is based off the NOAA-quarto-book GitHub repo designed by Eli Holmes and the similar data product book for the Groundfish Assessment Program.

This repo and GitHub Action was based on the tutorial by Openscapes quarto-website-tutorial by Julia Lowndes and Stefanie Butland.

## **16.1. Partners**

Scientists from the Alaska Fisheries Science Center conduct these bottom trawl surveys with participation from the Alaska Department of Fish & Game (ADF&G), the International Pacific Halibut Commission (IPHC), and universities. This research is conducted on chartered fishing vessels.

## **16.2. Collaborators**

Our data are used in many annual publications, including but not limited to the list below:

- Alaska Stock Assessments
- North Pacific Groundfish Stock Assessment and Fishery Evaluation Reports
- Groundfish Economic Status Reports for the Gulf of Alaska and Bering Sea and Aleutian Islands
- Alaska Marine Ecosystem Status Report Database
- Southeast Alaska Coastal Monitoring Survey Reports
- Alaska Fisheries Life History Database
- Essential Fish Habitat Research Plan in Alaska

## **17. Citations and References**

## 18. Access Constraints

There are no legal restrictions on access to the data. They reside in public domain and can be freely distributed.

**User Constraints:** Users must read and fully comprehend the metadata prior to use. Data should not be used beyond the limits of the source scale. Acknowledgement of AFSC Groundfish Assessment Program, as the source from which these data were obtained, in any publications and/or other representations of these data, is suggested.

## 19. References

- Alaska Fisheries Information Network (AKFIN). (2024). *AFSC groundfish assessment program design-based production data*. NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Program; <https://akfinbi.psmfc.org/analytics/>; U.S. Dep. Commer. <https://www.psmfc.org/program/alaska-fisheries-information-network-akfin>
- Hoff, G. R. (2016). *Results of the 2016 eastern Bering Sea upper continental slope survey of groundfishes and invertebrate resources* (NOAA Tech. Memo. NOAA-AFSC-339). U.S. Dep. Commer. <https://doi.org/10.7289/V5/TM-AFSC-339>
- Markowitz, E. H., Dawson, E. J., Wassermann, S., Anderson, A. B., Rohan, S. K., Charriere, B. K., and Stevenson, D. E. (2024). *Results of the 2023 eastern and northern Bering Sea continental shelf bottom trawl survey of groundfish and invertebrate fauna* (NOAA Tech. Memo. NMFS-AFSC-487; p. 242). U.S. Dep. Commer. <https://doi.org/10.25923/2mry-yx09>
- NOAA Fisheries Alaska Fisheries Science Center. (2024). *Fisheries one stop shop public data: RACE division bottom trawl survey data query*. <https://www.fisheries.noaa.gov/foss>; U.S. Dep. Commer.
- NOAA Fisheries Alaska Fisheries Science Center, Goundfish Assessment Program. (2024). *AFSC groundfish assessment program design-based production data*. <https://www.fisheries.noaa.gov/alaska/science-data/groundfish-assessment-program-bottom-trawl-surveys>; U.S. Dep. Commer.
- Siple, M. C., Szalay, P. G. von, Raring, N. W., Dowlin, A. N., and Riggle, B. C. (2024). *Data report: 2023 gulf of alaska bottom trawl survey* (NOAA Tech. Memo. AFSC processed report; 2024-09). U.S. Dep. Commer. <https://doi.org/10.25923/gbb1-x748>
- Von Szalay, P. G., Raring, N. W., Siple, M. C., Dowlin, A. N., Riggle, B. C., and Laman, E. A. and. (2023). *Data report: 2022 Aleutian Islands bottom trawl survey* (AFSC Processed Rep. 2023-07; p. 230). U.S. Dep. Commer. <https://doi.org/10.25923/85cy-g225>