

**Annual Report under Section 101(a)(5)(A) of the MMPA  
for Fisheries and Ecosystem Research Activities Conducted by Southwest Fisheries Science Center  
during January 1, 2017 – December 31, 2017**

On October 30, 2015, the Southwest Fisheries Science Center (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 Ecosystem (CCE), the Eastern Tropical Pacific (ETP), 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 governing this take as described in 50 CFR Part 219, Subpart A (CCE), 50 CFR Part 219, Subpart B (ETP), and 50 CFR Part 219, Subpart C (AMLR). These authorizations are valid through October 29, 2020.

In accordance with these authorizations, the SWFSC is required to provide annual reports. The following report will cover the period from January 1, 2017 – December 31, 2017 in the California Current Ecosystem (CCE). The center did not conduct research in the AMLR & ETP thus they will not 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, SX90 were predominant & pro-rated estimates of actual Level B acoustic take
- III. Information regarding use of trawl gear
- IV. Accounts of all incidents of marine mammal interactions in the CCE
- V. Evaluation of effectiveness of SWFSC mitigation strategies
- VI. Final outcome of serious injury determinations
- VII. Updates on development / implementation of MMEDs and analysis of bycatch patterns<sup>3</sup>
- VIII. Training provided to SWFSC staff

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

## I. Overview of SWFSC's mitigation measures

With the issuance of the SWFSC's MMPA LOA's a set of prescribed mitigation measures were outlined for the Center to follow on all surveys in order to attempt to minimize the likelihood or severity of incidental gear interactions with marine mammals and other protected species. These measures vary slightly depending on the gear type and survey but are mainly comprised of dedicated marine mammal / protected species watches, an associated exclusion zone and move-on rule if protected species are seen during watch, and standard operating procedures by gear type. Below are gear specific descriptions of these conservation measures in trawl-based surveys.

- 30 minute pre-set watch

During all SWFSC trawl surveys, a dedicated observer must initiate a 30 minute pre-set watch (visual observation) prior to deploying trawl gear. The surrounding waters are scanned with the naked eye and range finding sighting instruments during the day and at night are conducted using the naked eye and available vessel lighting.

- Move-on rule

If a marine mammal or other protected species is seen during the pre-set watch within 1 nautical mile (n mi) 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 n mi away from the set location. If, after moving-on, the marine mammal remains in the exclusion zone (within that 1 n mi radius the set location) the ship must move again or skip the station.

- Active gear monitoring

Once trawl net 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 during the active gear watch, the most appropriate action to avoid an interaction will be determined through the use of professional judgment. If professional judgment is employed it will be recorded. Professional judgment is only to be used in circumstances when the gear is already deployed - that is, if a marine mammal is seen during the pre-set watch, the move-on rule must be implemented, but if it is seen when the net is fishing, then professional judgment will be used to determine the best course of action to avoid an interaction.

- Marine mammal excluder device (MMED)

On the Nordic 264 trawl net, a marine mammal excluder device is used at all times. This device was developed to allow marine mammals to escape from the net without losing target species catch.

- Acoustic deterrent devices

On all SWFSC trawl nets, 2-4 acoustic deterrent devices, or pingers, are placed along the head rope and footrope to deter marine mammals from entering the net.

- Other standard trawl survey protocols

The SWFSC also employs several standard survey protocols to attempt to minimize impacts to protected species: 1) the gear will be emptied as quickly as possible upon retrieval in order to determine whether to or not protected species are present and 2) care will be taken when emptying the trawl to avoid damage to protected species that may be caught but not visible during retrieval.

If a marine mammal or other protected species is seen during the pre-set watch within 1 nautical mile (n mi) of the set location, 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 n mi away from the set location. If, after moving-on, the marine mammal remains within that 1 n mi radius the ship must move again or skip the station. If a marine mammal is seen during the active gear watch, the most appropriate action to avoid an interaction will be determined through the use of professional judgment. In addition to the watches, the SWFSC deploys 2-4 acoustic deterrent devices, or pingers, on trawl nets and a MMED on the Nordic 264 trawl.

**II. Line-kilometers surveyed during which the EK60/EK80, ME70, and SX90 were predominant during the reporting period and pro-rated estimates of actual take**

California Current Ecosystem				
Echosounder	EA Estimated summed dominant line-kms/source (0-200 m)	Summed line-kms of reporting period / source (0-200 m)	EA Estimated summed dominant line-kms/source (>200 m)	Summed line-kms of reporting period / source (>200 m)
SX90	33,880	5031	33,880	11515
EK60/EK80	79,912	16655	99,640	39627
ME70	19,728	25806	0	0

**Table 1.** Total line-kilometers (kms) surveyed during the reporting period for which the SX90, EK60/EK80, or ME70 echosounder was the predominant acoustic source in the CCE compared to the totals calculated in the SWFSC's MMPA LOA application (Appendix C of SWFSC's National Environmental Policy Act Programmatic Environmental Assessment).

Common name	Volumetric Density (#/km <sup>3</sup> )	Typical Vertical Habitat		SWFSC Reporting Period Acoustic Takes (# of animals)			Reporting Period Total Takes	EA Estimated Annual Takes
		0-200 m	>200 m	EK60/EK80	ME70	SX90		
<b>CC Cetaceans</b>								
Harbor porpoise	0.18873	X		41	89	12	142	682
Dall's porpoise	0.37765	X		82	177	25	284	1365
Pacific white-sided dolphin	0.10465	X		23	49	7	79	378
Risso's dolphin	0.05230	X		11	25	3	39	189
Bottlenose dolphin	0.00890	X		2	4	1	7	32
Striped dolphin	0.08335	X		18	39	5	63	301
Short-beaked common dolphin	1.54675	X		337	726	102	1164	5591
Long-beaked common dolphin	0.09620	X		21	45	6	72	348
Northern right-whale dolphin	0.04875	X		11	23	3	37	176
Killer whale	0.00355	X		1	2	0	3	13
Short-finned pilot whale	0.00062		X	3	0	1	5	12
Baird's beaked whale	0.00176		X	9	1	3	14	34
Mesoplodont beaked whales	0.00206		X	11	1	4	16	39
Cuvier's beaked whale	0.00764		X	41	4	14	59	146
Pygmy sperm whale	0.00218		X	12	1	4	17	42
Dwarf sperm whale	0.00218		X	12	1	4	17	42
Sperm whale	0.00340		X	18	2	6	26	65
Humpback whale	0.00415	X		1	2	1	4	15
Blue whale	0.00680	X		1	3	2	7	25
Fin whale	0.00920	X		2	4	3	9	33
Sei whale	0.00045	X		0	0	0	0	2
Common Minke whale	0.00360	X		1	2	1	4	13
Gray whale	0.09565	X		21	45	31	97	346
<b>CC Pinnipeds</b>								
California sea lion	1.19000	X		259	558	391	1208	4302
Steller sea lion, eastern subspecies	0.29165	X		63	137	96	296	1054
Guadalupe fur seal	0.03705	X		8	17	12	38	134
Northern fur seal	1.68275	X		366	790	553	1709	6083
Harbor seal	0.25200	X		55	118	83	256	911
Northern elephant seal	0.24800		X	1331	116	467	1914	4744

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

**III. SWFSC's Gear Meta Data for All Fisheries and Ecosystem Surveys in the CCE During the Reporting Period**

Research Area	Trawl Net	Total # tows	Fishing Depth Range (m)	Average Tow Duration of active fishing (minutes)
<i>California Current Ecosystem</i>	Modified cobb	109	3-50	15
	Nordic 264	147	0-16	42

Table 3. SWFSC trawl survey metadata for the reporting period by trawl net and research area.

In the CCE, the modified Cobb net was used during the Rockfish Recruitment survey (RL-17-03) and the Nordic 264 net was used for the Spring Coastal Pelagic Species (CPS) survey (1704RL) and the California Current Ecosystem survey (1707RL).

Gear Type	Survey	Total # sets	# Hooks	Total hook hours	Hook type	Fishing depth range (m)
Hook & Line	Rockfish Tagging & Release Device Testing	-	4	32	J Hook	70-110

Table 4. SWFSC's reporting period hook & line metadata in the CCE.

The SWFSC conducted a Rockfish Tagging & Release Device Testing project using electronic tags to assess post-release survival of rockfish following field recompression. This survey occurred as two trips aboard a chartered recreational fishing vessel.

#### IV. Marine Mammal Interactions

The following section will detail the SWFSC Level A marine mammal interaction events in the CCE.

Species	Authorized Take		
	M/SI + Level A <sup>1</sup>		Level B <sup>2</sup>
	Trawl	Longline	
Gray whale ( <i>Eschrichtius robustus</i> )	-	-	346
Humpback whale ( <i>Megaptera novaeangliae</i> )	-	-	14
Minke whale ( <i>Balaenoptera acutorostrata</i> )	-	-	13
Sei whale ( <i>Balaenoptera borealis</i> )	-	-	1
Fin whale ( <i>Balaenoptera physalus</i> )	-	-	33
Blue whale ( <i>Balaenoptera musculus</i> )	-	-	24
Sperm whale ( <i>Physeter macrocephalus</i> )	-	-	65
Pygmy or dwarf sperm whale ( <i>Kogia</i> spp.)	-	1	42
Cuvier's beaked whale ( <i>Ziphius cavirostris</i> )	-	-	146
Baird's beaked whale ( <i>Berardius bairdii</i> )	-	-	34
Hubbs', Blainville's, ginkgo-toothed, Perrin's, lesser, or Stejneger's beaked whales ( <i>Mesoplodon</i> spp.)	-	-	40
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	CA/OR/WA stock	8	32
	CA coastal stock	3	
Striped dolphin ( <i>Stenella coeruleoalba</i> )	11	1	301
Long-beaked common dolphin ( <i>Delphinis capensis</i> )	11	1	348
Short-beaked common dolphin ( <i>Delphinis delphis</i> )	11	1	5,592
Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> )	35	-	378
Northern right whale dolphin ( <i>Lissodelphis borealis</i> )	10	-	176
Risso's dolphin ( <i>Grampus griseus</i> )	11	1	188
Killer whale ( <i>Orcinus orca</i> )	-	-	13
Short-finned pilot whale ( <i>Globicephala macrorhynchus</i> )	-	1	12
Harbor porpoise ( <i>Phocoena phocoena</i> )	5	-	682
Dall's porpoise ( <i>Phocoenoides dalli</i> )	5	-	1,365
Guadalupe fur seal ( <i>Arctocephalus philippii townsendi</i> )	-	-	134
Northern fur seal ( <i>Callorhinus ursinus</i> )	California stock	-	236
	Pribilof Islands/ Eastern Pacific stock	5	11,555
California sea lion ( <i>Zalophus californianus</i> )	20	5	4,302
Steller sea lion ( <i>Eumetopias jubatus</i> )	9	1	1,055
Harbor seal ( <i>Phoca vitulina</i> )	9	-	910
Northern elephant seal ( <i>Mirounga angustirostris</i> )	5	-	4,743
Unidentified cetacean (Family Delphinidae or Family Phocoenidae)	1	-	-
Unidentified pinniped	1	1	-

<sup>1</sup> These 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> These takes may be by Level B harassment only. The number represents the annual take authorization for five years.

**Table 5.** SWFSC's take table from the MMPA LOA for the CCE (Table 1 in the authorization) displays the takes issued to the Center by gear type in that ecosystem over the five year authorization period (Oct 2015 - Oct 2020).

Authorized Trawl Species	# of Level A (M/SI) authorized incidental takes (2015-2020)	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>Delphinis delphis</i> )	11	0	11
Long-beaked common dolphin ( <i>Delphinis capensis</i> )	11	0	11
Pacific white-sided dolphin ( <i>Lagenorhynchus obliquidens</i> )	35	0	26
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	0	20
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

**Table 6.** SWFSC's Level A take in trawl gear (modified Cobb and Nordic 264 nets) for the reporting period and the remaining takes left for trawl surveys during the authorization period. There were no incidental interactions with trawl gear and marine mammals during the reporting period, thus take levels equal those issued (as displayed in Table 5).

## V. Evaluation of SWFSC Mitigation Strategies

An evaluation of the mitigation measures employed by the SWFSC to reduce potential impacts to marine mammals is outlined below for trawl gear. For detailed mitigation measure descriptions, please see Section 1 of this report.

### *Trawl Marine Mammal Mitigation Measures*

The SWFSC uses two types of trawl nets that require the implementation of mitigation measures, the Nordic 264 surface trawl, and the Modified Cobb midwater trawl net. During use of any of these nets, the following mitigation protocols must be observed: protected species watches (30 minute and active gear), move-on rule, use of pingers, use of a MMED on Nordic 264 net only, use of professional judgment, and standard survey protocols (all described in detail in Section 1).

To ensure compliance with these regulations, the Center has implemented the use of boiler plate language in all cruise / project instructions for trawl surveys that use the Nordic 264 or modified Cobb nets. The boiler plate language provides detail and instruction on the required mitigation measures and other standard trawl protocols. In addition to this, the Center has started collecting data in watch logs during each survey to record whether or not marine mammals or other protected species were seen during required watches, and if they were, what actions were implemented to mitigate potential interactions (e.g., move-on rule or professional judgment decisions).

Trawl Survey	Total # tows	Move-on implemented	% total tows that had to move-on	Trawl aborted due to MM	% of tows cancelled due to MM	Interaction events w/ MM
<i>Nordic 264 Net</i>						
Spring CPS -1704RL	64	5	8%	3	5%	0
Summer CPS – CCE 1707RL	86	3	3%	0	0%	0
<i>Modified Cobb Net</i>						
Rockfish Recruitment - RL-1703	109	10	9%	3	3%	0

**Table 7.** Implementation and effect of Marine Mammal (MM) Watches and move-on rule on SWFSC Trawl surveys during the reporting period. 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, and the ship had to move to exclude them from the restricted radius. The percent of total tows where the ship had to move-on represents the times where the ship moved to exclude marine mammals.

In some instances of a marine mammal sighting, the move-on was successful in avoiding marine mammal interactions and the net was set, but in others the haul was cancelled because the marine mammals remained in the restricted 1 n mi radius. Additionally, tow cancellation could have been the result of marine mammal sightings when the net was already set, but before the doors were deployed

and the mouth of the net was opened (start of active fishing), so a professional judgment call was made and the net was immediately hauled back to avoid interaction (trawl aborted).

There was one instance during the 1704RL survey and one instance during the 1707RL survey where marine mammals were observed during pre-set watches where the move-on rule was not enacted. In both cases, marine mammals were briefly sighted during the beginning of the watch, but had quickly moved out of the exclusionary zone (1 n mi radius) prior to reaching the survey stations.

For all trawl surveys, pre-set and active gear watches were conducted 100% of the time for the reporting period. In every instance during all surveys where the move-on rule was implemented and a trawl followed, there was no interaction with protected species.

Pingers were deployed and functioning on every tow for both nets throughout the reporting period.

## VI. Final outcome of serious injury determinations

There were no serious injury determinations needed for this reporting period as no marine mammals were taken. A final outcome determination of a single Pacific white-sided dolphin that was excluded from the MMED during the take event in the 2016 summer CCE survey (1607RL) is described in a draft report<sup>1</sup>. The assessment explains that, " In addition to the 7 dead dolphins retrieved dead from this trawl on 7/18/2016, an 8<sup>th</sup> animal was seen via video camera attached to net escaping alive through the marine mammal excluder device. Condition of animal unknown upon escape and based on dead condition of 7 associated animals that were trapped for a sufficient duration to result in death, this is being assigned as a serious injury due to unknown effects of capture myopathy."

1. Carretta, J.V., V. Helker, M.M. Muto, J. Greenman, K. Wilkinson, D. Lawson, J. Viezbicke, and J. Jannot. 2017. Sources of human-related injury and mortality for U.S. Pacific west coast marine mammal stock assessments, 2012-2016. U.S. Department of Commerce, NOAA Technical Memorandum, draft.

## **VII. Updates on development / implementation of MMEDs and analysis of bycatch patterns**

There are currently no updates or analysis of SWFSC's bycatch patterns. However, 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 on limiting survey impacts to protected species. With additional years of data collection we hope to be able to develop a more informed view of the efficacy of our mitigation strategies.

### **VIII. Training provided to SWFSC staff**

The SWFSC is required to conduct annual training for all chief scientists and other personnel who may be 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 to gain an understanding of successful versus unsuccessful decisions.

Annual training occurred in February 2017 and 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 and 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 sampling methodologies for marine mammal and sea turtles (in coordination with the SWFSC Marine Mammal and Turtle Division).