

**Annual Report under Section 101(a)(5)(A) of the Marine Mammal Protection  
Act for Fisheries and Ecosystem Research  
Activities Conducted by Southwest Fisheries Science Center from  
January 1, 2023 – December 31, 2023**

On January 15, 2021, SWFSC received Letters of Authorization (LOA) under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA; 16 U.S.C 1371(a)(5)) to take marine mammals incidental to fishery and ecosystem research activities in the California Current Research Area (CCRA), and the Antarctic Marine Living Resources Ecosystem (AMLR). Take of marine mammals incidental to SWFSC fishery and ecosystem research activities are subject to the provisions of the MMPA and the regulations described in 50 CFR Part 219, Subpart A (CCRA and AMLR). These authorizations are valid through January 14, 2026.

In accordance with these authorizations, SWFSC is required to provide annual reports. The following report covers the period from January 1, 2023 – December 31, 2023 and only one of the research areas: the CCRA. The Center did not conduct research in the Eastern Tropical Pacific Research Area, and projects in AMLR were conducted under a directed research permit, and thus neither will be included in this report.

The report will be organized into the following sections:

- I. Overview of SWFSC's Required Mitigation Measures
- II. Line-Kilometers Surveyed During Which EK60/80, ME70 and SX90 echosounders were Predominant and Pro-Rated Estimates of Actual Level B Acoustic Take
- III. SWFSC Gear Metadata for All Fisheries and Ecosystem Surveys in the CCRA During the Reporting Period
- IV. Accounts of All Incidents of Marine Mammal Interactions in the CCRA
- V. Final Outcome of Serious Injury Determinations
- VI. Evaluation of Effectiveness of SWFSC Mitigation Strategies
- VII. Updates on Mitigation Strategy Development
- VIII. Training Provided to SWFSC Staff and Cooperative Agencies

In each section, a summary for the CCRA will be described in relation to the reporting period.

**I. Overview of SWFSC's Required Mitigation Measures**

Prescribed mitigation measures are outlined in the MMPA LOAs for the Center to follow during surveys to minimize the likelihood or severity of incidental gear interactions with marine mammals and other protected species. Specific measures are described for each covered gear type, and consist of dedicated marine mammal/protected species watches, a move-on rule if protected species are seen during watch within the exclusionary zone, and other standard operating procedures.

Below are gear specific descriptions of these conservation measures in trawl, hook and line, and purse seine surveys:

● **15-minute pre-set watch**

During SWFSC trawl, purse seine, and hook and line surveys, a dedicated observer must initiate a 15-minute pre-set watch (visual observation) prior to deploying gear. The surrounding waters are scanned with the naked eye and range-sighting instruments with the assistance of available vessel

lighting. If two sequential stations are more than 15 minutes apart (assuming cruise speed of approximately 10 knots), then the watch will be conducted during the final 15 minutes of transit. If transit time is less than 15 minutes, then a marine mammal watch is conducted for the duration of the transit. A pre-set watch is conducted during pre-set activities once the vessel has arrived on station.

- **Move-on rule**

For surveys using a trawl net, if a marine mammal (excluding baleen whales) or other aquatic protected species are seen during the pre-set watch within 1 nautical mile (nmi) of the set location (i.e., exclusion zone), the move on rule must be implemented before starting the haul. The ship must move on to ensure that the observed marine mammal is 1 nmi away from the set location. If, after moving on, the marine mammal remains in the exclusion zone (within the 1-nmi radius of the set location) the ship must move again or skip the station. If baleen whales are in the vicinity of the station, professional judgment is used.

For surveys using a purse seine net, when one or more killer whales, small cetaceans or five or more pinnipeds are observed within 500 meters (m) of the planned sampling location, the vessel may remain on-site or move to another sampling location. If remaining onsite, the set will be delayed until the animals depart the vicinity or no longer appear to be at risk, at which point an additional 15-minute watch will be conducted. If after moving on the animals remain at risk of interaction, then the vessel must move again or skip the station. Marine mammals sighted beyond the 500-m exclusionary zone will be monitored to determine position and movement in relation to the vessel. Professional judgment is used to determine the best course of action to minimize risk of an interaction.

- **Active gear monitoring**

Once gear deployment begins, an active gear watch (visual monitoring during gear deployment, fishing, and retrieval) must be conducted by a dedicated observer. If a marine mammal is seen while gear is in the water, the most appropriate action to avoid an interaction is determined through the use of professional judgment. When professional judgment is used, it will be recorded, and is only to be used in circumstances when the gear is already deployed. For clarity, if a marine mammal is seen during the pre-set watch, the move-on rule must be implemented, but if it is seen during deployment of the net, active fishing, or haul back, then professional judgment is used to determine the best course of action to avoid an interaction.

If a marine mammal is sighted in the purse seine net, the net is opened immediately to free the animal.

- **Marine mammal excluder device (MMED)**

SWFSC's marine mammal excluder device (MMED) was developed to allow marine mammals to escape from the Nordic 264 trawl net without losing target catch. The modified Cobb trawl is not equipped with a MMED. A MMED was also fitted to the surface trawl net of the newly designed multi-function trawl (MFT) system.

- **Acoustic deterrent devices**

On all SWFSC trawl nets, 2-4 acoustic deterrent devices, or pingers, are placed along the headrope and footrope to deter marine mammals from entering the net. Operational status is checked prior to deploying the net.

- **Other standard trawl survey protocols**

SWFSC also employs several standard survey protocols to minimize impacts on protected species: 1) research operations are conducted as soon as practicable upon arrival at the sampling station; 2) the gear is emptied as quickly as possible upon retrieval in order to determine whether to or not protected species are present, and; 3) care is taken when emptying the trawl to avoid damage to protected species that may be caught, but not visible during retrieval of the net.

## **II. Line-Kilometers Surveyed During Which EK60/EK80, ME70, and SX90 Were Predominant and Pro-Rated Estimates of Actual Level B Acoustic Take**

Two trawl-based surveys were conducted in the CCRA during the reporting period: Rockfish Recruitment and Ecosystem Assessment (RREA) Survey (RL-23-03) and the California Current Ecosystem (CCE) Survey (RL-23-04). RL-23-03 was conducted aboard NOAA Ship Reuben Lasker and supplemented on NOAA Ship Bell M. Shimada during the Applied California Current Ecosystem Studies (ACCESS) Cruise. Trawl operations for RL-23-04 were conducted on NOAA Ships Reuben Lasker and Bell M. Shimada. A multi-function trawl (MFT) gear testing cruise (RL-24-02) was conducted aboard NOAA Ship Reuben Lasker to test the newly designed MFT system, which has the capacity to switch modes between mid-water and surface trawling. Acoustic systems used during the 2023 trawl-based surveys include: Simrad EK80 narrow beam echosounders, Simrad ME70 multibeam echosounder, Simrad MS70 multibeam sonar, and Simrad SX90 omnidirectional sonar. The Nearshore CPS Survey, a purse seine-based survey, was conducted aboard two fishing vessels (F/V): F/V Long Beach Carnage for the southern aspect of the survey, and F/V Lisa Marie for the northern portion of the survey. Long Beach Carnage and Lisa Marie sampled acoustically using five EK60 and four EK80 echosounders, respectively. Lastly, there were two California Cooperative Oceanic Fisheries Operations (CalCOFI) surveys (202304RL and 202304SH), which sampled with EK80 echosounders. A summary of the acoustic sampling for the various surveys are included in Table 1 below. A summary of annual Level B takes from acoustic sources can be found for each sound source and marine mammal species in Table 2 below.

**Table 1.** Line-kilometers (kms) surveyed during the reporting period for which the SX90, EK80, or ME70 systems were the predominant acoustic sources in the CCRA compared to the totals calculated in SWFSC's MMPA LOA application [Appendix B of SWFSC's National Environmental Policy Act (NEPA) Supplemental Programmatic Environmental Assessment (SPEA)]. Included in the 'EK60/EK80 - Summed line-kms of reporting period/source (0-200 m)' column is a fraction of Saildrone line-kms, which operated with an EK80 WBT mini echosounder. The acoustic output for this source operates with less power at 38 kHz (500W), less frequent intervals (~2 seconds) and a wider beamwidth (18 degrees) than that of the echosounder on the ship (typically 7 degrees). To calculate the difference in acoustic output between the WBT Mini echosounder vs. the ship's EK60/80 echosounder, the following equation was used: (Total Saildrone kms) \* (Change in beamwidth 7/18) \* (Change in power 500/2000) for operation at 38 kHz. The resulting number obtained was approximately 10% of the total Saildrone line-kms, which was added to the total line kms reported for the ship, and subsequently analyzed.

| California Current Ecosystem |  |  |  |   |   |   |
|------------------------------|--|--|--|---|---|---|
| Echosounder                  | SPEA Estimated summed dominant line kms/source (0-200 m) | Summed line-kms of reporting period / source (0-200 m) | Pro-rated predominant acoustic line-kms of reporting period/source (0-200 m) | SPEA Estimated summed dominant line-kms/source (>200 m) | Summed line-kms of reporting period / source (>200 m) | Pro-rated predominant acoustic line-kms of reporting period/source (>200 m) |
| SX90                         | 33,880   | 18,160   | 4,540  | 33,880  | 27,807  | 6,952   |
| EK60/EK80                    | 79,912   | 29,383   | 17,630   | 99,640  | 37,864  | 28,398  |
| ME70                         | 19,728   | 6,344  | 952  | 0   | 15,054  | 0 <sup>1</sup>  |

<sup>1</sup>The ME70 has negligible effects >200 m and is therefore pro-rated to 0.

**Table 2.** SWFSC's annual Level B harassment by acoustic sources by sound type for each marine mammal species in the CCRA. For each species and predominant source, the cross-sectional area for the relevant depth strata (Table 6.5 of SWFSC's PEA Appendix C) was multiplied by the pro-rated acoustic line-km for each respective strata (Table 1), and the volumetric density (shown here) to assess Level B harassment for the reporting period.

| Common name                 | Volumetric Density (#/km <sup>3</sup> ) | Typical vertical habitat |        | SWFSC Reporting Period Acoustic Takes (# of animals) |      |      | Reporting Period Total Takes | SPEA Estimated Annual Takes |
|-----------------------------|---|--------------------------|--------|--|------|------|------------------------------|-----------------------------|
|                             |   | 0-200 m                  | >200 m | EK60/EK80  | ME70 | SX90 |                              |                             |
| <i>CCE Cetaceans</i>        |   |                          |        |  |      |      |                              |                             |
| Harbor porpoise             | 0.17057                                 | X                        |        | 39   | 3    | 51   | 93                           | 675                         |
| Dall's porpoise             | 0.23154                                 | X                        |        | 53   | 4    | 69   | 126                          | 916                         |
| Pacific white-sided dolphin | 0.1042                                  | X                        |        | 24   | 2    | 31   | 57                           | 412                         |
| Risso's dolphin             | 0.05283                                 | X                        |        | 12   | 1    | 16   | 29                           | 209                         |

|                                      |         |   |   |     |    |      |      |       |
|--------------------------------------|---------|---|---|-----|----|------|------|-------|
| Bottlenose dolphin                   | 0.01565 | X |   | 4   | 0  | 5    | 9    | 62    |
| Striped dolphin                      | 0.22321 | X |   | 51  | 4  | 66   | 121  | 883   |
| Short-beaked common dolphin          | 3.64808 | X |   | 841 | 63 | 1081 | 1985 | 14430 |
| Long-beaked common dolphin           | 0.36033 | X |   | 83  | 6  | 107  | 196  | 1425  |
| Northern right-whale dolphin         | 0.15534 | X |   | 36  | 3  | 46   | 85   | 614   |
| Killer whale                         | 0.00318 | X |   | 1   | 0  | 1    | 2    | 13    |
| Short-finned pilot whale             | 0.00068 |   | X | 3   | 0  | 1    | 3    | 30    |
| Baird's beaked whale                 | 0.00523 |   | X | 20  | 0  | 6    | 26   | 72    |
| Mesoplodon beaked whales             | 0.00612 |   | X | 24  | 0  | 7    | 30   | 84    |
| Cuvier's beaked whale                | 0.01167 |   | X | 45  | 0  | 13   | 58   | 160   |
| Pygmy sperm whale                    | 0.01548 |   | X | 60  | 0  | 18   | 77   | 213   |
| Dwarf sperm whale                    | 0.01548 |   | X | 60  | 0  | 18   | 77   | 213   |
| Sperm whale                          | 0.00699 |   | X | 27  | 0  | 8    | 35   | 96    |
| Humpback whale                       | 0.00747 | X |   | 2   | 0  | 2    | 4    | 23    |
| Blue whale                           | 0.00449 | X |   | 1   | 0  | 1    | 2    | 18    |
| Fin whale                            | 0.03144 | X |   | 7   | 1  | 9    | 17   | 124   |
| Sei whale                            | 0.00185 | X |   | 0   | 0  | 1    | 1    | 10    |
| Common Minke whale                   | 0.0048  | X |   | 1   | 0  | 1    | 3    | 19    |
| Gray whale                           | 0.13483 | X |   | 31  | 2  | 40   | 73   | 533   |
| <i>CCE Pinnipeds</i>                 |         |   |   |     |    |      |      |       |
| California sea lion                  | 1.28803 | X |   | 297 | 22 | 382  | 701  | 5095  |
| Steller sea lion, eastern subspecies | 0.31306 | X |   | 72  | 5  | 93   | 170  | 914   |
| Guadalupe fur seal                   | 0.07915 | X |   | 18  | 1  | 23   | 43   | 313   |
| Northern fur seal                    | 3.18399 | X |   | 734 | 55 | 944  | 1732 | 12195 |
| Harbor seal                          | 0.28167 | X |   | 65  | 5  | 83   | 153  | 1114  |

|                        |       |  |   |      |   |     |      |      |
|------------------------|-------|--|---|------|---|-----|------|------|
| Northern elephant seal | 0.358 |  | X | 1377 | 0 | 407 | 1783 | 4916 |
|------------------------|-------|--|---|------|---|-----|------|------|

### III. SWFSC Gear Metadata for All Fisheries and Ecosystem Surveys in the CCE During the Reporting Period

In the CCRA, the modified Cobb net was used during RL-23-03 and the Nordic 264 during RL-23-04.

An MFT system was developed for use in the upcoming Integrated West Coast Pelagics Survey, which combines SWFSC's CCE Survey and Northwest Fisheries Science Center's (NWFSC) Acoustic Hake Survey. The system incorporates modes for either surface or midwater trawling to meet the objectives of both surveys. The MFT Testing cruise (RL-24-02), conducted during the reporting period, adhered to the mitigation measures required from each Center's LOAs. SWFSC mitigation measures were adhered to during surface trawling, and NWFSC mitigation measures were adhered to during midwater trawling. A total of 13 hauls were conducted, 3 of which were midwater trawls, and the remaining 10 were surface trawls. The cod end of the net was left open for all hauls.

Purse seine nets aboard commercial vessels were used by cooperative agencies Ocean Golds Seafood, Inc. (OGSI) and Washington Department of Fish and Wildlife (WDFW) for the northern aspect and California Wetfish Producers Association (CWPA) southern aspect of the Nearshore CPS Survey. Samples collected from the survey were analyzed by WDFW and California Departments of Fish and Wildlife (CDFW) biologists, respectively.

Hook and line gear was used in the Life History and Reproductive Ecology Investigations of Rockfish and Sablefish Project. During fishing efforts, an attempt is made to mimic the recreational fishing fleet, and therefore gear restrictions, other than established sport fishing regulations, are not imposed. Hook type was predominately J hooks and varied from 5/0 to 10/0 in size. Fishing line mostly consisted of spectra fishing line with a monofilament leader.

A summary of the aforementioned survey efforts and gear type can be found in Table 3 below.

**Table 3.** SWFSC gear metadata for the reporting period by trawl net, purse seine, hook and line in the CCRA.

| Research Area                       | Gear Type               | Total tows/sets # | Fishing Depth Range (m) | Average Tow Duration of active fishing (minutes) |
|-------------------------------------|-------------------------|-------------------|-------------------------|--|
| <i>California Current Ecosystem</i> | Modified cobb trawl net | 79                | 3-50                    | 5-15   |
|                                     | Nordic 264 trawl net    | 81                | 0-15                    | 45   |

|  |                                       |     |           |     |
|--|---------------------------------------|-----|-----------|-----|
|  | Multi-function trawl system (surface) | 13  | 0-30      | 45  |
|  | Purse seine                           | 127 | 0-15      | N/A |
|  | Hook and line                         | 35  | 30.5-94.7 | 26  |

Longline and deep-set buoy gear was not used during the reporting period.

#### IV. Accounts of All Incidents of Marine Mammal Interactions in the CCE

The following section will detail SWFSC Level A marine mammal and protected species interaction events in the CCRA. A summary of Level A incidental takes in SWFSC surveys during the reporting period can be found in Tables 5-7 for each gear type below.

**Table 4.** SWFSC's take table from the MMPA LOA for the CCRA displays the takes issued to the Center by gear type in that ecosystem over the five-year authorization period (January 2021 - January 2026).

| Species  | Authorized Take             |             |             |                      |
|--|-----------------------------|-------------|-------------|----------------------|
|  | M/SI + Level A <sup>1</sup> |             |             | Level B <sup>2</sup> |
|  | Trawl                       | Purse Seine | Hook & Line |                      |
| Gray whale ( <i>Eschrichtius robustus</i> )  | -                           | -           | -           | 533                  |
| Humpback whale ( <i>Megaptera novaeangliae</i> )   | -                           | -           | -           | 23                   |
| Minke whale ( <i>Balaenoptera acutorostrata</i> )  | -                           | -           | -           | 19                   |
| Sei whale ( <i>Balaenoptera borealis</i> )   | -                           | -           | -           | 10                   |
| Fin whale ( <i>Balaenoptera physalus</i> )   | -                           | -           | -           | 124                  |
| Blue whale ( <i>Balaenoptera musculus</i> )  | -                           | -           | -           | 18                   |
| Sperm whale ( <i>Physeter macrocephalus</i> )  | -                           | -           | -           | 96                   |
| Pygmy or dwarf sperm whale ( <i>Kogia</i> spp.)  | -                           | -           | 2           | 213                  |
| Cuvier's beaked whale ( <i>Ziphius cavirostris</i> )   | -                           | -           | -           | 160                  |
| Baird's beaked whale ( <i>Berardius bairdii</i> )  | -                           | -           | -           | 72                   |
| Hubbs', Blainville's, ginkgo-toothed, Perrin's, lesser, or Stejneger's beaked whales ( <i>Mesoplodon</i> spp.) | -                           | -           | -           | 84                   |

|   |   |    |   |   |        |
|---|---|----|---|---|--------|
| Bottlenose dolphin ( <i>Tursiops truncatus</i> )                  | CA/OR/WA stock                          | 8  | - | 1 | 62     |
|   | CA coastal stock                        | 3  | - | - |        |
| Striped dolphin ( <i>Stenella coeruleoalba</i> )                  |   | 11 | 1 | 2 | 883    |
| Long-beaked common dolphin ( <i>Delphinis capensis</i> )          |   | 11 | 1 | 2 | 1,425  |
| Short-beaked common dolphin ( <i>Delphinis delphis</i> )          |   | 11 | 1 | 2 | 14,430 |
| Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> ) |   | 40 | 1 | - | 412    |
| Northern right whale dolphin ( <i>Lissodelphis borealis</i> )     |   | 10 | 1 | - | 614    |
| Risso's dolphin ( <i>Grampus griseus</i> )                        |   | 11 | 1 | 2 | 209    |
| Killer whale ( <i>Orcinus orca</i> )                              |   | -  | - | - | 13     |
| Short-finned pilot whale ( <i>Globicephala macrorhynchus</i> )    |   | -  | - | 2 | 30     |
| Harbor porpoise ( <i>Phocoena phocoena</i> )                      |   | 5  | 1 | - | 675    |
| Dall's porpoise ( <i>Phocoenoides dalli</i> )                     |   | 5  | 1 | - | 916    |
| Guadalupe fur seal ( <i>Arctocephalus philippii townsendi</i> )   |   | -  | - | - | 313    |
| Northern fur seal ( <i>Callorhinus ursinus</i> )                  | California stock                        | 5  | - | - | 12,595 |
|   | Pribilof Islands/ Eastern Pacific stock |    |   |   |        |
| California sea lion ( <i>Zalophus californianus</i> )             |   | 20 | 5 | 5 | 5,095  |
| Steller sea lion ( <i>Eumetopias jubatus</i> )                    |   | 9  | - | 1 | 914    |
| Harbor seal ( <i>Phoca vitulina</i> )                             |   | 9  | 5 | - | 1,114  |
| Northern elephant seal ( <i>Mirounga angustirostris</i> )         |   | 5  | - | - | 4,916  |
| Unidentified cetacean (Family Delphinidae or Family Phocoenidae)  |   | 1  | - | - | -      |
| Unidentified pinniped   |   | 1  | 1 | 1 | -      |

<sup>1</sup> Takes may be by mortality or any lesser intensity, including serious injury and Level A harassment, and are apportioned by gear type. The number represents the total authorization over five years. <sup>2</sup> Takes may be by Level B harassment only. The number represents the annual take authorization for five years.

**Table 5.** SWFSC's Level A takes in trawl gear (Nordic 264, modified Cobb nets, and the MFT) for the reporting period and the remaining takes left for trawl surveys during the authorization period.

| Authorized Trawl Species  | # of Level A (M/SI) authorized incidental takes (2021-2026) | SWFSC Trawl Takes for the reporting period | Remaining Takes |
|---|---|--|-----------------|
| Bottlenose dolphin ( <i>Tursiops truncatus</i> ) CA/OR/WA offshore  | 8   | 0  | 8               |
| Bottlenose dolphin ( <i>Tursiops truncatus</i> ) CA coastal   | 3   | 0  | 3               |
| Striped dolphin ( <i>Stenella coeruleoalba</i> )  | 11  | 0  | 11              |
| Short-beaked common dolphin ( <i>Delphinus delphis</i> )  | 11  | 0  | 11              |
| Long-beaked common dolphin ( <i>Delphinus capensis</i> )  | 11  | 0  | 11              |
| Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> )   | 40  | 2  | 35              |
| Northern right whale dolphin ( <i>Lissodelphis borealis</i> )   | 10  | 0  | 10              |
| Risso's dolphin ( <i>Grampus griseus</i> )  | 11  | 0  | 11              |
| Harbor porpoise ( <i>Phocoena phocoena</i> )  | 5   | 0  | 5               |
| Dall's porpoise ( <i>Phocoenoides dalli</i> )   | 5   | 0  | 5               |
| Northern fur seal ( <i>Callorhinus ursinus</i> ) – California Stock & Pribilof Islands/ Eastern Pacific stock | 5   | 0  | 5               |
| California sea lion ( <i>Zalophus californianus</i> )   | 20  | 1  | 16              |
| Steller sea lion ( <i>Eumetopias jubatus</i> )  | 9   | 0  | 9               |
| Harbor seal ( <i>Phoca vitulina</i> )   | 9   | 0  | 9               |
| Northern elephant seal ( <i>Mirounga angustirostris</i> )   | 5   | 0  | 5               |
| Unidentified pinniped   | 1   | 0  | 1               |
| Unidentified cetacean (Family Delphinidae or Family Phocoenidae)  | 1   | 0  | 1               |

## *Level A Marine Mammal Interactions*

During the reporting period, SWFSC had 2 interactions with marine mammals; the first being with a California sea lion (*Zalophus californianus*), and the second interaction with two Pacific white-sided dolphins (*Lagenorhynchus obliquidens*). The interactions occurred on NOAA Ship Reuben Lasker during nighttime trawl operations. All required mitigation measures were followed. Pingers were tested for functionality and dedicated observer(s) performed the pre-set, gear deployment, active fishing, and gear retrieval watches. Watch logs and narratives from scientists indicate that no protected species were seen during the pre-set, gear deployment, and active fishing watches. The scientists followed SWFSC's Detailed Sampling Protocol for Marine Mammal and Sea Turtle Incidental Takes During SWFSC Research Cruises (PSIT-002.02) to determine species ID and sex. Photographs, morphometric measurements and skin samples were taken prior to freezing the carcasses.

Incidental take of one California sea lion (*Zalophus californianus*) occurred on September 15, 2023 off the coast of Central California (38.0117, -123.344) during RL-23-04 (haul 48) between the time period of 22:58 (PDT), the start of active fishing, and 00:37, the completion of active fishing. No hauls were conducted in the subsequent 24 hours. Marine mammals were not seen during the 15-minute pre-set watch. The visual observation period continued during gear deployment, active fishing (tow speed: 3.9 knots; trawl directionality: down swell), and gear retrieval. A splash was seen on the starboard side 25 minutes into active fishing, and although no animals were visualized at that time, a pinniped was suspected. A pinniped was then visualized approximately 38 minutes into active fishing. No marine mammals were seen during the last 10 minutes of active fishing. Once the doors were secured on board, the deck crew observed a small California sea lion entangled by one of the pectoral flippers in the 32 or 16 inch meshes just aft of the bridles. According to one of the witnesses, the animal appeared to be dragged by the net as it was hauling back. The animal was able to disentangle itself before the net was brought on deck. The animal did not appear to be emaciated or sustain visible injuries. It was subsequently seen swimming and jumping away from the net and then observed swimming around the codend. The incident was reported to the Protected Species Incidental Take (PSIT) database. Visibility was reported as foggy with partly cloudy skies. Wind speed was 2 knots and sea conditions were recorded as calm. Beaufort wind scale was 2. Sea surface temperature was 12.5°C and species composition of the catch was composed mostly of Northern anchovy. Four pingers (3-70 kHz and 1-10 kHz), confirmed to be operating properly by the scientific crew and the survey technician prior to net deployment, were attached to the headrope and footrope of the trawl net. The interaction was subsequently reported to appropriate parties to facilitate a serious injury determination.

A second incidental take event occurred on September 16, 2023 off the coast of Central California (38.960556, -123.900278) during RL-23-04 (haul 51) between the time period of 23:25 (PDT), the start of active fishing, and 00:10, the completion of active fishing. One marine mammal was observed at the stern just prior to the codend entering the water, prompting the ship to move 1 nautical mile per the move-on rule. After arriving at the new station, the marine mammal watch was started anew, and no marine mammals were observed during the pre-set watch, gear deployment, active fishing (tow speed: 4.1 knots), and gear retrieval. Upon gear retrieval, two deceased female Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) (RL230917.001, length: 185 cm; RL230917.002, length: 179 cm) were discovered entangled in the 4-inch mesh panel forward of the MMED. One was entangled by the pectoral fin and the other was entangled by the fluke and pectoral fin. Photographs were obtained, and the incidental take reported to the PSIT database within 24 hours. No obvious injuries or emaciation were noted. Neither of the animals were lactating. Visibility was reported as clear with overcast skies. Wind speed was 6 knots and sea conditions were recorded as calm. Beaufort wind scale was 1. Sea surface

temperature was 13.6°C and species composition of the catch was composed mostly of Northern anchovy. Four pingers (3-70 kHz and 1-10 kHz), confirmed to be operating properly by the scientific crew and survey technician prior to net deployment, were attached to the headrope and footrope of the trawl net. The animals were stored frozen and subsequently transferred to the Marine Mammal and Turtle Division at SWFSC for necropsy and further analysis.

**Table 6.** SWFSC's Level A takes in purse seine gear for the reporting period and the remaining takes left for purse seine surveys during the authorization period.

| Authorized Purse Seine Species                                    | # of Level A (M/SI) authorized incidental takes (2021-2026) | SWFSC Trawl Takes for the reporting period | Remaining Takes |
|---|---|--|-----------------|
| Striped dolphin ( <i>Stenella coeruleoalba</i> )                  | 1   | 0  | 1               |
| Long-beaked common dolphin ( <i>Delphinus capensis</i> )          | 1   | 0  | 1               |
| Short-beaked common dolphin ( <i>Delphinus delphis</i> )          | 1   | 0  | 1               |
| Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> ) | 1   | 0  | 1               |
| Northern right whale dolphin ( <i>Lissodelphis borealis</i> )     | 1   | 0  | 1               |
| Risso's dolphin ( <i>Grampus griseus</i> )                        | 1   | 0  | 1               |
| Harbor porpoise ( <i>Phocoena phocoena</i> )                      | 1   | 0  | 1               |
| Dall's porpoise ( <i>Phocoenoides dalli</i> )                     | 1   | 0  | 1               |
| California sea lion ( <i>Zalophus californianus</i> )             | 5   | 0  | 5               |
| Harbor seal ( <i>Phoca vitulina</i> )                             | 5   | 0  | 5               |
| Unidentified pinniped   | 1   | 0  | 1               |

During the reporting period, SWFSC had no Level A marine mammal interactions with purse seine nets.

**Table 7.** SWFSC's Level A takes in hook and line gear for the reporting period and the remaining takes during the authorization period.

| Authorized Purse Seine Species                                       | # of Level A (M/SI) authorized incidental takes (2021-2026) | SWFSC Trawl Takes for the reporting period | Remaining Takes |
|--|---|--|-----------------|
| Pygmy or dwarf sperm whale ( <i>Kogia</i> spp.)                      | 2   | 0  | 2               |
| Bottlenose dolphin ( <i>Tursiops truncatus</i> )<br>(CA/WA/OR Stock) | 1   | 0  | 1               |
| Striped dolphin ( <i>Stenella coeruleoalba</i> )                     | 2   | 0  | 2               |
| Long-beaked common dolphin ( <i>Delphinus capensis</i> )             | 2   | 0  | 2               |
| Short-beaked common dolphin ( <i>Delphinus delphis</i> )             | 2   | 0  | 2               |
| Risso's dolphin ( <i>Grampus griseus</i> )                           | 2   | 0  | 2               |
| Short-finned pilot whale ( <i>Globicephala macrorhynchus</i> )       | 2   | 0  | 2               |
| California sea lion ( <i>Zalophus californianus</i> )                | 5   | 0  | 5               |
| Steller sea lion ( <i>Eumetopias jubatus</i> )                       | 1   | 0  | 1               |
| Unidentified Pinniped  | 1   | 0  | 1               |

During the reporting period, SWFSC had no Level A marine mammal interactions with hook and line gear.

All accounts of Level A incidental take were reported to the Protected Species Incidental Take (PSIT) database within 48 hours. A notification was then administered to appropriate parties. See Appendix A Figure A.1 depicting location of SWFSC marine mammal incidental take from the reporting period.

## V. Final Outcome of Serious Injury Determinations

One serious injury determination was made during this field season for a sea lion that was entangled in the trawl net and self-released. A sea lion was seen twice during active fishing on the starboard side of the vessel and a professional judgment decision was made to continue fishing. Marine mammals were not seen within the last 10 minutes of fishing, and the net was retrieved with the net reel per normal operating procedures. The deck crew observed a small California sea lion entangled by the pectoral flipper in the 4- or 8-inch mesh section just aft of the bridles. According to a witness, the animal appeared to be dragged by the net. The animal was able to self-release prior to being brought on board and was seen quickly swimming and jumping away from the net. After swimming away, the animal returned and was

observed swimming around the codend. The final serious injury determination was non-serious injury under protocol P7B of National Marine Fisheries Service Procedure 02-238-01: *Guidelines for Distinguishing Serious From Non-Serious Injury of Marine Mammals Pursuant to the Marine Mammal Protection Act*.

## VI. Evaluation of Effectiveness of SWFSC Mitigation Strategies

Mitigation measures are continually evaluated by SWFSC to further reduce potential impacts to marine mammals. For detailed mitigation measure descriptions, please see Section 1 of this report.

### *Trawl Marine Mammal Mitigation Measures*

SWFSC routinely uses two types of trawl nets that require the implementation of mitigation measures: the Nordic 264 surface trawl, and the modified Cobb midwater trawl. A third trawl net, the MFT, will undergo additional testing in upcoming field seasons used during the future Integrated West Coast Pelagics Survey beginning in 2025. During use of these nets, the following mitigation protocols were adhered to: protected species watches (15-minute pre-set, gear deployment, active fishing and gear retrieval), move-on rule, use of 2-4 acoustic pingers, use of professional judgment, and standard survey protocols (all described in detail in Section 1).

Over the reporting period, watch logs showed that during nighttime surveys, animals were often able to be heard or seen in close proximity to the ship, resulting in implementation of the move-on rule in order to reduce risk of an interaction. Sightings typically occur in good conditions (i.e., minimal cloud cover or partly cloudy, considerable moonlight, low Beaufort Sea state, etc.) when the animals are in close proximity and made visible by available ship lighting. However, once the net has been deployed and is actively fishing, it is located a significant distance from the ship and therefore, even in good conditions, it is nearly impossible to see if marine mammals are in the vicinity of the net. This is evidenced by the fact that even after marine mammals were spotted during the pre-set watch and the ship moved 1 nautical mile, no marine mammals were seen during the second pre-set watch, gear deployment, and active fishing and yet two Pacific white-sided dolphins were incidentally taken. However, there were a number of hauls during both trawl surveys where marine mammals were seen during visual observations, a majority of which were during the pre-set watch and during haul back. There were a few instances where dolphins were observed during active fishing. In those instances, the ship retrieved the net and either enacted the move on rule, used professional judgment to minimize risk of an incidental take, or canceled the station as a result of the sightings. A summary of move-on efforts to mitigate incidental takes in trawls during each of the trawl surveys can be found in Table 12.

During the RL-23-04 survey, professional judgment was practiced in the following situations: In one instance, a dolphin group of ~25-50 animals appeared to be swimming at the starboard bow. Haul back was delayed for 13 minutes to mitigate risk of a gear interaction. On another occasion, a humpback whale was observed and heard approximately 3 minutes after the doors were deployed. The whale moved within 40 meters of the ship and then disappeared. The haul was continued per normal operating procedures. In a third instance, 3 dolphins were seen 5 minutes before haul back. The ship continued trawling and the dolphins were not observed again until the doors were on board. A third sighting of 5 dolphins occurred once the net was almost fully retrieved. There were no incidental takes during any of the hauls.

During the MFT testing cruise, the ship encountered large groups of dolphins several times, a majority of which were observed during the 15-minute pre-set watch or just prior to gear deployment. During one of the 15-minute watches, a large group of dolphins was observed approximately 1 mile from the ship. The ship made the decision to stay where it was, hoping the dolphins would move further away. The dolphins did not move and therefore the ship implemented the move on rule and moved approximately 2 nmi prior to trawling. No marine mammals were observed during the second 15-minute watch and the haul commenced. A large group of dolphins was observed feeding on a bait ball in the path of the ship during active fishing and therefore professional judgment was used and the haul aborted at 17 minutes to minimize the risk of an incidental take.

In preparation for surface trawling during the Integrated West Coast Pelagics Survey, the MMED will need to be modified to ensure it properly fits within the MFT net. The modifications would be minimal and the goal is to make the MMED fit the new net correctly to reduce fish escapement. To do this, the port and starboard bars of the frame will be modified to make the unit more ovoid. Modifications are expected to be completed prior to the commencement of the 2024 field season.

**Table 7.** Implementation and effect of marine mammal (MM) watches and move-on rule on SWFSC Trawl surveys during the reporting period.

| Trawl Survey  | Total # tows | Move-on Implemented | % total tows that had to move-on | Trawl aborted due to MM | % of total tows canceled due to MM |
|---|--------------|---------------------|----------------------------------|-------------------------|------------------------------------|
| <i>Modified Cobb Net</i>                                |              |                     |                                  |                         |                                    |
| Rockfish Recruitment and Ecosystem Assessment - RL23-03 | 79           | 6                   | 7.6%                             | 1                       | 1.3%                               |
| <i>Nordic 264 Net</i>                                   |              |                     |                                  |                         |                                    |
| Summer CCE - RL23-04                                    | 81           | 7                   | 8.6%                             | 2                       | 2.5%                               |
| <i>Multi-function Trawl System</i>                      |              |                     |                                  |                         |                                    |
| MFT Testing - Surface Trawl                             | 13           | 3                   | 23%                              | 0                       | 0%                                 |

The column labeled ‘Move-on Implemented’ represents the number of hauls where marine mammals were seen within 1 n mi of the set location during the pre-set watch or early in gear deployment or active trawling, resulting in the ship moving on to exclude them from the restricted radius. The column labeled ‘% of total tows that had to move on’ represents the percentage of total tows in which the ship had to move to exclude marine mammals. The column labeled ‘Trawl aborted due to MM’ reflects the number of times that a station was skipped due to the prolonged presence of marine mammals within the 1-n mi

radius, and the associated percentage in the column to the right labeled '% of total tows canceled due to MM.'

#### *Purse Seine Marine Mammal Mitigation Measures*

SWFSC conducts collaborative research with WDFW, CWPA, OGSI and CDFW, and with contracted F/Vs Lisa Marie and Long Beach Carnage to complete the Nearshore CPS Survey research objectives. The vessels use a purse seine net and require implementation of mitigation measures. During the use of these nets, the following mitigation protocols must be observed: protected species watches (15-minute pre-set, gear deployment, active fishing and gear retrieval), move on rule (specific to purse seine operations), use of professional judgment, and standard survey protocols, including opening of the net if cetaceans are observed within. Mitigation measure descriptions can be found in Section 1.

Over the reporting period, watch logs indicated a couple occasions where groups of cetaceans were seen passing outside of the exclusionary zone and enactment of the move-on rule was not required. The F/V Long Beach Carnage employed the move on as required once to avoid a porpoise group that was in the vicinity. A summary of effort compared to mitigation measure effort during purse seine activities can be found in Table 13.

**Table 8.** Implementation and effect of marine mammal (MM) watches and move-on rule on SWFSC purse seine surveys during the reporting period.

| Vessel             | Total # tows | Move-on Implemented | % Total tows that had to move-on | Trawl aborted due to MM | % Of total tows canceled due to MM |
|--------------------|--------------|---------------------|----------------------------------|-------------------------|------------------------------------|
| Lisa Marie         | 70           | 0                   | 0%                               | 0                       | 0%                                 |
| Long Beach Carnage | 57           | 1                   | 1.8%                             | 1                       | 1.8%                               |

#### *Hook and Line Marine Mammal Mitigation Measures*

Two hook and line surveys are covered under the MMPA LOA, in which visual monitoring must occur prior to deployment of gear, active fishing, and gear retrieval. Surveys typically conducted are the Genetics, Physiology and Aquaculture Project and Life History and Reproductive Ecology Investigations of Rockfish. The former did not occur this season. Mitigation measure descriptions for hook and line gear can be found in Section 1.

Over the reporting period, no interactions with marine mammals were observed while using hook and line gear.

To ensure compliance with these regulations, SWFSC implements the use of standardized language in annual training and all project instructions for surveys that use trawl nets. Project instructions, which detailed required environmental compliance and other standard trawl protocols, were provided to the crew of NOAA Ship Reuben Lasker for all trawl surveys discussed in this report.

## **VII. Mitigation Strategy Updates**

A major part of implementing EC / ITA compliance throughout the Center has been devoted to data collection to aid in the understanding of the practical impacts of our mitigation measures and limiting survey impacts to protected species. With additional years of data collection, we aim to develop a more informed view of the efficacy of our mitigation strategies. A Fisheries Ecosystem-Environmental Compliance Annual Forum was held on January 31, 2024. The forum was designed to facilitate review and discussion regarding incidental take, mitigation measures, understanding of protected species protocols, and recommendations for improvements.

A continuous effort is underway to analyze environmental factors that may play a role in Level A incidental takes. Current and historical data collected from trawl surveys between 2008-2022, including watch logs, GoPro footage (between the years of 2013-2016), and a number of environmental factors have been recorded in an active dataset. Environmental factors included are moon phase, visibility, sky conditions, sea surface temperature, salinity, wind speed, and potentially chlorophyll. Pending the results of a final analysis, the goal is to create a risk analysis for scientists to use at sea.

## **VIII. Training Provided to SWFSC Staff and Cooperative Agencies**

SWFSC is required to conduct annual training for chief scientists and other personnel responsible for implementing mitigation measures, data collection, and reporting requirements. A portion of the training must be dedicated to discussion on the use of best professional judgment to avoid marine mammal interactions and to gain an understanding of successful versus unsuccessful decisions.

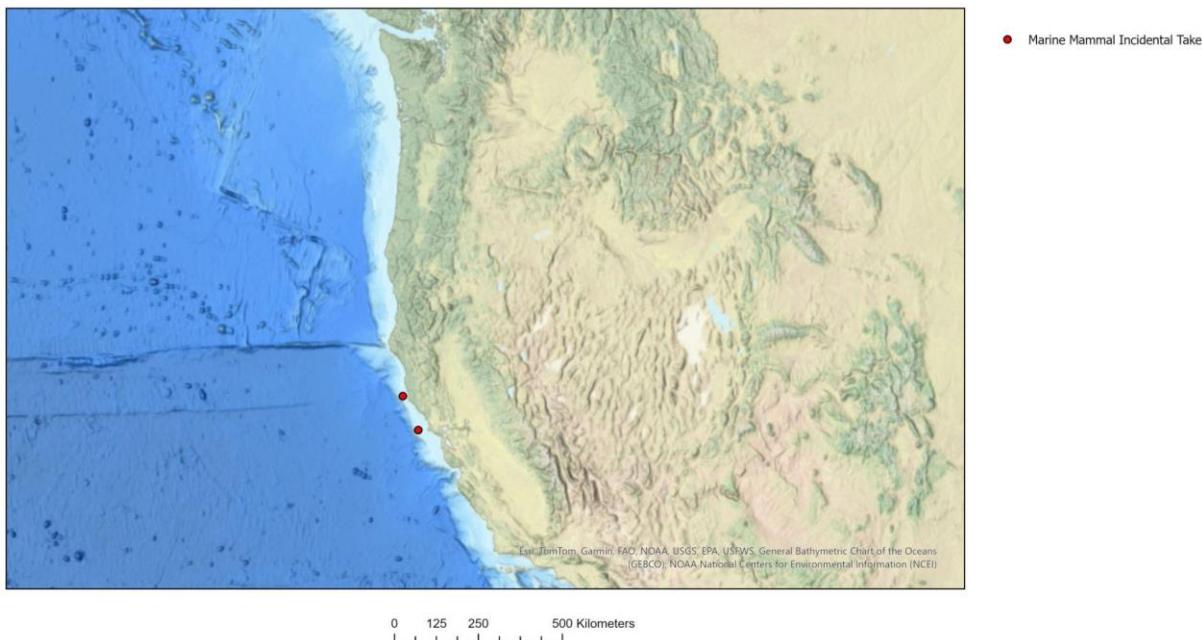
Quarterly meetings are held between Environmental Compliance Coordinators on the West coast (SWFSC, NWFSC, AFSC and PIFSC) to discuss various topics, including protocols, training and authorization renewals. Quarterly meetings are held and led by the Office of Science and Technology for Environmental Compliance Coordinators from each of the Science Centers to discuss various topics pertaining to environmental compliance.

Annual training was provided April 18, 2023 for SWFSC's Fisheries Ecology Division trawl-based surveys and on April 19, 2023 for the Fisheries Resources Division trawl-based survey. Training for Nearshore CPS Survey participants, which include cooperative agencies (WDFW and CWPA), was provided on April 18, 2023. Training for hook and line projects was provided to Chief Scientists and key biologists within those projects on March 7, 2023. All trainings included the following topics: overview and background of statutory requirements, SWFSC's incidental take history, development of the Center's mitigation measures, scope of coverage for the Center's authorized takes, implementation of the authorization conditions (mitigation measures, reporting requirements, data collection, etc), discussion of the use of professional judgment in interactions/avoidance practices with protected species, and review of handling and sampling methodologies for marine mammal and sea turtles (in coordination with SWFSC's Marine

Mammal and Turtle Division). In addition to the annual training, refresher environmental compliance training sessions were offered to participants of the Summer CCE Survey. Refresher training occurred on June 20, 2023. Protected Species Handling Training was provided to the NOAA Ship Reuben Lasker crew on April 6, 2023. All training sessions were provided virtually.

## Appendix A

### Marine Mammal Incidental Take in 2023



**Figure 1.** Map of SWFSC's Level A incidental take of marine mammal species protected under the MMPA over the reporting period.