

# **Abundance, Potential Biological Removal, and Bycatch Estimates for the Hawaii Pelagic Stock of False Killer Whales for 2015–2019**

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## Executive Summary

Updated abundance and mortality and serious injury (M&SI) information is required for the Hawaii pelagic stock of false killer whales to support management actions under the Take Reduction Plan. Due to the urgent nature of the management requirements, this report provides an overview of the available abundance and M&SI information for this stock, information generally provided within the annual stock assessment report. The information provided in this report will be superseded by the 2020 and 2021 stock assessment reports once those reports become available.

The current abundance estimate for the Hawaii pelagic stock of false killer whales is 2,086 (CV = 0.35) individuals in the Hawaii EEZ. This estimate was derived from a species density model using encounter data from the 2017 Hawaiian Islands Cetacean and Ecosystem Assessment Survey, as well as from other cetacean surveys in the central Pacific. The potential biological removal (PBR) for this stock within the EEZ is computed to be 16 pelagic false killer whales.

Under the Marine Mammal Protection Act Guidelines for Assessing Marine Mammal Stocks (NMFS 2012), the 5-yr average M&SI rate, estimated across all sources of mortality and serious injury, is compared to PBR to determine stock status. Several hook-and-line fisheries operate relatively nearshore within the main Hawaiian Islands, though none of these fisheries are observed and therefore M&SI estimates are not available from this sector. The 2015–2019 5-year average M&SI rate of pelagic false killer whales within the Hawaii EEZ based on interactions within the commercial longline fisheries is 9.8 whales per year. This M&SI rate is below PBR but is not below the zero mortality rate goal for this stock.

## **Introduction**

Annual Marine Mammal Protection Act (MMPA) stock assessment reports (SARs) are generally the official mode for conveying marine mammal stock status in U.S. waters. By statute, these reports include documentation of the best-available scientific information on stock abundance, human-caused mortality, as well as other demographic and population information. They provide the current stock status, including relating the most recent 5-year human-caused mortality and serious injury (M&SI) estimate to the potential biological removal (PBR).

The Pacific Islands Regional Office has requested stock status determination for the Hawaii pelagic stock of false killer whales, including M&SI estimates through calendar year 2019, in support of management actions under the False Killer Whale Take Reduction Plan (TRP). As M&SI estimates generally appear in SARs with a 2-year lag, this report serves to provide the relevant abundance and mortality information ahead of the publication of the appropriate SAR.

## **Hawaii Pelagic False Killer Whale Stock Abundance and PBR**

Encounter data from shipboard line-transect surveys conducted since 1986 were used to estimate the abundance of false killer whales across the central Pacific using a model-based approach and for the Hawaii EEZ using both model- and design-based approaches (Bradford et al. 2020). The model-based abundance estimates use sighting data from 1997 to 2017 from the central Pacific to derive habitat-based models of animal density for the overall period, then predict the density and abundance for each Hawaii survey year (2002, 2010, and 2017) based on the environmental conditions within that year (see Becker et al. 2016; Forney et al. 2015). The modeling framework incorporates Beaufort sea-state-specific trackline detection probabilities for false killer whales derived following the methods of Barlow et al. (2015) and accounts for changes in false killer whale data collection through time (see Bradford et al. 2020 for details). Although comparable design-based estimates are available for each survey year, the model-based estimates account for additional variability through explicit examination of habitat relationships across survey years, resulting in abundance estimates with lower inter-annual variation. The present model-based approach does not allow for explicit examination of abundance trends.

Previous design-based estimates from the Hawaii EEZ using subsets of the full dataset and different line-transect parameters have been published (Barlow 2006; Bradford et al. 2014). Bradford et al. (2020) provides updated abundance estimates for prior survey years using the most current parameter estimates, and as such is considered the best available estimate for false killer whales in the Hawaii EEZ for each survey year. The model-based estimate of abundance for the Hawaii pelagic stock of false killer whales within the Hawaii EEZ for survey year 2017 is 2,086 (CV = 0.35; 95% CI, 1,079 to 4,031) animals (Bradford et al. 2020). The minimum population abundance (N<sub>min</sub>), used for computation of PBR, is calculated as the lower 20<sup>th</sup> percentile of the log-normal distribution (following Barlow et al. 1995) for the 2017 abundance estimate, or 1,567 animals.

### **Potential Biological Removal**

The PBR level for the Hawaii pelagic stock of false killer whales is calculated as the minimum population estimate within the EEZ multiplied by one half the default maximum net growth rate for cetaceans ( $\frac{1}{2}$  of 4%) multiplied by a recovery factor of 0.50 (for a stock of unknown status with a Hawaii EEZ mortality and serious injury rate  $CV \leq 0.30$ ; see “Mortality and Serious Injury for 2015 to 2019” section below), resulting in a PBR of 16 false killer whales per year.

## Mortality and Serious Injury for 2015 to 2019

False killer whales have been observed hooked or entangled in the Hawaii-based deep-set and shallow-set fisheries for many decades (e.g., Forney and Kobayashi 2007). Between 2015 and 2019, no false killer whales were observed hooked or entangled in the fully-observed (i.e., 100% observer coverage) shallow-set longline fishery. During the same period, 48 false killer whales were observed taken in the deep-set longline fishery (18–21% observer coverage) within the Hawaii EEZ and adjacent high seas (Table 1) (Bradford 2018a; 2018b; in review, unpublished data). The severity of injuries resulting from interactions with longline gear is determined based on an evaluation of the observer's description of each interaction and following the most recently developed criteria for assessing serious injury in marine mammals (NMFS 2012). In the deep-set longline fishery, 13 false killer whales were taken within the Hawaiian EEZ, including one within the overlap area of the pelagic and Northwestern Hawaiian Islands (NWHI) stocks (see Bradford et al. 2020; Bradford et al. 2015 for stock boundaries and overlap zones). Stock identity is not known for any of the whales taken within the EEZ, though those outside of a stock overlap zone are assumed to be pelagic stock animals. Eleven of the observed takes were considered seriously injured and two not seriously injured based on the information provided by the observer. Outside of the Hawaii EEZ, five were observed dead, 21 were considered seriously injured, seven were considered not seriously injured, and two could not be determined based on the information provided by the observer. Three additional unidentified "blackfish" (unidentified cetaceans known to be either false killer whales or short-finned pilot whales) were also taken outside of the Hawaii EEZ within the deep-set longline fishery between 2015 and 2019, with one considered seriously injured, one not seriously injured, and one that could not be determined based on the information provided by the observer (Table 1) (Bradford 2018a; 2018b; in review, unpublished data).

The Southern Exclusion Zone (SEZ) is an area south of the main Hawaiian Islands (MHI) that is closed under the TRP when two deaths or serious injuries are observed within the Hawaii EEZ in a single calendar year. The SEZ was closed in November 2018, following two serious injuries within the Hawaii EEZ. This closure remained in effect through the remainder of calendar year 2018. Following re-opening of the SEZ on January 1, 2019, the SEZ was again closed in February 2019, following two serious injuries. Following this closure, there were three additional serious injuries within the Hawaii EEZ in 2019. The SEZ remained closed for the duration of calendar year 2019 and remains closed until specific criteria noted within the FKW TRP are met.

The annual total estimated number of dead or seriously injured whales is calculated based on observer coverage rate, the location of observed takes (inside or outside of the EEZ), and the ratio of observed dead and seriously injured whales versus those judged to be not seriously injured (McCracken in review-a; in review-b). Observer coverage is measured on a per-trip basis throughout the calendar year as described by McCracken (2019). The proportion of dead and seriously injured whales versus non-serious injuries has been calculated annually based on the injury status of observed takes since the implementation of the TRP in 2013. This proportion is then applied to determine the estimated total number of M&SI within the calendar year (McCracken and Cooper in review). Takes of unidentified blackfish are prorated to false killer whale and short-finned pilot whale based on distance from shore (McCracken 2010) given patterns of previous bycatch for each species. Following proration of unidentified blackfish takes to species, Hawaii EEZ and high-seas estimates of false killer whale takes are calculated by



summing the annual false killer whale take and the annual blackfish take prorated as false killer whale within each region (McCracken 2020).

Annual total bycatch estimates also must be prorated among false killer whale stocks, as all stocks have some portion of their stock area exposed to longline fishing. Estimated takes within the Hawaii EEZ are apportioned to each stock area by first allocating take to stock areas based on relative annual fishing effort (by set) in that area. If an observed take occurred within the MHI insular-pelagic or NWHI-pelagic overlap zones, the take was assigned to that zone and the remaining estimated bycatch was assigned to stock areas as previously described. Stock area bycatch estimates are then multiplied by the relative density of each false killer whale stock within that area to estimate stock-specific bycatch for each year. Uncertainty estimates for stock-specific bycatch combine the variance of total annual false killer whale bycatch and the fractional variance of false killer whale density according to which stock is being estimated. Enumeration of fishing effort within stock overlap zones is assumed to be known without error. Proration of unidentified blackfish takes and of false killer whale takes within the stock overlap zones introduces unquantified uncertainty into the bycatch estimates, but until methods of determining stock identity for animals observed taken within the overlap zone are available, and all animals taken can be identified to species and stock (e.g., with photos or tissue samples), these proration approaches are needed to ensure that potential impacts to all stocks are assessed in the overlap zones. Based on the described approach, estimates of annual mortality and serious injury of the Hawaii pelagic stock of false killer whales inside and outside of the Hawaii EEZ are shown in Table 1.

Several hook-and-line fisheries operate near the main Hawaiian Islands and have the potential to interact with Hawaii pelagic false killer whales. These fisheries are not observed and there is no reliable data collection mechanism to assess M&SI rates for these fisheries. Therefore, the impact of these fisheries has not been assessed and is not included in the M&SI estimates presented.

**Table 1. Summary of available information on incidental mortality and serious injury (MSI) of false killer whales and unidentified blackfish (BF) (false killer whale (FKW) or short-finned pilot whale (SFPW)) in the Hawaii-based deep-set longline fishery for 2015 to 2019. Information on all observed takes (T) and those determined to be dead or seriously injured (MSI) is included. Unidentified blackfish are pro-rated as either FKW or SFPW according to their distance from shore following McCracken (2010).**

Year	Observed Takes FKW T/MSI (BF T/MSI)		Pelagic Stock Estimated M&SI (CV)	
	Outside Hawaii EEZ	Within Hawaii EEZ	Outside Hawaii EEZ	Within Hawaii EEZ
2015	5/4 (1/1 <sup>†</sup> )	0 (0)	21.0 (0.4)	0 (-)
2016	9/8 <sup>†</sup> (0)	1/1 (0)	27.9 (0.3)	4.0 (0.8)
2017	4/4 <sup>†</sup> (0)	2/1 (0)	28.5 (0.3)	8.1 (0.6)
2018	8/5 (0)	4/4 (0)	29.4 (0.3)	11.9 (0.4)
2019	9/7 (1/0)	6/5 (0)	37.2 (0.3)	25.0 (0.4)
<b>2015-2019 Average annual M&amp;SI</b>			<b>28.8 (0.2)</b>	<b>9.8 (0.3)</b>

<sup>†</sup> Injury status could not be determined based on information collected by the observer. Injury status is prorated (see text).

## **Stock status**

This stock is not listed as “threatened” or “endangered” under the Endangered Species Act (1973), nor designated as “depleted” under the MMPA. Following the NMFS Guidelines for Assessing Marine Mammal Stocks (NMFS 2005), the status of this transboundary stock of false killer whales is assessed based on the estimated abundance and mortality and serious injury within the Hawaii EEZ because estimates of human-caused mortality and serious injury from all U.S. and non-U.S. sources in high seas waters are not available. The estimated M&SI within the Hawaii EEZ in 2018 and 2019 were the highest recorded since before the TRP was put into place. The average 5-year annual mortality and serious injury for 2015–2019 (9.8) is less than PBR (16), such that this stock likely will not be considered a “strategic stock” under the MMPA when the relevant SAR becomes available. The total fishery mortality and serious injury for the Hawaii pelagic stock of false killer whales cannot be considered to be insignificant and approaching zero (i.e., less than 10% of PBR, or 1.0 animals per year).

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