Assessment of Incidental Interactions with Marine Mammals in the Hawaii Longline Deep and Shallow Set Fisheries from 2006 through 2010[1]

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Introduction

This report provides estimates of the number of incidental interactions with marine mammals by the Hawaii longline deep set fishery for years 2006 through 2010 based on data collected by the longline fishery observer program.

Table 1 provides a list of all cetacean species for which an interaction with the fishery has been recorded by the observer program from 1994-present. The report provides the estimated total number of interactions in the deep set fishery (Tables 2 through 6) and the observed total number of interactions in the shallow set fishery (Tables 10 through 12) for each year during 2006-2010 and average annual interactions over the five year period. As there is 100% observer coverage of the shallow set fleet, the number of interactions is provided by a summation of the observed interactions, rather than by an estimate. Numbers are provided by species and geographical region for both total interactions and interactions resulting in death or a serious injury (DSI). The regions are (1) within the Hawaiian Islands Exclusive Economic Zone (EEZ), (2) within the EEZ of Palmyra Atoll, (3) within the combined EEZs of Johnston Atoll, Baker Island, Howland Island, and Jarvis Island, and (4) outside the U.S. EEZ. No marine mammal interactions with the shallow set fishery were observed in the EEZs of Palmyra Atoll, Johnston Atoll, Baker and Howland Islands, or Jarvis Island during years 2006 through 2010; hence, no tables are provided for shallow set interactions in these regions.

A proportion of the estimated number of 'blackfish' (unidentified whales considered to be either false killer whales or short-finned pilot whales) is added to the estimates of identified false killer whale and short-finned pilot whale in Tables 7 and 13. In the case of false killer whales, estimates of interactions and DSI within the Hawaiian Islands EEZ are further partitioned into two putative stocks (Carretta et al. 2009), the insular stock and the pelagic stock (Table 8 and Table 14).

Definitions

The number of incidental interactions refers to all interactions on longline trips by the specific fishery landing in the specified time period. For annual estimates, a trip was considered to have taken place during the year in which the vessel returned to port. A longline deep set fishing trip is defined as any commercial fishing trip by a vessel with a Hawaii longline permit that departs or returns at a Hawaii port, except when the captain specifies prior to departure, as

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required, that the vessel will be targeting swordfish. The latter trips are defined as shallow set longline fishing trips. An interaction is defined as an event where a marine mammal is restrained in some manner by the fishing gear, typically by being hooked or entangled in the gear.

The region to which an interaction was assigned was based on the recorded capture location of the marine mammal. If the capture location was unknown, then the region was determined by four geographical coordinates, namely the latitude and longitude of the beginning and ending of longline setting and hauling for the fishing operation on which the interaction occurred. The recorded latitude and longitude values were inspected, and the interaction was assigned to the region with the greatest representation. For example, if the beginning and ending of the set and beginning of the haul occurred within Hawaiian Islands EEZ and the end of the haul was outside, then the region of the interaction as assigned was Hawaii's EEZ because three of the points were in the region. The R package Splancs (Rowlingson and Diggle, 1993) was used to determine if a location fell within or outside a specified region.

The Marine Mammal Protection Act requires estimation of annual mortalities and serious injuries of marine mammals that occur within U.S. waters. The severity of injuries is assessed on a case-by-case basis using information provided by the on-board observers on the nature of the interaction, injuries, and any gear remaining on the animal upon its release (Forney 2010). Occasionally an interaction will be observed, but not enough information can be gathered to determine the extent of injuries caused by the interaction. In this case, the condition of the animal is classified as undetermined (UD). When this situation occurs in the deep set fishery, the animal's condition is estimated as part of the process in which the unobserved interactions are estimated (methodology is described below). When this situation occurs in the shallow set fishery, the total number of interactions resulting in DSI is the year's number of known DSI interactions plus the product of the year's number of UD and the estimated probability of the interaction resulting in DSI. The estimated probability is the proportion of animals determined to be DSI among the total number of animals with injury determinations from years 2000 through 2010. Prior to 2000, the deep and shallow set fisheries were managed as one fishery and the regulations concerning the use of circle hooks and non-squid bait in the shallow set fishery did not exist. As this management shift imposed major changes in the longline fishery, data prior to year 2000 are not used to estimate current probabilities. The grouping of animals used to determine these proportions for the species with at least one UD is given in Table 15. The standard error of the estimate is estimated assuming the binomial distribution with the random variable defined as the number of animals with a DSI injury determination and the sample size defined as the total number of animals with known injury determination.

Observer coverage and sampling schemes

The interaction estimates for the deep set fishery are based on a random sample of longline trips on which scientific observers are deployed. During years 2006 through 2010, observed trips were selected using two sampling schemes to accommodate fluctuating coverage levels and utilize observers efficiently. Coverage levels vary throughout the year because of fluctuation in the fleet's activity level, demands of 100% coverage in the Hawaii longline shallow set fishery for swordfish, and an influx of observers after completion of NMFS observer training. Because observers are not paid while waiting to be deployed, they must be assigned

with minimal delay when available. The alternative of paying them while they are waiting to be deployed would increase the cost of the observer program. The two sampling schemes attempt to reach a balance between obtaining a probability sample and being cost effective. A probability sample implies that all trips have a probability of being sampled and the sampling probabilities are known. These sampling probabilities form the basis of design-based estimators. An unbiased design-based estimator has the merit that it is unbiased regardless of the characteristics of the population being surveyed.

The primary scheme was a systematic sample. Before departing on a fishing trip, longline vessels were required to call the NOAA Fisheries Pacific Islands Regional Office (PIRO) observer program contractor at least 72 hours prior to their intended departure date. To enable sample selection, the PIRO contractor numbered calls sequentially in the order in which they were received. Herein, this assigned number is referred to as the call number. Prior to the beginning of a quarter, a systematic sample of call numbers was drawn by PIFSC and supplied to the contractor. The trips associated with these selected call numbers were designated to be sampled. Although every reasonable effort was made to sample selected trips, there were some selected trips that departed without an observer. In this situation, the PIRO contractor recorded that the trip was not sampled along with a short explanation of why it was not sampled. If a trip was selected but the vessel did not leave within a reasonable amount of time, usually the observer was reassigned to a different vessel trip. When the selected vessel was ready to depart, a different observer was assigned to it.

The systematic sample requires having an observer available to be deployed whenever a selected trip is ready to depart. Achieving this requirement under full targeted coverage, typically 20% coverage, throughout the year requires having enough observers on contract to accommodate higher levels of fleet activity and paying them when they are not deployed on a vessel. These requirements frequently cannot be met under the current level of funding; therefore, the quarterly sample selected under the systematic design was usually slightly smaller than the targeted coverage, typically 5% less. When this occurred, the additional trips needed to reach the full targeted level were selected using a secondary sampling scheme. This secondary scheme was used when all trips selected by the systematic sample were already covered and an observer was ready to be deployed. In this instance, a trip was randomly selected with equal probability from the calls received that day that had not already been selected. If more than one observer needed to be assigned, the appropriate number of trips was sampled with equal probability from this pool of call-ins. The coverage obtained by this secondary sampling scheme was flexible and dependent on the need to deploy observers. The additional samples drawn under the secondary sampling scheme depart from traditional probability samples because the days when additional samples were drawn were not randomly selected but determined by the need to deploy observers. Trips sampled by the systematic and secondary protocols are used to estimate incidental take.

The contractor's sampling records were used to approximate sampling probabilities. Examination of these records revealed periods of time within a quarter when coverage appeared to have been greater or less than the full targeted coverage. Specifically, periods of time for which the number of secondary samples were greater than expected represent higher coverage, and those for which the number of secondary trips were fewer than expected represent lower coverage. Before computing the sampling probabilities, periods of comparable coverage were

identified. The sampling probabilities were computed by enumerating the number of call-ins during consecutive time periods of comparable coverage and assuming that the secondary samples were selected with equal probability from those trips that had not been selected as part of the systematic sample. When coverage was below that of the anticipated systematic sample, the sampling probabilities were computed by enumerating all call-ins during this period and assuming that the trips sampled were selected with equal probability.

Estimation of total and DSI interactions

Because the coverage level changed with the fluctuations in observer availability and fishing activity, the observed trips were not selected with equal probability. Therefore, the Horvitz-Thompson estimator (Thompson 1992) was used to estimate total interactions, as it takes into account unequal sampling probabilities. Given probability π_i that trip i is included in the sample, the Horvitz-Thompson estimator is

$$\hat{\tau} = \sum_{i=1}^{n} \frac{y_i}{\pi_i},$$

where n is the number of unique trips sampled and y_i is the value of interest as observed for trip i. For known π_i, the Horvitz-Thompson estimator is an unbiased estimator of the total τ. The incidental interaction records used to compute the Horvitz-Thompson estimator were those available in the Longline Observer Database System. The DSI classifications of observed takes were made based on the observer's written description of each interaction and guidelines established by a 2007 workshop on differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations (Andersen et. al. 2007).

To estimate the total incidental interactions for a species of interest, the y-values were the total number of interactions recorded for the trip. When estimating the total number of interactions within a specified region, the y-values were the total number of interactions within the specified region for the trip. The estimated totals reported for each region are rounded to the nearest integer. An estimate of the overall total for the four regions may not equal the sum of reported estimates for the individual regions because the overall estimate is based on summation of unrounded regional estimates.

The total number of interactions resulting in DSI was estimated using the estimator $(\hat{\tau} - x)\hat{p} + x_{DSI}$, where x, x_{DSI}, and $\hat{\tau}$ are, for the region, species, and year being estimated, the observed number of interactions, the observed number of interactions classified as DSI, and the estimated total number of interactions for the region, respectively. The quantity $\hat{p}$ is the estimated probability that an interaction resulted in the condition DSI. The proportion of animals observed as DSI in relation to the total number of animals observed in the deep set fishery from years 2000 through 2010 was used for $\hat{p}$. As some species have very few observed interactions, some pooling across species was done, taking into account similarities between species and the nature of their interactions with gear. In particular, species known to depredate catch or bait were separated from those not known to depredate, and large whales were considered separately from smaller cetaceans. Unidentified animals were also considered separately because they generally

are not observed dead (i.e., if an animal is observed dead, then it can usually be brought close to the vessel for identification). Table 9 provides these groupings. The DSI estimates for years 2006 through 2009 may differ from estimates reported in the past as the current values of $\hat{p}$ include year 2010 data.

Estimates of uncertainty

Standard errors and 95% confidence intervals were approximated using a parametric bootstrap algorithm to estimate the distribution of the error. The parametric bootstrap was based on the assumption that cetacean interactions are Poisson distributed and that the proportion of interactions resulting in DSI are binomially distributed. The standard errors and confidence intervals reported here assume that the interaction and DSI rates are constant over years and regions within a species. The sampling coefficient of variation (cv) is the estimated standard error divided by the point estimate. When the point estimate is zero, the symbol NaN (not a number) is reported in the cv column, as dividing by the integer zero has no meaning. There are instances where the confidence intervals are report as [0,0]. This occurs frequently for the estimates within the Palmyra Atoll EEZ and the combined EEZ of Johnston Atoll, Baker and Howland Islands, and Jarvis Island as there are very few trips in these regions, resulting in a very low probability that an interaction between a cetacean and the deep-set fishery occurred.

Splitting the blackfish bycatch estimates into False Killer Whale and Short-finned Pilot Whale bycatch estimates

There are instances where a cetacean interaction has been observed but the cetacean cannot be identified to species level — it can only be identified as being either a false killer whale or a short-finned pilot whale. The term 'blackfish' has been used to identify this level of identification. In years when there are observed blackfish interactions, these interactions must be incorporated into the false killer whale and short-finned pilot whale bycatch estimates; otherwise, the bycatch of these species will be underestimated. Tables 7 and 13 apportion the estimated number of blackfish into false killer whale and short-finned pilot whale categories by estimating the conditional probability that a blackfish is a false killer whale, or a short-finned pilot whale, given the distance from the whale's capture location to the nearest shoreline. This conditional probability was estimated using a generalized additive model. McCracken (2010) provides details on the methodology and underlying assumptions.

Marine mammal stock assignment

There are two recognized stocks of false killer whale within the Hawaiian Islands EEZ (Chivers et al. 2007). Total interactions within this region are assigned by stock based on the geographic stock ranges presented in the Draft 2010 stock assessment report (Carretta et al. 2009), incorporating recommendations made by the Pacific Scientific Review Group at their November 2009 meeting. These stock ranges include: (1) an insular stock region within 40 km of the main Hawaiian Islands, 2) an overlap zone for the two stocks between 40 km and 140 km from the main Hawaiian Islands, and (3) a pelagic stock region between the 140-km boundary

and the outer boundary of the Hawaiian Islands EEZ. False killer whales caught within the near shore 40-km boundary are considered to be from the insular stock. False killer whales caught within the region defined by the 140-km and EEZ boundaries are considered to be from the pelagic stock. False killer whales caught in the overlap region between 40 km and 140 km are assigned to one of the two stocks based on a logistic function relating the conditional probabilities that a false killer whale is from the insular or pelagic stock to the distance from the capture location to the nearest shoreline. The probability that an unidentified blackfish in the overlap zone is a false killer whale from the insular stock was computed as the product of the two conditional probabilities: the conditional probability that a blackfish is a false killer and the conditional probability that a false killer whale in the overlap zone is from the insular stock. The probability for the pelagic stock was computed in a similar manner. McCracken (2010) provides more details on the methodologies and the underlying assumptions. The total number of interactions and DSI estimates for these three regions are estimated in a similar manner as for the other geographical regions. Tables 8 and 14 provide the estimates for the insular and pelagic stocks of false killer whales.

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Table 1. List of cetacean species codes, common names, and scientific names.

Code	Common Name	Scientific name
BE	Bryde's whale	*Balaenoptera edeni*
BF	'Blackfish' = PC or GM (unidentified)	*Globicephala macrorhynchus* or *Pseudorca crassidens*
DD	Common dolphin	*Delphinus* spp.
GG	Risso's dolphin	*Grampus griseus*
GM	Short-finned pilot whale	*Globicephala macrorhynchus*
MD	Blainville's beaked whale	*Mesoplodon densirostris*
MN	Humpback whale	*Megaptera novaeangliae*
PC	False killer whale	*Pseudorca crassidens*
PM	Sperm whale	*Physeter macrocephalus*
SA	Pantropical spotted dolphin	*Stenella attenuata*
SC	Striped dolphin	*Stenella coeruleoalba*
SL	Spinner dolphin	*Stenella longirostris*
TT	Bottlenose dolphin	*Tursiops truncatus*
UC	Unidentified cetacean (includes Observer Program codes UW and UD)	
UK	Pygmy or dwarf sperm whale	*Kogia* sp.
ZU	Unidentified beaked whale	Ziphiid whale

Table 2. Incidental interaction statistics for the Hawaii longline deep set fishery over all regions combined. The injury determination (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) is given for all observed interactions. Estimates are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). Table entries include the point estimate (Est.), estimated standard error (SE), sampling coefficient of variation (CV), and approximate 95% confidence interval (C.I.). All species for which an interaction has been observed by the observer program (from 1994-present) are listed. See Table 1 for a key to the cetacean species codes. Estimated annual interactions have been rounded to the nearest integer. The five year averages (5yr avg) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures. NaN=quantity undefined.

ALL REGIONS												
		Observed				Estimated DSI				Estimated Total			
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
BF	2006	0	2	0	0	13	4.1	0.3	[2,17]	16	5.1	0.3	[2,21]
	2007	0	0	0	0	0	5.5	NaN	[0,4]	0	6.9	NaN	[0,5]
	2008	0	3	0	0	7	3.4	0.5	[3,12]	9	4.2	0.5	[3,14]
	2009	0	0	0	0	0	3.4	NaN	[0,4]	0	4.3	NaN	[0,5]
	2010	0	1	0	0	2	3.2	1.3	[1,7]	3	4.0	1.4	[1,8]
	5yr avg	0.0	1.2	0.0	0.0	4.5	1.8	0.4	[1.2,6.8]	5.4	2.2	0.4	[1.2,8.2]
GG	2006	0	2	0	0	5	3.4	0.6	[2,10]	5	3.4	0.6	[2,10]
	2007	1	0	0	0	3	4.6	1.6	[1,7]	3	4.6	1.6	[1,7]
	2008	0	1	0	0	2	3.0	1.7	[1,5]	2	3.0	1.7	[1,5]
	2009	0	0	0	0	0	3.0	NaN	[0,3]	0	3.0	NaN	[0,3]
	2010	0	1	0	0	3	2.8	1.0	[1,6]	3	2.8	1.0	[1,6]
	5yr avg	0.2	0.8	0.0	0.0	2.6	1.5	0.6	[1.0,4.4]	2.6	1.5	0.6	[1.0,4.4]
GM	2006	0	2	0	0	5	3.0	0.6	[2,8]	6	4.0	0.7	[2,10]
	2007	0	1	0	0	2	4.1	2.0	[1,5]	2	5.5	2.3	[1,7]
	2008	0	1	2	0	3	2.5	1.0	[1,6]	5	3.4	0.7	[3,10]
	2009	0	0	0	0	0	2.7	NaN	[0,3]	0	3.6	NaN	[0,4]
	2010	0	0	0	0	0	2.5	NaN	[0,3]	0	3.3	NaN	[0,4]
	5yr avg	0.0	0.8	0.4	0.0	1.8	1.4	0.7	[1.2,3.6]	2.6	1.8	0.7	[1.2,5.0]
MD	2006	0	0	0	0	0	2.0	NaN	[0,2]	0	2.6	NaN	[0,2]
	2007	0	0	0	0	0	2.7	NaN	[0,3]	0	3.5	NaN	[0,3]
	2008	0	0	0	0	0	1.7	NaN	[0,2]	0	2.3	NaN	[0,2]
	2009	0	0	0	0	0	1.7	NaN	[0,2]	0	2.2	NaN	[0,2]
	2010	0	0	0	0	0	1.6	NaN	[0,2]	0	2.1	NaN	[0,2]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.9	NaN	[0.0,1.0]	0.0	1.1	NaN	[0.0,1.2]
MN	2006	0	0	0	0	0	0.7	NaN	[0,1]	0	2.7	NaN	[0,2]
	2007	0	0	0	0	0	0.9	NaN	[0,1]	0	3.9	NaN	[0,3]
	2008	0	0	0	0	0	0.6	NaN	[0,1]	0	2.2	NaN	[0,2]
	2009	0	0	0	0	0	0.6	NaN	[0,1]	0	2.3	NaN	[0,2]
	2010	0	0	0	0	0	0.6	NaN	[0,1]	0	2.1	NaN	[0,2]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.3	NaN	[0,0.4]	0.0	1.2	NaN	[0.0,1.2]

Table 2 continued

		Observed				Estimated DSI				Estimated Total			
							ALL REGIONS						
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
PC	2006	0	3	1	0	16	11.3	0.7	[3,31]	18	12.2	0.7	[4,34]
	2007	0	2	2	0	12	14.5	1.2	[2,28]	15	15.6	1.1	[4,32]
	2008	0	3	0	0	11	9.1	0.8	[3,24]	11	9.8	0.9	[3,36]
	2009	1	8	0	1	51	9.5	0.2	[29,67]	55	10.3	0.2	[31,71]
	2010	0	3	1	0	17	8.8	0.5	[3,30]	19	9.4	0.5	[4,33]
	5yr avg	0.2	3.8	0.8	0.2	21.4	5.0	0.2	[9.8,29.2]	23.7	5.3	0.2	[11.4,32.0]
SA	2006	0	0	0	0	0	1.2	NaN	[0,1]	0	1.6	NaN	[0,1]
	2007	0	0	0	0	0	1.6	NaN	[0,1]	0	2.1	NaN	[0,1]
	2008	1	0	0	0	3	1.0	0.4	[1,4]	3	1.3	0.4	[1,5]
	2009	0	0	0	0	0	1.1	NaN	[0,1]	0	1.4	NaN	[0,1]
	2010	0	0	0	0	0	0.9	NaN	[0,1]	0	1.2	NaN	[0,1]
	5yr avg	0.2	0.0	0.0	0.0	0.5	0.5	1.0	[0.2,1.0]	0.6	0.7	1.1	[0.2,1.4]
SC	2006	1	0	0	0	5	1.6	0.3	[1,7]	6	2.1	0.4	[1,8]
	2007	0	0	0	0	0	2.0	NaN	[0,2]	0	2.8	NaN	[0,2]
	2008	0	0	0	0	0	1.4	NaN	[0,2]	0	1.8	NaN	[0,2]
	2009	0	0	0	0	0	1.4	NaN	[0,2]	0	1.8	NaN	[0,2]
	2010	0	0	0	0	0	1.3	NaN	[0,2]	0	1.7	NaN	[0,2]
	5yr avg	0.2	0.0	0.0	0.0	0.9	0.7	0.7	[0.2,1.8]	1.2	0.9	0.8	[0.2,2.2]
TT	2006	0	1	0	0	1	3.3	3.3	[1,4]	1	3.3	3.3	[1,4]
	2007	0	0	0	0	0	3.9	NaN	[0,3]	0	3.9	NaN	[0,3]
	2008	0	0	0	0	0	2.8	NaN	[0,3]	0	2.8	NaN	[0,3]
	2009	0	1	0	0	5	2.8	0.6	[1,9]	5	2.8	0.6	[1,9]
	2010	0	1	0	0	4	2.5	0.6	[1,8]	4	2.5	0.6	[1,8]
	5yr avg	0.0	0.6	0.0	0.0	2.1	1.4	0.7	[0.6,3.8]	2.1	1.4	0.7	[0.6,3.8]
UC	2006	0	1	0	0	2	5.8	3.0	[1,9]	2	7.2	3.3	[1,11]
	2007	0	1	1	0	3	7.3	2.7	[1,10]	4	8.9	2.2	[2,14]
	2008	0	1	0	0	3	4.8	1.8	[1,10]	3	5.9	1.9	[1,12]
	2009	0	0	2	1	12	4.9	0.4	[0,19]	17	6.0	0.3	[3,26]
	2010	0	1	0	1	10	4.5	0.5	[1,16]	12	5.5	0.5	[2,19]
	5yr avg	0.0	0.8	0.6	0.4	5.8	2.5	0.4	[1.8,9.2]	7.8	3.0	0.4	[1.8,11.8]
ZU	2006	0	1	0	0	5	1.8	0.3	[1,7]	7	2.3	0.3	[1,9]
	2007	0	0	0	0	0	2.1	NaN	[0,2]	0	2.8	NaN	[0,2]
	2008	0	0	0	0	0	1.4	NaN	[0,2]	0	1.8	NaN	[0,2]
	2009	0	0	0	0	0	1.5	NaN	[0,2]	0	2.0	NaN	[0,2]
	2010	0	0	0	0	0	1.4	NaN	[0,2]	0	1.8	NaN	[0,2]
	5yr avg	0.0	0.2	0.0	0.0	1.0	0.7	0.7	[0.2,1.8]	1.3	1.0	0.7	[0.2,2.4]

Table 3. Incidental interaction statistics for the Hawaii longline deep set fishery outside U.S. EEZ. The injury determination (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) is given for all observed interactions. Estimates are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). Table entries include the point estimate (Est.), estimated standard error (SE), sampling coefficient of variation (CV), and approximate 95% confidence interval (C.I.). All species for which an interaction has been observed by the observer program are listed. See Table 1 for a key to the cetacean species codes. Estimated annual interactions have been rounded to the nearest integer. The five year averages (5yr avg.) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures. NaN=quantity undefined.

OUTSIDE U.S. EEZ													
		Observed				Estimated DSI				Estimated Total			
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
BF	2006	0	0	0	0	0	2.5	NaN	[0,3]	0	3.1	NaN	[0,3]
	2007	0	0	0	0	0	3.5	NaN	[0,4]	0	4.4	NaN	[0,4]
	2008	0	0	0	0	0	2.4	NaN	[0,3]	0	3.0	NaN	[0,3]
	2009	0	0	0	0	0	2.5	NaN	[0,3]	0	3.2	NaN	[0,3]
	2010	0	0	0	0	0	2.7	NaN	[0,4]	0	3.3	NaN	[0,4]
	5yr avg	0.0	0.0	0.0	0.0	0.0	1.2	NaN	[0.0,1.6]	0.0	1.5	NaN	[0.0,1.8]
GG	2006	0	2	0	0	5	1.9	0.4	[2,8]	5	1.9	0.4	[2,8]
	2007	1	0	0	0	3	3.3	1.1	[1,5]	3	3.3	1.1	[1,5]
	2008	0	1	0	0	2	2.1	1.2	[1,4]	2	2.1	1.2	[1,4]
	2009	0	0	0	0	0	2.2	NaN	[0,2]	0	2.2	NaN	[0,2]
	2010	0	0	0	0	0	2.3	NaN	[0,2]	0	2.3	NaN	[0,2]
	5yr avg	0.2	0.6	0.0	0.0	2.0	1.1	0.5	[0.8,3.4]	2.0	1.1	0.5	[0.8,3.4]
GM	2006	0	1	0	0	1	1.8	1.8	[1,3]	1	2.5	2.5	[1,3]
	2007	0	1	0	0	2	2.7	1.4	[1,5]	2	3.7	1.6	[1,6]
	2008	0	1	2	0	3	1.7	0.7	[1,5]	5	2.3	0.5	[3,9]
	2009	0	0	0	0	0	2.0	NaN	[0,3]	0	2.7	NaN	[0,3]
	2010	0	0	0	0	0	2.1	NaN	[0,3]	0	2.7	NaN	[0,3]
	5yr avg	0.0	0.6	0.4	0.0	1.1	0.9	0.9	[1.0,2.2]	1.7	1.2	0.7	[1.0,3.2]
MD	2006	0	0	0	0	0	1.3	NaN	[0,2]	0	1.6	NaN	[0,2]
	2007	0	0	0	0	0	1.7	NaN	[0,2]	0	2.2	NaN	[0,2]
	2008	0	0	0	0	0	1.2	NaN	[0,2]	0	1.6	NaN	[0,2]
	2009	0	0	0	0	0	1.2	NaN	[0,2]	0	1.6	NaN	[0,2]
	2010	0	0	0	0	0	1.3	NaN	[0,2]	0	1.7	NaN	[0,2]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.6	NaN	[0.0,0.6]	0.0	0.8	NaN	[0.0,0.8]
MN	2006	0	0	0	0	0	0.5	NaN	[0,1]	0	1.8	NaN	[0,1]
	2007	0	0	0	0	0	0.6	NaN	[0,1]	0	2.5	NaN	[0,2]
	2008	0	0	0	0	0	0.5	NaN	[0,1]	0	1.5	NaN	[0,2]
	2009	0	0	0	0	0	0.5	NaN	[0,1]	0	1.6	NaN	[0,2]
	2010	0	0	0	0	0	0.5	NaN	[0,1]	0	1.7	NaN	[0,2]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.8	NaN	[0.0,0.8]

Table 3 continued.

		Observed				Estimated DSI				Estimated Total			
OUTSIDE U.S. EEZ													
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
PC	2006	0	2	0	0	9	7.1	0.8	[2,18]	10	7.7	0.8	[2,20]
	2007	0	0	1	0	2	9.5	4.5	[0,13]	3	10.3	3.1	[1,15]
	2008	0	0	0	0	0	6.5	NaN	[0,9]	0	6.9	Inf	[0,9]
	2009	1	6	0	0	39	6.9	0.2	[22,49]	41	7.5	0.2	[23,53]
	2010	0	1	0	0	6	7.3	1.3	[1,15]	6	7.9	1.3	[1,16]
	5yr avg	**0.2**	**1.8**	**0.2**	**0.0**	**11.2**	**3.4**	**0.3**	**[3.2,16.2]**	**12.1**	**3.7**	**0.3**	**[3.4,17.6]**
SA	2006	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2007	0	0	0	0	0	1.2	NaN	[0,1]	0	1.6	NaN	[0,1]
	2008	1	0	0	0	3	0.7	0.3	[1,4]	3	0.9	0.3	[1,5]
	2009	0	0	0	0	0	0.7	NaN	[0,1]	0	1.0	NaN	[0,1]
	2010	0	0	0	0	0	0.8	NaN	[0,1]	0	1.1	NaN	[0,1]
	5yr avg	**0.2**	**0.0**	**0.0**	**0.0**	**0.5**	**0.4**	**0.7**	**[0.2,1.0]**	**0.6**	**0.5**	**0.8**	**[0.2,1.2]**
SC	2006	0	0	0	0	0	1.1	NaN	[0,1]	0	1.5	NaN	[0,1]
	2007	0	0	0	0	0	1.4	NaN	[0,1]	0	1.8	NaN	[0,1]
	2008	0	0	0	0	0	0.9	NaN	[0,1]	0	1.2	NaN	[0,1]
	2009	0	0	0	0	0	1.0	NaN	[0,1]	0	1.3	NaN	[0,1]
	2010	0	0	0	0	0	1.1	NaN	[0,1]	0	1.4	NaN	[0,1]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.5**	**NaN**	**[0.0,0.6]**	**0.0**	**0.7**	**NaN**	**[0.0,0.6]**
TT	2006	0	0	0	0	0	2.0	NaN	[0,2]	0	2.0	NaN	[0,2]
	2007	0	0	0	0	0	3.0	NaN	[0,2]	0	3.0	NaN	[0,2]
	2008	0	0	0	0	0	1.9	NaN	[0,2]	0	1.9	NaN	[0,2]
	2009	0	1	0	0	5	2.0	0.4	[1,8]	5	2.0	0.4	[1,8]
	2010	0	1	0	0	4	2.1	0.5	[1,7]	4	2.1	0.5	[1,7]
	5yr avg	**0.0**	**0.4**	**0.0**	**0.0**	**1.9**	**1.0**	**0.5**	**[0.4,3.0]**	**1.9**	**1.0**	**0.5**	**[0.4,3.0]**
UC	2006	0	0	0	0	0	3.6	NaN	[0,4]	0	4.5	NaN	[0,5]
	2007	0	0	1	0	1	5.0	8.5	[0,6]	2	6.1	3.5	[1,8]
	2008	0	1	0	0	3	3.3	1.2	[1,7]	3	4.1	1.3	[1,9]
	2009	0	0	2	1	12	3.6	0.3	[3,17]	17	4.4	0.3	[6,24]
	2010	0	1	0	1	10	3.7	0.4	[1,14]	12	4.6	0.4	[2,17]
	5yr avg	**0.0**	**0.4**	**0.6**	**0.4**	**5.0**	**1.8**	**0.3**	**[1.4,7.2]**	**6.9**	**2.1**	**0.3**	**[2.0,10.0]**
ZU	2006	0	1	0	0	5	1.1	0.2	[2,7]	7	1.4	0.2	[2,8]
	2007	0	0	0	0	0	1.5	NaN	[0,1]	0	2.0	NaN	[0,1]
	2008	0	0	0	0	0	1.0	NaN	[0,1]	0	1.3	NaN	[0,1]
	2009	0	0	0	0	0	1.0	NaN	[0,1]	0	1.4	NaN	[0,1]
	2010	0	0	0	0	0	1.2	NaN	[0,1]	0	1.5	NaN	[0,1]
	5yr avg	**0.0**	**0.2**	**0.0**	**0.0**	**1.0**	**0.5**	**0.5**	**[0.2,1.6]**	**1.3**	**0.7**	**0.5**	**[0.2,2.0]**

Table 4. Incidental interaction statistics for the Hawaii longline deep set fishery within the Hawaiian Islands EEZ. The injury determination (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) is given for all observed interactions. Estimates are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). Table entries include the point estimate (Est.), estimated standard error (SE), sampling coefficient of variation (CV), and approximate 95% confidence interval (C.I.). All species for which an interaction has been observed by the observer program are listed. See Table 1 for a key to the cetacean species codes. Estimated annual interactions have been rounded to the nearest integer. The five year averages (5yr avg.) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures. NaN=quantity undefined.

HAWAIIAN ISLANDS EEZ													
		Observed				Estimated DSI				Estimated Total			
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
BF	2006	0	2	0	0	13	3.0	0.2	[5,16]	16	3.7	0.2	[6,20]
	2007	0	0	0	0	0	3.2	NaN	[0,3]	0	4.2	NaN	[0,3]
	2008	0	3	0	0	7	2.3	0.3	[3,10]	9	2.8	0.3	[3,12]
	2009	0	0	0	0	0	2.2	NaN	[0,3]	0	2.8	NaN	[0,3]
	2010	0	1	0	0	2	1.6	0.6	[1,5]	3	2.0	0.7	[1,5]
	5yr avg	0.0	1.2	0.0	0.0	4.5	1.1	0.3	[1.6,6.2]	5.4	1.4	0.3	[2.0,7.4]
GG	2006	0	0	0	0	0	2.5	NaN	[0,2]	0	2.5	NaN	[0,2]
	2007	0	0	0	0	0	3.2	NaN	[0,2]	0	3.2	NaN	[0,2]
	2008	0	0	0	0	0	1.9	NaN	[0,2]	0	1.9	NaN	[0,2]
	2009	0	0	0	0	0	2.0	NaN	[0,2]	0	2.0	NaN	[0,2]
	2010	0	1	0	0	3	1.5	0.5	[1,5]	3	1.5	0.5	[1,5]
	5yr avg	0.0	0.2	0.0	0.0	0.6	1.0	1.8	[0.2,1.6]	0.6	1.0	1.8	[0.2,1.6]
GM	2006	0	1	0	0	4	2.2	0.6	[1,6]	5	2.9	0.6	[1,8]
	2007	0	0	0	0	0	2.4	NaN	[0,3]	0	3.2	NaN	[0,3]
	2008	0	0	0	0	0	1.7	NaN	[0,2]	0	2.4	NaN	[0,3]
	2009	0	0	0	0	0	1.7	NaN	[0,2]	0	2.3	NaN	[0,2]
	2010	0	0	0	0	0	1.2	NaN	[0,2]	0	1.6	NaN	[0,2]
	5yr avg	0.0	0.2	0.0	0.0	0.7	0.9	1.2	[0.2,1.8]	0.9	1.1	1.2	[0.2,2.4]
MD	2006	0	0	0	0	0	1.4	NaN	[0,2]	0	1.9	NaN	[0,2]
	2007	0	0	0	0	0	1.8	NaN	[0,2]	0	2.4	NaN	[0,2]
	2008	0	0	0	0	0	1.1	NaN	[0,2]	0	1.5	NaN	[0,2]
	2009	0	0	0	0	0	1.1	NaN	[0,1]	0	1.5	NaN	[0,1]
	2010	0	0	0	0	0	0.8	NaN	[0,1]	0	1.1	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.6	NaN	[0.0,0.6]	0.0	0.8	NaN	[0.0,0.8]
MN	2006	0	0	0	0	0	0.4	NaN	[0,1]	0	1.9	NaN	[0,2]
	2007	0	0	0	0	0	0.5	NaN	[0,1]	0	2.6	NaN	[0,1]
	2008	0	0	0	0	0	0.4	NaN	[0,1]	0	1.5	NaN	[0,1]
	2009	0	0	0	0	0	0.4	NaN	[0,1]	0	1.5	NaN	[0,1]
	2010	0	0	0	0	0	0.3	NaN	[0,1]	0	1.1	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.8	NaN	[0.0,0.8]

Table 4 continued

		Observed				Estimated DSI				Estimated Total			
		HAWAIIAN ISLANDS EEZ											
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
PC	2006	0	1	1	0	7	8.1	1.2	[1,16]	8	8.7	1.1	[2,19]
	2007	0	1	1	0	8	8.9	1.1	[1,18]	10	9.6	1.0	[2,20]
	2008	0	3	0	0	11	6.2	0.6	[3,20]	11	6.6	0.6	[3,22]
	2009	0	2	0	1	12	6.1	0.5	[2,21]	13	6.6	0.5	[3,23]
	2010	0	2	1	0	12	4.5	0.4	[2,19]	13	4.9	0.4	[3,21]
	5yr avg	**0.0**	**1.8**	**0.6**	**0.2**	**9.9**	**3.1**	**0.3**	**[2.6,14.4]**	**11.2**	**3.3**	**0.3**	**[3.2,16.6]**
SA	2006	0	0	0	0	0	0.9	NaN	[0,1]	0	1.1	NaN	[0,1]
	2007	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2008	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2009	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2010	0	0	0	0	0	0.4	NaN	[0,1]	0	0.6	NaN	[0,1]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.3**	**NaN**	**[0.0,0.4]**	**0.0**	**0.4**	**NaN**	**[0.0,0.4]**
SC	2006	1	0	0	0	5	1.0	0.2	[1,6]	6	1.4	0.2	[1,7]
	2007	0	0	0	0	0	1.3	NaN	[0,1]	0	1.8	NaN	[0,1]
	2008	0	0	0	0	0	0.9	NaN	[0,1]	0	1.2	NaN	[0,1]
	2009	0	0	0	0	0	0.9	NaN	[0,1]	0	1.2	NaN	[0,1]
	2010	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	5yr avg	**0.2**	**0.0**	**0.0**	**0.0**	**0.9**	**0.4**	**0.5**	**[0.2,1.4]**	**1.2**	**0.6**	**0.5**	**[0.2,1.8]**
TT	2006	0	1	0	0	1	2.3	2.3	[1,3]	1	2.3	2.3	[1,3]
	2007	0	0	0	0	0	2.0	NaN	[0,2]	0	2.0	NaN	[0,2]
	2008	0	0	0	0	0	1.9	NaN	[0,2]	0	1.9	NaN	[0,2]
	2009	0	0	0	0	0	1.8	NaN	[0,2]	0	1.8	NaN	[0,2]
	2010	0	0	0	0	0	1.3	NaN	[0,1]	0	1.3	NaN	[0,1]
	5yr avg	**0.0**	**0.2**	**0.0**	**0.0**	**0.2**	**0.9**	**4.3**	**[0.2,1.2]**	**0.2**	**0.9**	**4.3**	**[0.2,1.2]**
UC	2006	0	1	0	0	2	4.0	2.1	[1,6]	2	5.1	2.3	[1,8]
	2007	0	1	0	0	2	4.2	2.1	[1,7]	2	5.3	2.2	[1,8]
	2008	0	0	0	0	0	3.2	NaN	[0,4]	0	4.0	NaN	[0,5]
	2009	0	0	0	0	0	3.1	NaN	[0,4]	0	3.8	NaN	[0,4]
	2010	0	0	0	0	0	2.3	NaN	[0,4]	0	2.9	NaN	[0,4]
	5yr avg	**0.0**	**0.4**	**0.0**	**0.0**	**0.8**	**1.6**	**2.0**	**[0.4,3.0]**	**0.9**	**1.9**	**2.1**	**[0.4,3.6]**
ZU	2006	0	0	0	0	0	1.3	NaN	[0,1]	0	1.7	NaN	[0,1]
	2007	0	0	0	0	0	1.2	NaN	[0,1]	0	1.5	NaN	[0,1]
	2008	0	0	0	0	0	1.0	NaN	[0,1]	0	1.3	NaN	[0,1]
	2009	0	0	0	0	0	1.0	NaN	[0,1]	0	1.3	NaN	[0,1]
	2010	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.5**	**NaN**	**[0.0,0.6]**	**0.0**	**0.6**	**NaN**	**[0.0,0.6]**

Table 5. Incidental interaction statistics for the Hawaii longline deep set fishery within the Palmyra Atoll EEZ. The injury determination (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) is given for all observed interactions. Estimates are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). Table entries include the point estimate (Est.), estimated standard error (SE), sampling coefficient of variation (CV), and approximate 95% confidence interval (C.I.).   All species for which an interaction has been observed by the observer program are listed. See Table 1 for a key to the cetacean species codes. Estimated annual interactions have been rounded to the nearest integer. The five year averages (5yr avg.) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures. NaN=quantity undefined.

PALMYRA ATOLL EEZ													
Species	Year	Observed				Estimated DSI				Estimated Total			
		D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
BF	2006	0	0	0	0	0	0.5	NaN	[0,1]	0	0.7	NaN	[0,1]
	2007	0	0	0	0	0	0.5	NaN	[0,1]	0	0.6	NaN	[0,1]
	2008	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2009	0	0	0	0	0	0.4	NaN	[0,0]	0	0.5	NaN	[0,0]
	2010	0	0	0	0	0	0.4	NaN	[0,1]	0	0.5	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.2	NaN	[0.0,0.2]
GG	2006	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	0.4	NaN	[0,1]	0	0.4	NaN	[0,1]
	2008	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2009	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	2010	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.2	NaN	[0.0,0.2]
GM	2006	0	0	0	0	0	0.4	NaN	[0,1]	0	0.5	NaN	[0,1]
	2007	0	0	0	0	0	0.3	NaN	[0,1]	0	0.5	NaN	[0,1]
	2008	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2009	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2010	0	0	0	0	0	0.3	NaN	[0,1]	0	0.4	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.2]	0.0	0.2	NaN	[0.0,0.2]
MD	2006	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2008	0	0	0	0	0	0.1	NaN	[0,0]	0	0.2	NaN	[0,0]
	2009	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.2]	0.0	0.1	NaN	[0.0,0.2]
MN	2006	0	0	0	0	0	0.1	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	0.1	NaN	[0,0]	0	0.3	NaN	[0,0]
	2008	0	0	0	0	0	0.0	NaN	[0,0]	0	0.2	NaN	[0,0]
	2009	0	0	0	0	0	0.1	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.1	NaN	[0,0]	0	0.2	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0	NaN	[0.0,0.2]	0.0	0.1	NaN	[0.0,0.2]

Table 5 continued

		Observed				Estimated DSI				Estimated Total			
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
PC	2006	0	0	0	0	0	1.5	NaN	[0,2]	0	1.7	NaN	[0,2]
	2007	0	1	0	0	2	1.4	0.8	[1,4]	2	1.5	0.9	[1,4]
	2008	0	0	0	0	0	0.7	NaN	[0,1]	0	0.7	NaN	[0,1]
	2009	0	0	0	0	0	1.1	NaN	[0,1]	0	1.2	NaN	[0,1]
	2010	0	0	0	0	0	1.2	NaN	[0,2]	0	1.3	NaN	[0,2]
	5yr avg	0.0	0.2	0.0	0.0	0.3	0.6	1.7	[0.2,1.2]	0.3	0.6	1.7	[0.2,1.2]
SA	2006	0	0	0	0	0	0.1	NaN	[0,0]	0	0.2	NaN	[0,0]
	2007	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2008	0	0	0	0	0	0.1	NaN	[0,0]	0	0.1	NaN	[0,0]
	2009	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.1	NaN	[0,0]	0	0.1	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.0]	0.0	0.1	NaN	[0.0,0.0]
SC	2006	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2007	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2008	0	0	0	0	0	0.1	NaN	[0,0]	0	0.1	NaN	[0,0]
	2009	0	0	0	0	0	0.1	NaN	[0,0]	0	0.1	NaN	[0,0]
	2010	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.2]	0.0	0.1	NaN	[0.0,0.2]
TT	2006	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	2008	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2009	0	0	0	0	0	0.3	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.2	NaN	[0.0,0.2]
UC	2006	0	0	0	0	0	0.8	NaN	[0,1]	0	1.0	NaN	[0,1]
	2007	0	0	0	0	0	0.6	NaN	[0,1]	0	0.8	NaN	[0,1]
	2008	0	0	0	0	0	0.3	NaN	[0,1]	0	0.4	NaN	[0,1]
	2009	0	0	0	0	0	0.6	NaN	[0,1]	0	0.7	NaN	[0,1]
	2010	0	0	0	0	0	0.6	NaN	[0,1]	0	0.8	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.3	NaN	[0.0,0.4]	0.0	0.3	NaN	[0.0,0.4]
ZU	2006	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2007	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2008	0	0	0	0	0	0.1	NaN	[0,0]	0	0.1	NaN	[0,0]
	2009	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2010	0	0	0	0	0	0.1	NaN	[0,0]	0	0.2	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.2]	0.0	0.1	NaN	[0.0,0.2]

PALMYRA ATOLL EEZ

Table 6. Incidental interaction statistics for the Hawaii longline deep set fishery within the combined EEZs of Johnston Atoll, Baker and Howland Islands and Jarvis Island. The injury determination (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) is given for all observed interactions. Estimates are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). Table entries include the point estimate (Est.), estimated standard error (SE), sampling coefficient of variation (CV), and approximate 95% confidence interval (C.I.). All species for which an interaction has been observed by the observer program are listed. See Table 1 for a key to the cetacean species codes.. Estimated annual interactions have been rounded to the nearest integer. The five year averages (5yr avg.) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures. NaN=quantity undefined.

| EEZs of JOHNSTON ATOLL, BAKER AND HOWARD ISLANDS, AND JARVIS ISLAND | | | | | | | | | | | | |
| | | Observed | | | | Estimated DSI | | | | Estimated Total | | | |
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
BF	2006	0	0	0	0	0	1.1	NaN	[0,1]	0	1.3	NaN	[0,1]
	2007	0	0	0	0	0	2.3	NaN	[0,1]	0	2.8	NaN	[0,1]
	2008	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2009	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	2010	0	0	0	0	0	0.5	NaN	[0,1]	0	0.6	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.5	NaN	[0.0,0.4]	0.0	0.7	NaN	[0.0,0.4]
GG	2006	0	0	0	0	0	1.0	NaN	[0,1]	0	1.0	NaN	[0,1]
	2007	0	0	0	0	0	1.1	NaN	[0,1]	0	1.1	NaN	[0,1]
	2008	0	0	0	0	0	0.6	NaN	[0,0]	0	0.6	NaN	[0,0]
	2009	0	0	0	0	0	0.5	NaN	[0,1]	0	0.5	NaN	[0,1]
	2010	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.4	NaN	[0.0,0.2]	0.0	0.4	NaN	[0.0,0.2]
GM	2006	0	0	0	0	0	0.9	NaN	[0,1]	0	1.2	NaN	[0,1]
	2007	0	0	0	0	0	1.8	NaN	[0,1]	0	2.4	NaN	[0,1]
	2008	0	0	0	0	0	0.5	NaN	[0,1]	0	0.7	NaN	[0,1]
	2009	0	0	0	0	0	0.5	NaN	[0,1]	0	0.6	NaN	[0,1]
	2010	0	0	0	0	0	0.4	NaN	[0,1]	0	0.5	NaN	[0,1]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.4	NaN	[0.0,0.4]	0.0	0.6	NaN	[0.0,0.4]
MD	2006	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	1.1	NaN	[0,0]	0	1.3	NaN	[0,0]
	2008	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	2009	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2010	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.2	NaN	[0.0,0.2]	0.0	0.3	NaN	[0.0,0.2]
MN	2006	0	0	0	0	0	0.1	NaN	[0,0]	0	0.6	NaN	[0,0]
	2007	0	0	0	0	0	0.4	NaN	[0,0]	0	1.6	NaN	[0,0]
	2008	0	0	0	0	0	0.1	NaN	[0,0]	0	0.4	NaN	[0,0]
	2009	0	0	0	0	0	0.1	NaN	[0,0]	0	0.4	NaN	[0,0]
	2010	0	0	0	0	0	0.1	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.1	NaN	[0.0,0.2]	0.0	0.4	NaN	[0.0,0.2]

Table 6 continued

		Observed				Estimated DSI				Estimated Total			
EEZs of JOHNSTON ATOLL, BAKER AND HOWARD ISLANDS, AND JARVIS ISLAND													
Species	Year	D	SI	NSI	UD	Est.	SE	CV	C.I.	Est.	SE	CV	C.I.
PC	2006	0	0	0	0	0	3.1	NaN	[0,2]	0	3.3	NaN	[0,2]
	2007	0	0	0	0	0	6.2	NaN	[0,2]	0	6.6	NaN	[0,2]
	2008	0	0	0	0	0	1.9	NaN	[0,2]	0	2.1	NaN	[0,2]
	2009	0	0	0	0	0	2.0	NaN	[0,2]	0	2.1	NaN	[0,2]
	2010	0	0	0	0	0	1.4	NaN	[0,2]	0	1.5	NaN	[0,2]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.5**	**NaN**	**[0.0,1.2]**	**0.0**	**1.6**	**NaN**	**[0.0,1.2]**
SA	2006	0	0	0	0	0	0.4	NaN	[0,0]	0	0.7	NaN	[0,0]
	2007	0	0	0	0	0	0.7	NaN	[0,0]	0	0.9	NaN	[0,0]
	2008	0	0	0	0	0	0.3	NaN	[0,0]	0	0.3	NaN	[0,0]
	2009	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.1	NaN	[0,0]	0	0.2	NaN	[0,0]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**NaN**	**[0.0,0.2]**	**0.0**	**0.2**	**NaN**	**[0.0,0.2]**
SC	2006	0	0	0	0	0	0.3	NaN	[0,0]	0	0.3	NaN	[0,0]
	2007	0	0	0	0	0	0.6	NaN	[0,0]	0	1.2	NaN	[0,0]
	2008	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2009	0	0	0	0	0	0.2	NaN	[0,0]	0	0.2	NaN	[0,0]
	2010	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**NaN**	**[0.0,0.2]**	**0.0**	**0.3**	**NaN**	**[0.0,0.2]**
TT	2006	0	0	0	0	0	1.0	NaN	[0,1]	0	1.0	NaN	[0,1]
	2007	0	0	0	0	0	1.5	NaN	[0,1]	0	1.5	NaN	[0,1]
	2008	0	0	0	0	0	0.5	NaN	[0,0]	0	0.5	NaN	[0,0]
	2009	0	0	0	0	0	0.5	NaN	[0,1]	0	0.5	NaN	[0,1]
	2010	0	0	0	0	0	0.4	NaN	[0,0]	0	0.4	NaN	[0,0]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**	**NaN**	**[0.0,0.2]**	**0.0**	**0.4**	**NaN**	**[0.0,0.2]**
UC	2006	0	0	0	0	0	1.8	NaN	[0,1]	0	2.3	NaN	[0,1]
	2007	0	0	0	0	0	3.1	NaN	[0,1]	0	3.8	NaN	[0,1]
	2008	0	0	0	0	0	1.0	NaN	[0,1]	0	1.2	NaN	[0,1]
	2009	0	0	0	0	0	1.0	NaN	[0,1]	0	1.2	NaN	[0,1]
	2010	0	0	0	0	0	0.7	NaN	[0,1]	0	0.9	NaN	[0,1]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.8**	**NaN**	**[0.0,0.6]**	**0.0**	**1.0**	**NaN**	**[0.0,0.6]**
ZU	2006	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2007	0	0	0	0	0	0.9	NaN	[0,0]	0	1.3	NaN	[0,0]
	2008	0	0	0	0	0	0.3	NaN	[0,0]	0	0.4	NaN	[0,0]
	2009	0	0	0	0	0	0.3	NaN	[0,0]	0	0.3	NaN	[0,0]
	2010	0	0	0	0	0	0.2	NaN	[0,0]	0	0.3	NaN	[0,0]
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**NaN**	**[0.0,0.2]**	**0.0**	**0.3**	**NaN**	**[0.0,0.2]**

Table 7. Revised estimates of false killer whale (PC) and short-finned pilot whale (GM) interactions and DSI over all regions and within the Hawaiian Islands EEZ. All observed blackfish interactions used in the revised estimates occurred within the Hawaiian Islands EEZ. The estimates are for the deep set longline fishery. The last two rows give the revised average bycatch estimates and DSI from 2006 to 2010.

		ALL REGIONS		HAWAIIAN ISLANDS EEZ	
		Estimated DSI	Estimated Total	Estimated DSI	Estimated Total
Species	Year	Est.	Est.	Est.	Est.
PC	2006	28	33	19	23
	2007	12	15	8	10
	2008	18	19	18	19
	2009	51	55	12	13
	2010	20	22	14	16
	5yr avg	**25.7**	**28.7**	**14.2**	**16.3**
GM	2006	5	6	4	5
	2007	2	2	0	0
	2008	3	6	0	1
	2009	0	0	0	0
	2010	0	0	0	0
	5yr avg	**2.1**	**2.9**	**1.0**	**1.2**

Table 8. False killer whale incidental interaction statistics for the Hawaii longline deep set fishery within Hawaii's EEZ. The estimates are for identified false killer whales (PC), the proportion of blackfish estimated to be false killer whales (PC|BF), and the sum of these two (total). Injury determinations (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) within the three defined geographical regions are given for observed interactions. Estimates for the pelagic and insular stocks are given for the total number of incidental interactions (D, SI, and NSI) and the total number resulting in death or a serious injury (DSI). The observed interactions in the overlap zone in 2006 were 93.1 km (BF) and 123.8 km from the shoreline when observed. The blackfish observed interaction in the pelagic stock core area was observed when observer coverage was around 8%, thus the high raising factor. The five year averages (5yr avg.) are based on unrounded annual estimates, so they may differ from a five year average of the rounded figures.

		Insular Stock Core Area				Stock Overlap Zone				Pelagic Stock Core Area			
Species	Year	D	SI	NSI	UD	D	SI	NSI	UD	D	SI	NSI	UD
PC	2006	0	0	0	0	0	0	1	0	0	1	0	0
	2007	0	0	0	0	0	0	0	0	0	1	1	0
	2008	0	0	0	0	0	0	0	0	0	3	0	0
	2009	0	0	0	0	0	0	0	0	0	2	0	1
	2010	0	0	0	0	0	0	0	0	0	2	1	0
PC|BF	2006	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.9	0.0	0.0
	2007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0
	2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Total	2006	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.9	0.0	0.0
	2007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0
	2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0
	2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0
	2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	1.0	0.0

Hawaiian Islands EEZ - False killer whale stock assignment
Observed takes by stock area

Estimated Takes for Insular Stock

	Estimated DSI				Estimated Total		
Year	PC	PC|BF	Total		PC	PC|BF	Total
2006	1	2	3		1	2	3
2007	0	0	0		0	0	0
2008	0	0	0		0	0	0
2009	0	0	0		0	0	0
2010	0	0	0		0	0	0
5yr avg	0.2	0.4	0.5		0.2	0.4	0.6

Estimated Takes for Pelagic Stock

	Estimated DSI				Estimated Total		
Year	PC	PC|BF	Total		PC	PC|BF	Total
2006	6	10	16		7	13	20
2007	8	0	8		10	0	10
2008	11	7	18		11	8	19
2009	12	0	12		13	0	13
2010	12	2	14		13	3	16
5yr avg	9.7	3.9	13.6		11.0	4.7	15.6

Table 9. Species groups used to estimate the proportions of interactions that result in a death or serious injury. For species with very few observed interactions within the Hawaii longline deep set fishery, observations from the Hawaii longline shallow set fishery were also used when computing the proportions. See Table 1 for a key to the cetacean species codes.

Species group	Years	Fisheries	Observed				Proportions for analysis	
			D	SI	NSI	UD	DSI	NSI
PC	2000-2010	Deep	3	34	3	1	0.93	0.08
GM	2000-2010	Deep	1	7	3	0	0.73	0.27
GG,TT	2000-2010	Deep	2	7	0	0	1.00	0.00
DD,MD,SA,SC,SL,ZU,UK	2000-2010	Deep and Shallow	5	4	3	0	0.75	0.25
MN,BE,PM	2000-2010	Deep and Shallow	0	1	4	1	0.20	0.80
UC,BF	2000-2010	Deep	0	15	4	2	0.79	0.21

Table 10. The total number of observed incidental interactions (Total) and interactions resulting in death or a serious injury (DSI) for the Hawaii shallow set longline fishery over all regions combined. Included are the compiled injury determinations (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) for observed interactions. When there is at least one undetermined injury determination within a year, the year's total DSI is estimated and the standard error provided (se).   The averages over five years are tabulated (5yr avg). See Table 1 for a key to the cetacean species codes.

ALL REGIONS						
Species	Year	D	SI	NSI	UD	DSI	Total
BE	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
BF	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	1	0	0	1	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.2	0.0	0.0	0.2	0.2
GG	2006	1	0	0	1	2 (se=.05)	2
	2007	0	3	0	0	3	3
	2008	1	3	0	0	4	4
	2009	0	1	1	1	2 (se=.05)	3
	2010	1	5	1	0	6	7
	5yr avg	0.6	2.4	0.4	0.4	3.0	3.8
MN	2006	0	1	0	0	1	1
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.2	0.2	0.0	0.2	0.4

Table 10 continued

ALL REGIONS							
Species	**Year**	**D**	**SI**	**NSI**	**UD**	**DSI**	**Total**
PC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	1	0	0	1	1
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.2**	**0.2**	**0.0**	**0.2**	**0.4**
SC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	1	0	0	1	1
	2009	0	0	0	0	0	0
	2010	1	1	0	0	2	2
	5yr avg	**0.2**	**0.4**	**0.0**	**0.0**	**0.6**	**0.6**
TT	2006	0	1	0	0	1	1
	2007	0	3	0	0	3	3
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	2	0	0	2	2
	5yr avg	**0.0**	**1.2**	**0.0**	**0.0**	**1.2**	**1.2**
UC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	1	1 (se=0.09)	1
	2010	0	0	1	0	0	1
	5yr avg	**0.0**	**0.0**	**0.2**	**0.2**	**0.0**	**0.4**
UK	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**	**0.2**

Table 11. The total number of observed incidental interactions (Total) and interactions resulting in death or a serious injury (DSI) for the Hawaii longline shallow set fishery outside the U.S. EEZ. Included are the compiled injury determinations (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) for observed. When there is at least one undetermined injury determination within a year, the year's total DSI is estimated and the standard error provided (se). The averages over five years are tabulated (5yr avg). See Table 1 for a key to the cetacean species codes.

Species	Year	D	SI	NSI	UD	DSI	Total
OUTSIDE U.S. EEZ							
BE	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
BF	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	1	0	0	1	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.2**	**0.0**	**0.0**	**0.2**	**0.2**
GG	2006	1	0	0	1	2 (se=.05)	2
	2007	0	3	0	0	3	3
	2008	1	3	0	0	4	4
	2009	0	1	1	1	2 (se=.05)	3
	2010	1	5	1	0	6	7
	5yr avg	**0.6**	**2.4**	**0.4**	**0.4**	**3.0**	**3.8**
MN	2006	0	1	0	0	1	1
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.2**	**0.2**	**0.0**	**0.2**	**0.4**

Table 11 continued

OUTSIDE U.S. EEZ							
Species	Year	D	SI	NSI	UD	DSI	Total
PC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
SC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	1	0	0	1	1
	2009	0	0	0	0	0	0
	2010	1	1	0	0	2	2
	5yr avg	**0.2**	**0.4**	**0.0**	**0.0**	**0.6**	**0.6**
TT	2006	0	1	0	0	1	1
	2007	0	2	0	0	2	2
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	2	0	0	2	2
	5yr avg	**0.0**	**1.0**	**0.0**	**0.0**	**1.0**	**1.0**
UC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	1	1 (se=0.09)	1
	2010	0	0	1	0	0	1
	5yr avg	**0.0**	**0.0**	**0.2**	**0.2**	**0.0**	**0.4**
UK	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**	**0.2**

Table 12. The total number of observed incidental interactions (Total) and interactions resulting in death or a serious injury (DSI) for the Hawaii shallow set longline fishery within the Hawaiian Islands EEZ. Included are the compiled injury determinations (D=dead, SI=serious injury, NSI=non-serious injury, UD=undetermined) for observed interactions. When there is at least one undetermined injury determination within a year, the year's total DSI is estimated and the standard error provided (se). The averages over five years are tabulated (5yr avg). See Table 1 for a key to the cetacean species codes.

HAWAIIAN ISLANDS EEZ							
Species	Year	D	SI	NSI	UD	DSI	Total
BE	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
BF	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
GG	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
MN	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0

Table 12 continued

HAWAIIAN ISLANDS EEZ							
Species	Year	D	SI	NSI	UD	DSI	Total
PC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	1	0	0	1
	2009	0	1	0	0	1	1
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.2	0.2	0.0	0.2	0.4
SC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
TT	2006	0	0	0	0	0	0
	2007	0	1	0	0	1	1
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.2	0.0	0.0	0.2	0.2
UC	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0
UK	2006	0	0	0	0	0	0
	2007	0	0	0	0	0	0
	2008	0	0	0	0	0	0
	2009	0	0	0	0	0	0
	2010	0	0	0	0	0	0
	5yr avg	0.0	0.0	0.0	0.0	0.0	0.0

Table 13. Revised estimates of false killer whale (PC) and short-finned pilot whale (GM) interactions and DSI over all regions and within the outside the U.S. EEZ. Between 2006 and 2010 only one blackfish was observed and it was outside the U.S. EEZ.   The estimates are for the shallow set longline fishery. The last two rows give the revised average bycatch estimates and DSI from 2006 to 2010.

		ALL REGIONS		OUTSIDE U.S. EEZ	
		Estimated DSI	Estimated Total	Estimated DSI	Estimated Total
Species	Year	Est.	Est.	Est.	Est.
PC	2006	0	0	0	0
	2007	0	0	0	0
	2008	1	2	1	1
	2009	1	1	0	0
	2010	0	0	0	0
	5yr avg	0.3	0.5	0.1	0.1
GM	2006	0	0	0	0
	2007	0	0	0	0
	2008	0	0	0	0
	2009	0	0	0	0
	2010	0	0	0	0
	5yr avg	0.1	0.1	0.1	0.1

Table 14. The total number of observed false killer whale interactions by condition category for the Hawaii longline shallow set fishery in each stock area and the estimated total interactions and DSI for the insular and pelagic false killer whale stocks. The averages over five years are tabulated for the two stocks (5yr avg).

Hawaiian Islands EEZ - False killer whale stock assignment													
		Insular Stock Core Area				Stock Overlap Zone				Pelagic Stock Core Area			
	Year	D	SI	NSI	UD	D	SI	NSI	UD	D	SI	NSI	UD
Observed takes by stock area	2006	0	0	0	0	0	0	0	0	0	0	0	0
	2007	0	0	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0	1	0
	2009	0	0	0	0	0	0	0	0	0	1	0	0
	2010	0	0	0	0	0	0	0	0	0	0	0	0

Estimated Takes by Stock					
		Insular Stock		Pelagic Stock	
	Year	DSI	Total	DSI	Total
	2006	0	0	0	0
	2007	0	0	0	0
	2008	0	0	0	1
	2009	0	0	1	1
	2010	0	0	0	0
	5yr avg	0.0	0.0	0.2	0.4

Table 15. Species groups used to estimate the proportions of interactions that result in a death or serious injury. Observations from the Hawaii longline deep set fishery were also used when computing the proportions as there were few observed interactions within the shallow set fishery. See Table 1 for a key to the cetacean species codes.

			Observed			Proportions for analysis	
Species group	Years	Fisheries	D	SI	NSI	DSI	NSI
GG,TT	2000-2010	Deep and Shallow	5	29	2	0.94	0.06
UC,BF	2000-2010	Deep and Shallow	0	17	6	0.74	0.26