

2016-2017 Humpback Whale Entanglement and Whale-Vessel Contact Reports, Response Efforts, and Related Sanctuary Research Around the Main Hawaiian Islands

Season-end Report



**Compiled by:
Ed Lyman**

Hawaiian Islands Humpback Whale National Marine Sanctuary

Response activities conducted under NOAA Fisheries' Marine Mammal Health and Stranding Response Program Permit (MMHSRP, # 18786-1)

Research activities conducted under NOAA Fisheries Pacific Islands Fisheries Science Center permit (# 15240) or NOAA MMHSRP (permit # 18786-1), and state of Hawai'i PMAL permit (# 2016-212)

May 31, 2017

Summary:

The Hawaiian Islands Large Whale Entanglement Response Network (Network) is a multi-agency, community-based effort towards authorized and safe response to entangled large whales around the main Hawaiian Islands. The Hawaiian Islands Humpback Whale National Marine Sanctuary, NOAA Fisheries' Pacific Islands Regional Office, NOAA Fisheries' Office of Protected Resources, and the state of Hawai'i's Department of Land and Natural Resources oversee the effort at different levels. The entire effort, and associated threat monitoring such as ship-strikes (non-incident whale-vessel contacts) is part of NOAA Fisheries' Marine Mammal Health and Stranding Response Program (permit #18786-1). This past season was the Network's 15th and was marked by a second season of fewer reports and associated responses. The differences may in part lie with fewer animals and lower residency around the islands as once again fewer sightings and reduced whale acoustics were reported, especially early and late in the season. Only three humpback whales were confirmed entangled in gear. All three animals were believed to have life threatening entanglements. Two response efforts were mounted for an entangled humpback whale off Kaua'i. While the animal was well documented and assessed, it was not re-located for any follow-up disentanglement effort. Another two responses were mounted for an entangled humpback whale off Maui. The multi-day, multi-agency effort resulted in approximately 780 feet of 5/8" coaxial, communications-type cable being removed from the animal. Unfortunately, another 60 feet remained embedded in the animal's mouth. No response was possible for the third report off a remote region off the Big Island. The Hawai'i Network has now freed 23 large whales from life threatening entanglements, removed over 10,000 feet of measurable line and netting, and has gathered a great deal of information (*e.g.* more than 50 sets of gear identified) toward reducing the threat in the future.

Reports of humpback whales involved in non-incident contact with vessels (*i.e.* ship-strikes) also continued a downward trend. Only three confirmed cases were reported this past season. All were tour vessels and were self-reported (*i.e.* reported by vessel operator making contact). All three cases occurred while the vessels were transiting, and as minimal contact with no signs of injury.

The Sanctuary continued its 15th season of health and risk monitoring of Hawai'i's humpback whales. Recent analysis of scarring around the peduncle region of 148 animals, indicated that between 17% and 32% of the humpback whales in Maui Nui waters this past season have been recently entangled. The percentages are comparable to those found for humpback whales sampled between 2003 and 2016.

The Sanctuary's research team accomplished more than 378 nm (700 kms) of transects covering Ma'alaea Bay and the Auau Channel. The effort indicated that humpback whale relative abundance and habitat usage of the area peaked in mid-February before slowly decreasing over the remainder of the season.

Entanglements:

The Hawaiian Islands Humpback Whale National Marine Sanctuary (Sanctuary) works closely with NOAA's National Marine Fisheries Services' (NOAA Fisheries) Office of Protected Resources (OPR), Pacific Islands Regional Office (PIRO), Pacific Islands Fisheries Science Center (PIFSC), NOAA Corps, and Office of Law Enforcement (OLE); Hawai'i's Department of

Land and Natural Resources (DLNR); the United States Coast Guard (USCG); and others on receiving, and when appropriate, responding to reports of humpback whales in distress (*e.g.* struck by vessels and entangled in gear). The Sanctuary coordinates response efforts involving entangled large whales around the main Hawaiian Islands, under the Hawaiian Islands Large Whale Entanglement Response Network (Network), which is a collaborative effort between the state and federal agencies already mentioned, local whale researchers, the tour industry, fishers, and many private citizens. The primary objectives of the Network are to provide safe and authorized response to entangled large whales in order to free some large whales from life threatening entanglements, increase awareness, and to gather valuable information that may mitigate the threat (risks) of entanglement for large whales and associated response. It is for risk reduction that all Network efforts involving close approach to large whales are authorized, overseen, and permitted, under NOAA Fisheries' Office of Protected Resource's Marine Mammal Health and Stranding Response Program (MMHSRP; permit # 18786-1).

The Hawaiian Islands Large Whale Entanglement Response Network, now in its 15th season, comprises over 300 members who have received various levels of training in order to support large whale response efforts statewide. More than 540 hours of training have been conducted since 2002, illustrating the importance of training and preparedness. Caches of specially designed equipment have been established on the islands of Hawai'i, Maui, O'ahu, and Kaua'i to support entanglement response efforts (see Figure 1).

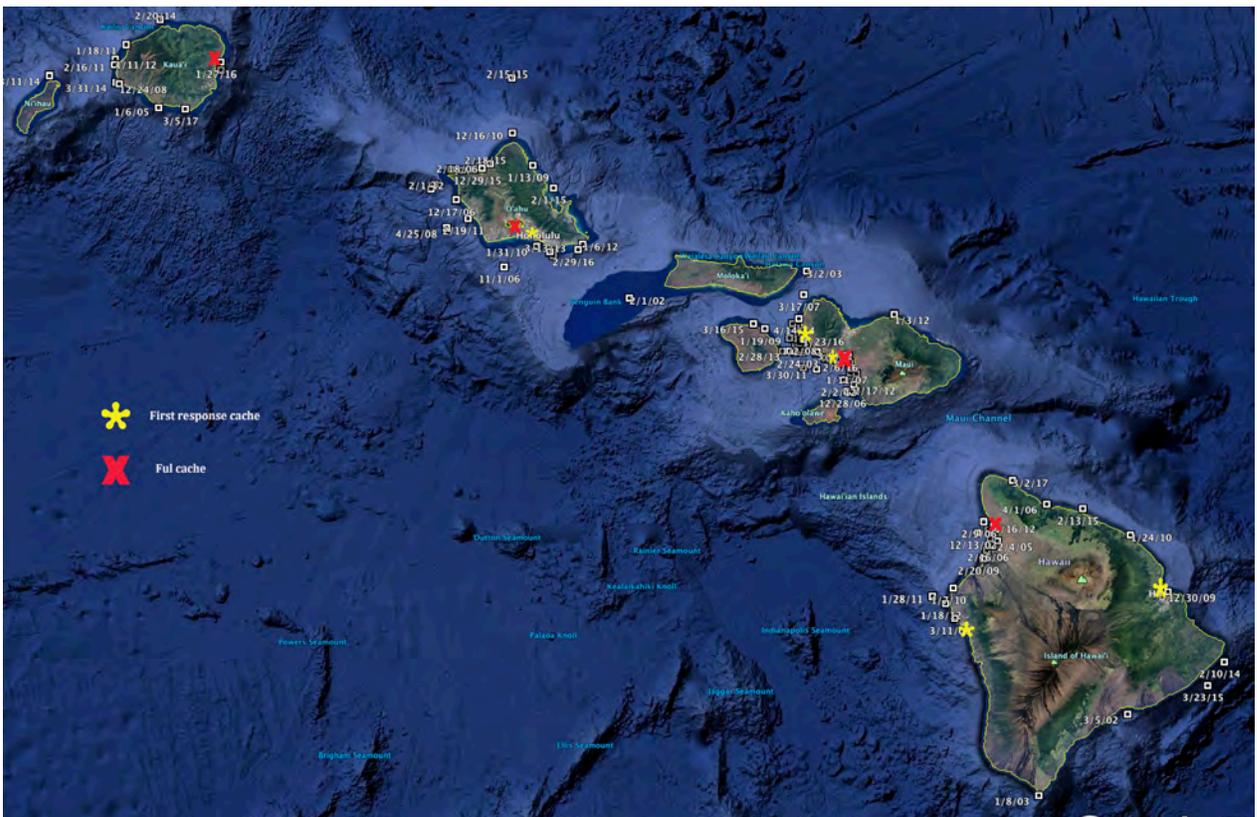


Figure 1: Confirmed entanglement reports from Hawai'i between 2002 and 2017

Since 2002, the Sanctuary has received more than 342 reports of large whales entangled in gear. The earliest confirmed report of a humpback whale observed entangled on their Hawaiian

breeding/calving grounds was November 1 (2007), while the latest was April 25 (2008). Confirmed reports generally start in December, increase in frequency into February, and then decline into April (see Figure 2). The number of reports has fluctuated from season to season (see Figure 3). Overall, 173 reports were confirmed as truly involving entangled large whales, representing as many as 110 different individuals (see Figure 4). All but three of these reports – a sei whale and two sperm whales, were humpback whales.

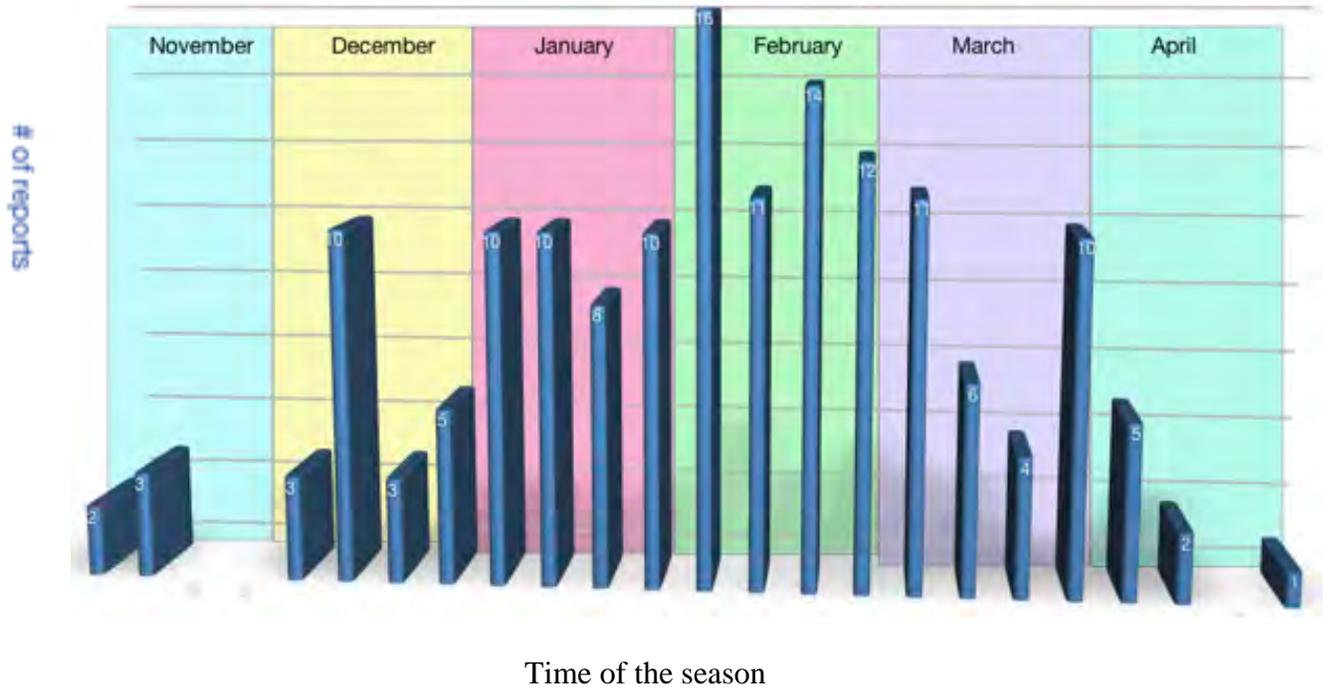


Figure 2: Entanglement reports throughout the season (2002 – 2017)

The Network does not, or cannot, respond to every report of an entangled whale. Past responses and thorough vetting of initial entanglement reports has shown that approximately half (48.0%) of reports here in Hawai'i have been misreported or cannot be confirmed (Lyman *et al.*, 2007; HIHWNMS data, 2014). Today that value is 49.4%. Examples of misreports include: white-flipped humpback whales interpreted as carrying gear; animals in the proximity of gear, but not entangled; reflections off the wet backs of animals interpreted as buoys; calves being interpreted as gear; and surface behaviors, like breaching, being interpreted as animals trying to throw an entanglement. Figure 3 shows the total number of reports received each season broken down by confirmed and unconfirmed.

Since 2002, the Network has mounted over 155 on-water or in-air responses (Figure 5). In those cases when an on-water response should and could be mounted, the network has a 35% success rate freeing entangled large whales of all or significant amounts of gear. Many reports come in too late in the day, represent animals too far offshore, and/or are in conditions that are not conducive (*e.g.* rough sea state) for mounting rescue efforts. However, the biggest contributor to an unsuccessful response is simply not re-locating the animal. If there is no standby vessel, then an entangled whale ends up being a rather large needle in an even larger haystack. Over the years, standby support has increased, resulting in a greater success rate. In

addition to agency partners, the tour industry, whale researchers, and fishers have been extremely valuable towards monitoring animals until additional help can arrive.

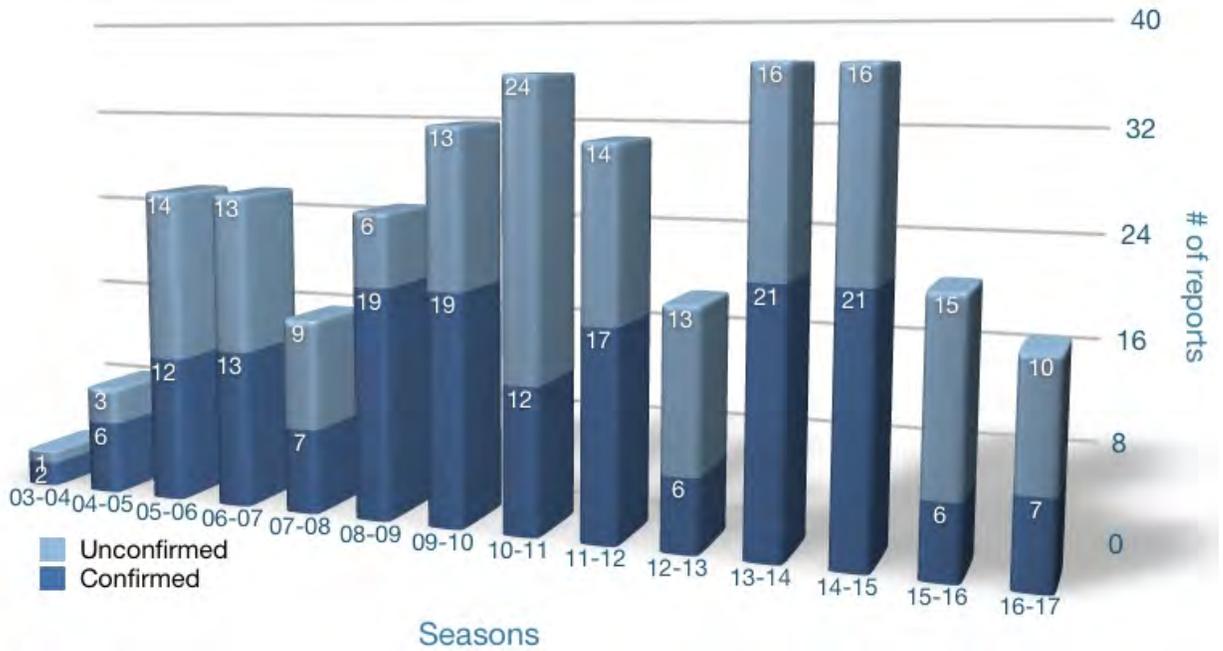


Figure 3: Large whale entanglement reports in Hawai'i between 2002 and 2017 seasons

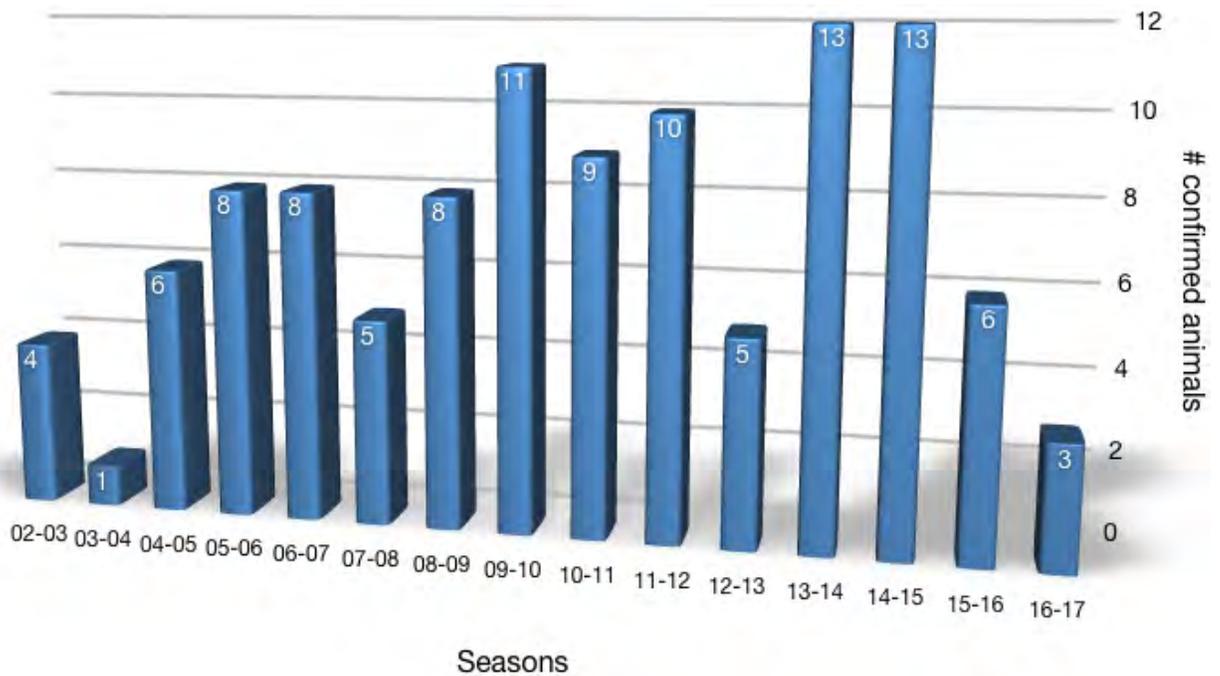


Figure 4: Number of confirmed animals reported entangled between 2002 and 2017

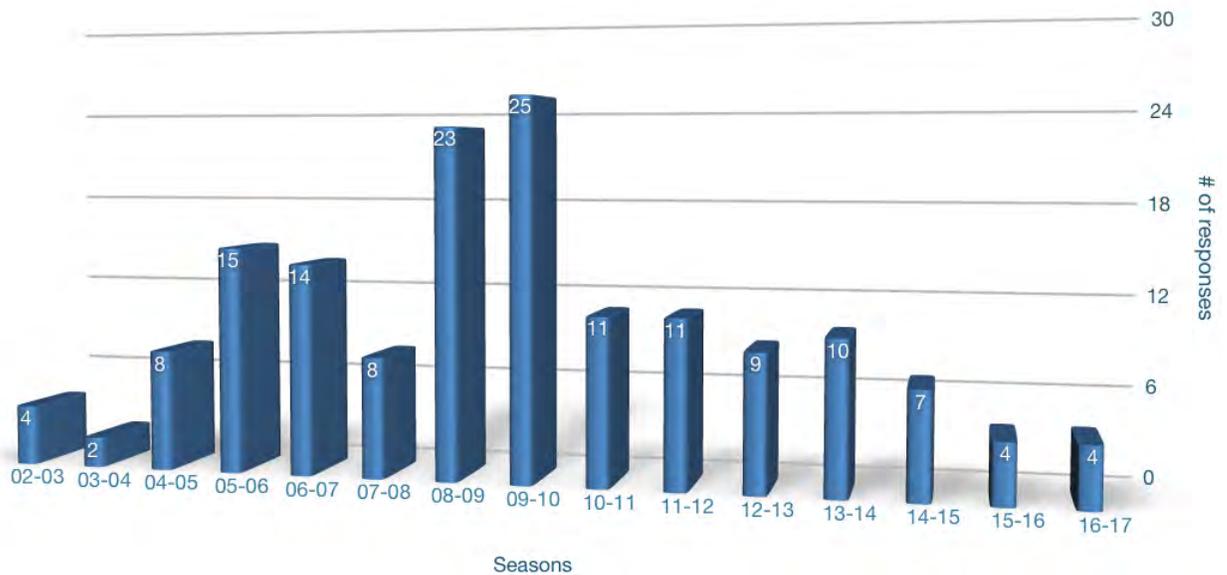


Figure 5: Number of responses to entangled whales between 2002 and 2017 seasons

Since 2002, the Network has removed or recovered over 10,000 feet of entangling gear¹ from 23 large whales (22 humpbacks and 1 sei whale) around the main Hawaiian Islands. Animals have been confirmed entangled in local fishing gear (traps, longline and monofilament), mooring gear, marine debris, and actively fished gear set as far away as Alaska. To date, 12 humpback whales reported entangled in Hawai‘i have been confirmed to have gear from Alaska. Nine (9) of the reports of Alaska gear were commercial trap gear. The greatest known straight-line distance (accounting for obstacles) a whale has carried gear is over 2,450 nm (between Wrangell, Alaska and the Hawaiian Island of Maui). To date, at least 10 animals have been reported entangled in trap gear set around the main Hawaiian Islands. Fixed gear – gear that is set and left, whether fishing gear or not, was the most prevalent gear documented entangling large whales reported around the main Hawaiian Islands (see Figure 6).

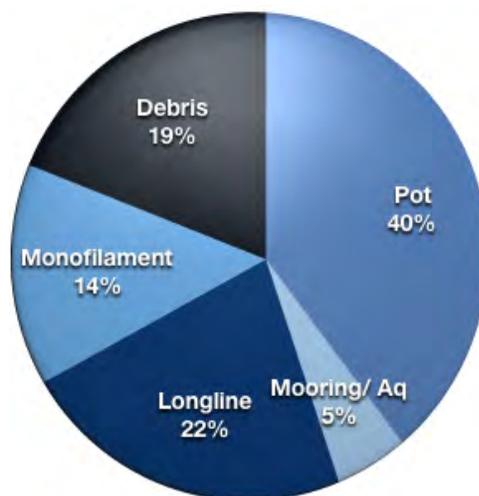


Figure 6: Percentage of gear types removed, or documented on entangled humpback whales off Hawai‘i (2003 – 2017)

Since 2002 nearly half of the animals confirmed entangled have been subadults (n=43). Many of these reports were received early in the season. Reports of subadults are based on size, and thus may represent a degree of error (*e.g.* a small adult male may be reported as a subadult). Only six (6) calves have been confirmed entangled in Hawai'i since 2001 (see Figure 7).

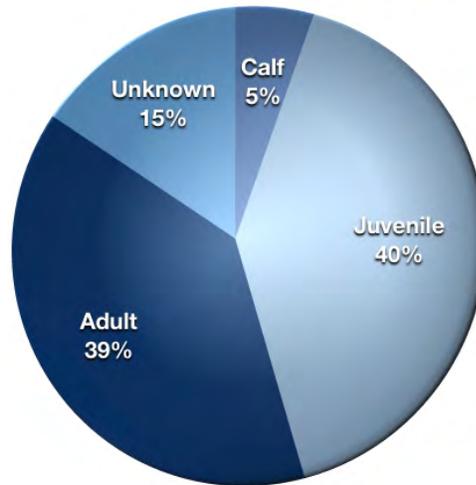


Figure 7: Age class² reported entangled in Hawai'i between 2002 and 2017

The 2016-2017 humpback whale season (November 1, 2016 – May 15, 2017) was the lowest number of confirmed large whale entanglement cases received since 2004. Only seven (7) confirmed reports, representing 3 different animals, were received. Two (2) of the entangled humpback whales were adults and 1 was a subadult.

The Network mounted 4 on-water and/or in-air response efforts to 2 cases (*i.e.* entangled humpback whales) this past season. One (1) animal off Kaua'i was assessed and documented through the efforts of NOAA Fisheries' Jamie Thomson and Captain Tara Leota of Kauai Sea Riders. A multi-agency response involving Sanctuary, NOAA Fisheries, and U.S Coast Guard Personnel from O'ahu and Station Kaua'i aboard a 45-foot USCG patrol vessel from Station Kaua'i was mounted to free the animal. However, the animal was not re-located. An entangled whale reported off the Big Island could not be responded to due to time of day and remoteness of location. A third entangled whale, reported off Maui, involved a multi-day and multi-agency effort, involving the Sanctuary, Kaho'olawe Island Reserve Commission (KIRC), NOAA Corps, Ultimate Whale Watch, the U.S. Coast Guard, Maui's Ocean Safety, Stellwagen Bank National Marine Sanctuary, and others. Many tour operators, including: Quicksilver, Pacific Whale Foundation, Trilogy Excursions, Redline Rafting, Blue Water Rafting, and Maui Diamond II provided assistance by monitoring the animal. The effort ended up being very unique and challenging with the animal entangled through the mouth in over 850 feet of 5/8" coaxial cable. In the end, Ocean Safety delivered cable cutters to the team and approximately 780 feet of cable was removed. Unfortunately, about 60 feet of cable remained caught in the whale's mouth as the cable could not be pulled free and the team dared not approach any closer to the surface-active animal. Additional details are provided as case study narratives.

Of the gear removed or documented on the animals this season, only one was identified and that was the communications-type cable. However, the source and actual use of the cable remains unknown. There is some evidence that the cable had been re-purposed as part of a FAD (Fish Aggregating Device).

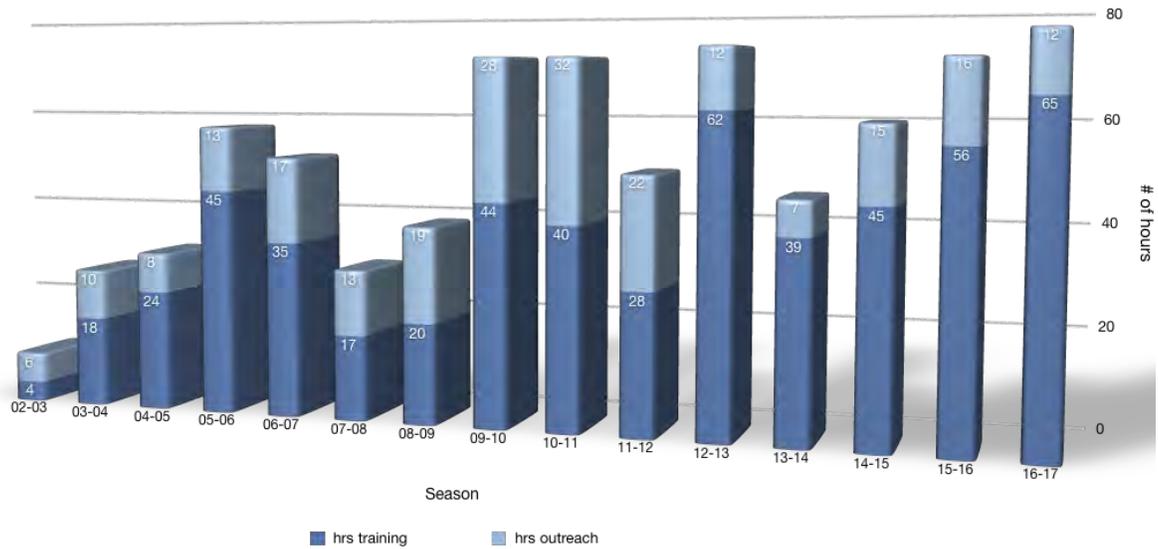


Figure 8: Amount of outreach and training towards entanglement threat and response (2002 – 2017) in Hawai‘i.

The season was unique in several ways:

1. It was yet another very quiet season, with only the 7 confirmed reports, involving 3 confirmed cases and 4 on-water (and in air) responses, and one successful disentanglement effort. Only the 2007-08, the 2012-13, and the 2015-16 seasons have resulted in comparable low numbers.
2. Like last season, all reports were received late in the season (no early season – prior to January, reports were received. Typically, during the months of November and December, 2 to 4 reported cases, representing subadults, are received).
3. The season was also marked by its brevity. The first confirmed report wasn’t received until March 2 and the last was received on March 11 - a span of only 9 days (last year was the previous record of 69 days). This was the first time that there were no confirmed reports during the month of February.
4. This is the first time the Sanctuary has encountered an animal entangled in cable, and is one of the few cases worldwide. It was a unique challenge and resulted in a new tool being used for response and subsequently added to the tool kit.
5. More than 65 hours of large whale entanglement response trainings were performed across the main Hawaiian Islands in preparation for the whale season. This represents the greatest amount of training effort since 2003. Much of the additional hours were a result of extra effort put toward preparation and training by Bob Gladden and others on the island of Hawai‘i.

It is apparent the important role the on-water and in-air community plays toward the large whale entanglement response effort. Reporters are not just reporting, but providing initial assessment, documentation, and standby support. These actions are the foundation of the effort that not only help save whales, but at the same time, gain valuable information toward threat reduction, which helps more animals in the future.

Summary of 2016-2017 season disentanglement reports and efforts:

- Seventeen (17) reports of entangled whales were received this season (10 unconfirmed and 7 confirmed).
- As many as 3 humpback whales were confirmed entangled in gear.
- Only one (1) of the entangled whales was initially sighted within Sanctuary waters.
- Reports were received off the Big Island, Kaua'i, and Maui Nui waters.
- Two (2) reports involved adults and 1 was a subadult.
- There were 4 multi-agency, multi-asset responses mounted to 2 different animals.
- Tour industry platforms from Ultimate Whale Watch, Pacific Whale Foundation, Kauai Sea Riders, Trilogy Excursions, Maui Diamond II, Quicksilver, Redline Rafting, Blue Water Rafting, and others, assisted and were instrumental in providing sightings, documentation, and monitoring of entangled animals.
- Aerial reporting was provided by Blue Hawaiian Helicopter and the U.S. Coast Guard.
- Support was also provided by the United States Coast Guard (Sector Honolulu, Air Station Barbers Point Air Station and stations Kaua'i, O'ahu and Maui); Hawai'i's Department of Land and Natural Resources (DLNR), Kaho'olawe Island Reserve Commission (KIRC), Maui's Ocean Safety, and NOAA Corps.

Case reports of disentanglement efforts:

March 5, 2017: Entanglement Response Efforts to an Adult Humpback Whale off Kaua'i



Image showing the multiple wraps of yellow polypropylene line (NOAA MMHSRP #18786-1)

8:30 Entangled animal reported by a Kauai Sea Riders tour vessel off Kaloa Landing on the south side of Kaua'i.

Sanctuary (Jean Souza) and state Department of Land and Natural Resources (Mimi Olry) provided shore side support.

11:30 A dedicated, rapid, first response effort was mounted using one of Kauai Sea Rider's vessels with trained responders Captain Tara Leota and Jamie Thomton of NOAA Fisheries on board. They were able to obtain excellent documentation and assessment using surface and pole-mounted cameras. Animal's location: 21° 52.0'N/ 159° 28.15'W



Underwater image obtained using a pole-mounted camera (Jamie Thomton/ NOAA MMHSRP (permit # 18786-1)

The entanglement represented moderate to heavy gauge yellow polypropylene line through the mouth, over the back, aft of the animal's blowhole, knotted, then wrapped under mid-body and then back over at the tailstock region. A light-colored, also moderate to heavy gauge sinking line was integrated with the poly near the tailstock region. The yellow poly trailed approximately 30 feet behind the animal, while the sinking line trailed around 80 feet behind. The sinking line included several tangles which likely equates to over 200 feet of line. The animal was in poor condition, being very emaciated, rough-skinned, light-colored, and had patches of cyamids (whale lice).

14:45 A full disentanglement response gets underway aboard a U.S. Coast Guard 45-foot response boat out of Station Kaua'i with trained responders from USCG (team from Station Kaua'i and Eric Roberts, Station O'ahu Marine Mammal Liaison), NOAA Fisheries (Jamie Thomton), and the Hawaiian Islands Humpback Whale National Marine Sanctuary (Ed Lyman).



Loading response inflatable on USCG 45-foot patrol boat at USCG Station Kaua'i

Unfortunately, the whale was lost with lack of standby support during the interim between first and full responses. However, because the conditions were excellent most of the day and the animal had remained in the same area for much of the morning, the decision was made for the team to get underway with the mission to re-locate the animal.

The on-water community was alerted to keep an eye out.

An extensive search was done of the area with a trained responder (Tree Cloud) assisting by spotting whales from a high vantage point on shore. Unfortunately, after several hours of searching and over 12 animals assessed, the entangled whale was not re-located.

Good effort by USCG, NOAA Fisheries, HIHWNMS, Kauai Sea Riders, DLNR and others. Mahalo to everyone!

3/6/7

10:30 Outrigger canoe reported animal in same region. No standby support available.

Aerial and on-water response mounted by four helicopters, state Department of Land and Natural Resources, and four operators to re-locate animal. USCG standing by to assist as well as trained responder from NOAA Fisheries who is prepared to tag animal if re-sighted.

Participants/ Responders (roles in parentheses):

Ed Lyman (Primary responder- L5)
Eric Roberts (Responder - L3)

Jamie Thomson (First responder)
Jean Souza (Shoreside support)
Mimi Olry (Shoreside support)
Tara Leota (First Responder)
Tree Cloud (Shoreside support)

Support:

U.S. Coast Guard - Station Kaua'i and Sector Honolulu
Kaua'i Reef Riders

Organizations and agencies involved:

NOAA Fisheries Office of Protected Resources (oversight and permit)
Hawaiian Islands Humpback Whale National Marine Sanctuary (effort lead)
NOAA Fisheries Protected Resources' Pacific Islands Regional Office (response and regional oversight)
Hawai'i Department of Land and Natural Resources
U.S. Coast Guard - Station Kaua'i and Sector Honolulu

March 11–12, 2017: Entanglement Response Efforts to a Subadult Humpback Whale off Maui



Initial response team uses a live-streaming pole camera to document and assess the entangled humpback whale (NOAA MMHSRP- permit # 18786-1)

Saturday, March 11, 2017

11:30 HST Report received of small humpback whale (reported as calf) by itself, and behaving oddly off of the Pali lookout, Maui. Animal close to shore.

A Research Specialist visiting from Stellwagen Bank National Marine Sanctuary checks out the animal from shore and reports that the animal is a subadult humpback whale with raw leading edges to its flukes. No gear is observed, but there may be scarring around the right side of the mouth.

13:37 Response mounted to initially assess and document the animal. The Hawaiian Islands Humpback Whale National Marine Sanctuary's response boat, Koholā, departs Ma'alaea Harbor with trained responders from the Sanctuary and NOAA Corps onboard.

Maui Diamond II provides some assessment of the animal as the sanctuary boat is underway.

Upon arriving on scene, a polecam is used determined that a subadult humpback whale is actually entangled. The entanglement at the time is believed to involve moderate-gauge line exiting both sides of the mouth and heading straight down.

15:39 Crew from U.S. Coast Guard Station Maui aboard one of their 45-foot patrol boats arrive on scene to provide additional assistance. One additional trained responder was also transported aboard the Coast Guard vessel to join the team aboard the Koholā.

15:51 The response team initially attempts to use a 28-foot long pole with a live-feed video camera placed above a fixed, hooked knife in order to reach down and cut the lines exiting the animal's mouth. While close, the animal became evasive or hung its head low, making the lines inaccessible.

16:32-16:46 The team tries to sweep the lines lying below the animal with a cutting grapple, but the animal moves away from the vessel and sweeping line.

17:05-17:27 Attempts made with the pole knife again, but with no luck due to the animal's evasive behavior.

It was noted that the animal would move enough at times for the lines to trail aft and rise somewhat towards the surface (though still remaining at least 6 – 8 feet deep).

18:20 Attempts made to reach the lines when they come closer to surface while the animal moves. Multiple attempts with fixed knife and cutting grapple with no success due to animal's evasive behavior.

18:35 With the sun low on the horizon, the effort is terminated (Sunset at 18:34)



Blough - NOAA HIHWNMS/ MMHSRP (Permit# 18786)

Response team of Lyman, DeFazio LTJG, Thompson, and James make the final cuts (NOAA MMHSRP permit# 18786-1)

Sunday, March 12, 2017

07:20 The subadult humpback whale reported entangled off the Pali Lookout, Maui the day before is re-sighted in the same vicinity. However, the animal soon changes behavior and heads south towards central Kihei before apparently letting the trailing gear settle on the ocean floor again in about 60 feet of water off Kamaole Beach I.

08:26 Koholā departs Ma'alaia Harbor with responders from HIHWNS, NOAA Corps, Stellwagen Bank National Marine Sanctuary, and the West Maui response team (incl. personnel from tour operation Ultimate Whale Watch).

While underway, several tour operations monitor the animal, including: *Ocean Odyssey* (Pacific Whale Foundation), *Quicksilver*, Redline Rafting, Blue Water Rafting, and *Maui Diamond II*.

08:44 Koholā arrives on scene of animal where Blue Water Rafting is standing by and begins to assist with crowd control of stand-up paddle boarders, kayaks, and private vessels.

09:20 Polecam used for additional assessment; however, animal is evasive and not allowing for much of an approach.

09:29 USCG arrives on scene to assist with response effort and crowd control.

10:16-11:09 Multiple attempts made to try and sweep up the deep lying “line” below the animal, but they prove futile. Weights added to line for these attempts to help it sink.

13:08 Inflatable launched with three responders onboard (L3 Thompson at helm and L3 James at bow)

13:26-13:46 Attempts made to use inflatable along with the Koholā to get a cutting grapple in position behind the animal, but these also prove unsuccessful.

Over time Grupenhoff, the captain of the support boat, notices that the animal has a pattern to its movements and it may be trailing more gear than originally assessed.

13:59 Fourth responder joins team in inflatable for assessment. An opportunity to look over the side of the inflatable with a mask confirms that the fairly heavy-gauge gear trails well away from the animal and just off the bottom.

14:28 The team, lead by James, places a cutting grapple on the gear, but soon finds that the action of the trailing gear caused the cutting grapple line to twist around the entangling gear, removing all force to the blades.

15:00 The team then grapples the gear well away from the animal and pulls it to the surface with much difficulty to find out that the gear is actually heavy-gauge (~5/8") electrical-type cable.

15:47 With this information in hand, the team, with the assistance of comms officer, Rachel Finn, acquires cable cutters with the help of shore side support (Kate Eifler) and personnel from Ocean Safety that are under Hawai'i's Department of Land and Natural Resources.

15:51 Considering that much of the cable is now off the bottom between the cutting grapple with a large polyball attached and the inflatable with gear in hand (but not onboard) the team pulls the inflatable up along the cable fairly easily.

Using the newly acquired cable cutters, a test cut of one of the two trailing cables is made approximately 100 feet from the animal and is successful.

15:58 The team continues to pull up the cable to as close as deemed safe, and cuts both cables leading to the whale's mouth. Earlier assessment had determined that the gear was not likely to be pulled from the whale's mouth, and gear handling confirmed that no "slippage" of gear was occurring. The cable had already embedded itself too deeply at the back of the whale's mouth to be pulled out.

16:08 Attempts to use polecam to assess animal and entanglement. Animal swims near shore and is not accessible by the team.

16:25 Three responders in inflatable depart for Kihei boat ramp with cable removed from animal.



Blough - NOAA HIHWNMS/ MMHSRP (Permit# 18786)
Team successfully cuts cables as animal swims away (NOAA MMHSRP permit #18786-1)

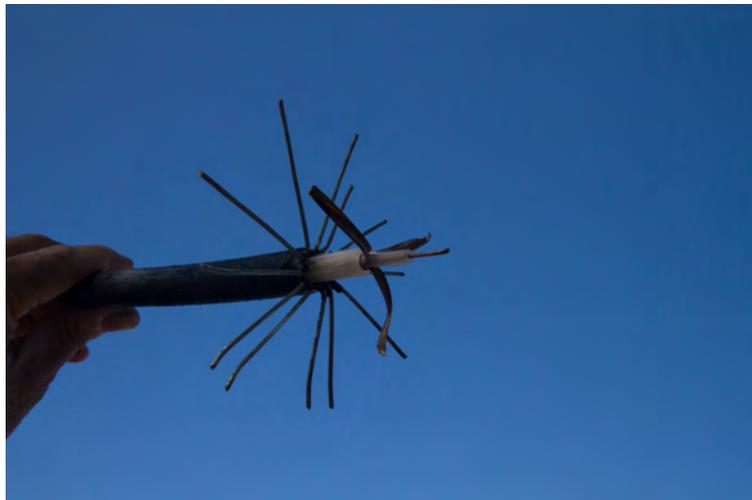
16:27-16:39 Attempts made to assess, and perhaps biopsy sample animal, but animal swims too close to shore and effort is terminated.

16:42 Koholā departs for harbor.

Participants/ Responders (roles in parentheses):

3/11/2017:

- Ed Lyman (Primary responder- L5)
- Carmen DeFazio (Captain)
- Grant Thompson (Responder and gear - L3)
- Rachel Finn (Data and documenter - L3)
- Kate Eifler (Documenter)
- Tasia Blough (Shoreside support)
- Ted Grupenhoff (Shoreside support)



Dissected coaxial cable removed from humpback whale

3/12/2017:

Ed Lyman (Primary responder - L5)
Rachel Finn (Data, documenter, and comms - L3)
Grant Thompson (Responder, gear, inflatable driver - L3)
Lee James (Responder - L3)
Liz Stahl (Documenter - L3)
Carmen DeFazio (Captain and responder)
Ted Grupenhoff (Captain and responder)
Tasia Blough (Documenter)
Kate Eifler (Shoreside support)

Support:

U.S. Coast Guard - Station Maui and Sector Honolulu
Hawai'i's Department of Land and Natural Resources/ County of Maui Ocean Safety
Officers

Organizations and agencies involved:

NOAA Fisheries Office of Protected Resources (oversight and permit)
Hawaiian Islands Humpback Whale National Marine Sanctuary (effort lead)
NOAA Fisheries Protected Resources Pacific Islands Regional Office (regional oversight)
NOAA Corps
Stellwagen Bank National Marine Sanctuary
Kaho'olawe Island Reserve Commission
West Maui Rapid Response team (Ultimate Whale Watch)
U.S. Coast Guard (Station Maui and Sector Honolulu)
Hawai'i's Department of Land and Natural Resources/ County of Maui Ocean Safety
Pacific Whale Foundation
Redline Rafting
Quicksilver
Blue Water Rafting
Maui Diamond II
Trilogy Excursions

Whale-vessel Contact Reports

During the 2016-17 whale season (Nov. 1, 2016 – May 15, 2017), the Hawaiian Islands Humpback Whale National Marine Sanctuary received 3 confirmed reports of humpback whales being involved in non-incident contacts with vessels. Two (2) of the 3 confirmed reports occurred within the Sanctuary. Two occurred off Maui and one of Kaua'i. Two (2) of the animals were subadults and one was an adult. All 3 cases involved tour operations, were self-reported by crew of the vessel making contact, and reported no signs of injury (*e.g.* blood or wounds observed). However, due to the nature of assessing these animals by relying on limited and brief observations from the surface, not observing signs of injury does not mean that the animal was not impacted by the contact.

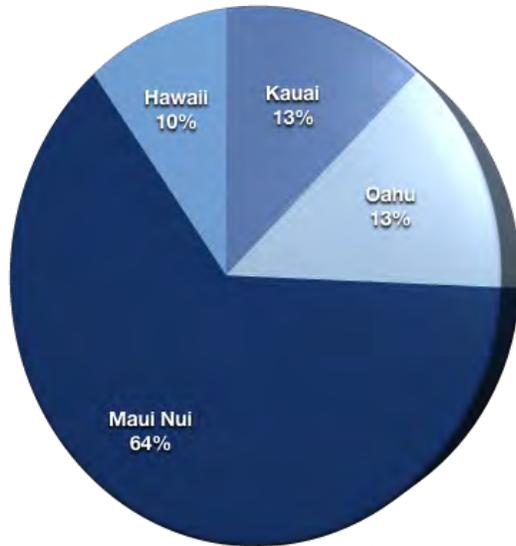


Figure 8: Location of self-reported contact reports between 2002 and 2017.

To date, most (64%) of self-reported contacts were reported off Maui. However, the region is believed to have greater whale densities and higher vessel traffic compared to other areas (see Figures 8 and 9). Younger animals (calves and subadults) make up a majority (63.2%) of the known-aged contacts (See Figure 10). Annual reports of contacts between whales and vessels had generally increased in numbers from the early 1980s through early 2000s – likely a result of increasing number of animals and greater awareness affecting reporting. However, starting in 2010, the number of non-incident contacts confirmed between humpback whales and vessels has slowly decreased (see Figure 11).



Figure 9: Initial reported location of confirmed ship-struck humpback whales through 2017 season.

The above findings are a result of initial assessment efforts made under NOAA Fisheries Marine Mammal Health and Stranding Response Program, and do not necessarily represent final legal determinations on whale-vessel interactions.

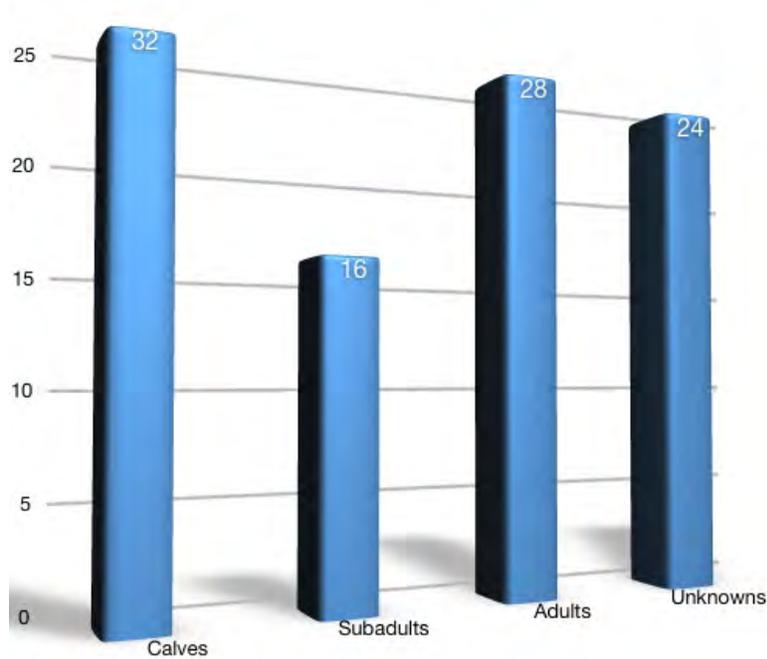


Figure 10: Age class of confirmed ship-struck humpback whales reported in Hawai'i between 2002 and 2017

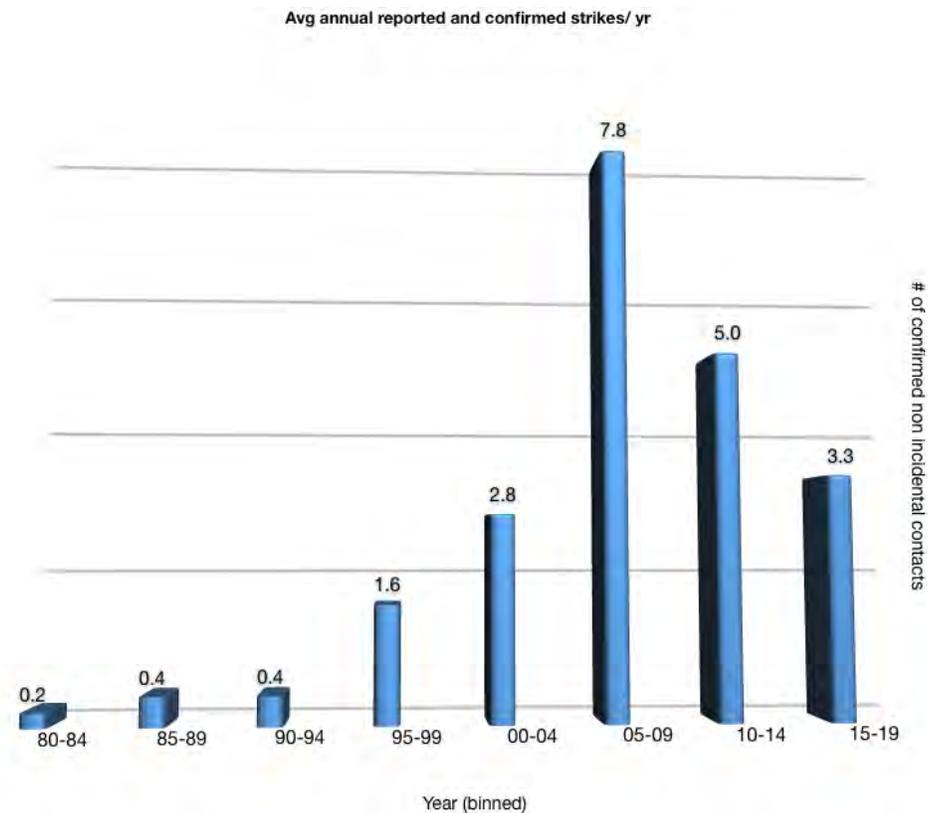


Figure 11: Number of confirmed, non-incident contacts between whales and vessels reported as 5-year bins between 1980 and 2017.

Research: Health and Risk Assessment Monitoring

The Sanctuary's primary research mission is to monitor and characterize the health of and risks (real or potential) to humpback whales in Hawai'i's waters. This past season, from January 5 through April 13, the sanctuary mounted 27 research cruises aboard its research vessel the *Koholā*. Nearly 190 hours were spent traversing 1150 nm off Maui Nui waters. The results were that 138 groups, comprising 342 animals, were photo-documented and assessed.

Of these, 148 animals could be identified (i.e. fluke ID) and had adequate coverage of the peduncle region for scar analysis towards quantifying entanglement threat (frequency) and impact. Analysis provided a very conservative estimate of those animals recently entangled based on scarring of 17% (based on high-likelihood entanglement scars being found in at least 2 of the 6 regions analyzed around the peduncle region) to a high of 31% (based on scars found only in one region and thus decreasing their certainty). To reduce this uncertainty, animals coded with only one region as likely having entanglement scarring -the maybes, were removed from the analysis and an estimate of 20% or 1 in every 5 humpback whales photo-documented in Maui Nui waters this past season had scars indicating they had recently been entangled. The effort and analysis very likely under-estimates the overall threat as it does not account for those animals that do not show any scarring from past entanglements, or those that fall victim to the threat and are no longer around to be considered. These results are similar to those found for 281 animals analyzed between 2005 and 2016 (Minimum rate = 17%; Maximum rate = 34%, conditional/ exclude the maybes = 21%). Entanglement in marine debris and actively fished gear is considered one of the major threats to humpback whales and other marine animals.

The Sanctuary also completed its first full season of vessel-based line transect surveys in order to better quantify habitat usage and relative abundance of humpback whales in the Maui Nui waters. Transects were performed on all research days, but one (n = 26). Transects were run from January 5 through April 13. A total of 93 transects representing more than 700 km were accomplished. Results indicated that peak sightings, generally between 1.2 and 1.9 animals/km, occurred between January and early March. While from mid-March through the end of the season's effort, sighting generally ranged from nearly no sightings to below .6 animals/km.



Figure 12: 2017-season transect findings

Many people volunteered their time to assist with obtaining imagery and the analysis, and their efforts are greatly appreciated.

Research crew (alphabetically):

Carmen DeFazio, LTJG
Kate Eifler
Rachel Finn
Ted Grupenhoff
Jason Moore
Daniel Opitz
Jeff Pantukhoff
Jim Peckarsky
Deborah Rybak
Michael Rybak
Chris Straub
Tiff Winn
Todd Winn

References:

Bradford, A., and E. Lyman. 2015. Injury determinations for humpback whales and other cetaceans reported to NOAA response networks in the Hawaiian Islands during 2007-2012. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-45, 29p

Currie JJ, Stack SH, Easterly SK, Kaufman GD, Martinez E. Modeling whale-vessel encounters: the role of speed in mitigating collisions with humpback whales (*Megaptera novaeangliae*). Document SC/66a/HIM/3. 2015. 17 p.

Lammers, Marc O., Adam A. Pack, and Lisa Davis. *Historical evidence of whale/vessel collisions in Hawaiian waters (1975–present)*. OSI Technical Report 2003-01. Prepared for the Hawaiian Islands Humpback Whale National Marine Sanctuary. Oceanwide Science Institute, Honolulu, HI, 2003

Lammers, M.O., Pack, A.A., Lyman, E.G. and Espiritu, L. (2013). Trends in collisions between vessels and North Pacific humpback whales (*Megaptera novaeangliae*) in Hawaiian waters (1975-2011). *Journal of Cetacean Research and Management*, 13(1): 73-80.

Lyman, E., J. Cordaro, K. Jackson, A. Jensen, D. Mattila, B. Norberg, L. Spaven, S. Wilkin, K. Wilkinson. A preliminary investigation of gear entangling humpback whales, *Megaptera novaeangliae*, in the North Pacific. Abstract for SPLASH Symposium. at 18th Biennial Conference of the Biology of Marine Mammals. October 11, 2009. Quebec, Canada

Lyman, E. G., J. Kenney, S. Landry, D. Mattila, and J. Robbins. Reliability of Eyewitness Reports of Entangled Large Whales: what do formal disentanglement programs tell us about the global problem? Abstract in the Proceedings of the 17th Biennial Conference of the Biology of Marine Mammals. Nov. 29 – Dec 3, 2007 Cape Town, South Africa.

Mattila, D. K., S. Landry, E. Lyman, J. Robbins, and T. Rowles. 2007. Scientific Information that can be Gained Through Large Whale Disentanglements. International Whaling Commission Paper. SC/59/BC1

Neilson, J.L., J.M. Straley, C.M. Gabriele, S. Hills. (2009). Non-Lethal Entanglement of Humpback Whales (*Megaptera novaeangliae*) in Fishing Gear in Northern Southeast Alaska, *Journal of Biogeography*. 36, pp. 452-464

Robbins, J., J. Kenney, S. Landry, E. Lyman, and D. Mattila. Reliability of eyewitness reports of large whale entanglement. International Whaling Commission Paper. SC/59/BC2

Robbins, J. and D. Mattila. (2004). Estimating Humpback Whale (*Megaptera novaeangliae*) Entanglement Rates on the Basis of Scar Evidence, *Northeast Fisheries Science Center*. Provincetown, MA. pp. 1-22.

Acknowledgements:

As in past seasons, credit goes to the on-water community of tour boat operators, fishermen, the whale researchers, and others who all contribute. For those animals in distress, they report, assess, document, and many times monitor the animal(s) until additional help can arrive. In regard to research, they share their knowledge and the animals they have found. Ed Lyman of the Hawaiian Islands Humpback Whale National Marine Sanctuary coordinates large whale entanglement response effort around the main Hawaiian Islands, David Schofield of NOAA Fisheries Pacific Islands Regional Office coordinates overall marine mammal response efforts for the greater Pacific Islands Region, and Jamison Smith, the National Large Whale Entanglement Response Coordinator oversees the large whale entanglement response effort at a national level through NOAA Fisheries' Office of Protected Resources' Marine Mammal Health and Stranding Response Program. However, it is the additional efforts of the on-water community that make the difference on whether an entangled whale is ultimately saved, and valuable information collected to reduce the threat of entanglement. This season the captains and crew aboard tour platforms, Blue Hawaiian Helicopters, Ultimate Whale Watch vessels, *Aloha Kai* and *Wiki Wahine*, Pacific Whale Foundation's *Ocean Discovery* and *Ocean Odyssey*, Kauai Sea Riders, Captain Steve's *Cane Fire 2*, Trilogy Excursion's *Trilogy V*, *Mau Diamond II*, *Quicksilver*, Redline Rafting, Bluewater Rafting, fishing vessel *Marjorie Ann*, and others that we may have missed, were all instrumental to response efforts, and as such deserve a great deal of credit. Efforts are much more likely to be successful when the on-water community reports, assesses, documents, and monitors the animal(s) until trained and well-equipped teams arrive.

Acknowledgements also go to the efforts of the Network's State and Federal partners, including the U.S. Coast Guard, the U.S. Coast Guard Auxiliary and Reserve, Hawaiian Islands Humpback Whale National Marine Sanctuary, Hawai'i's Department of Land and Natural Resources (DLNR, DOCARE, DAR, Ocean Safety), Hawai'i's police departments, NOAA's Pacific Islands Fisheries Science Center, NOAA Corps, NOAA Office of Law Enforcement, and NOAA Fisheries' Pacific Islands Regional Office, NOAA Fisheries' Office of Protected Resources, and NOAA Fisheries Protected Resources Division.

While there are many individuals and organizations to acknowledge, several warrant special mention. Once again, Bob Gladden, Kit Kelly, Cammy Dabney, Deron Verbeck, and many other members of the West Hawai'i Marine Mammal Response Network, whose efforts at maintaining readiness should be an example to us all. Lee James and the captains of Ultimate Whale Watch, as well as, the rest of the gang making up the West Maui Response Team also deserve a great deal of credit for their efforts toward reporting and response. The same goes for Jens and Stephanie Currie, and all the captains and crew of the Pacific Whale Foundation vessels. Between Pacific Whale Foundation and Ultimate Whale Watch, they typically account for over half of all confirmed reports statewide. Continued acknowledgements also go to Jason Moore, a professional photographer, who has donated a great deal of his time, not only toward response efforts, but to research as well. Jason was this year's Hawaiian Islands Humpback Whale National Marine Sanctuary Volunteer of the Year awardee. A plethora of accolades go to Grant Thompson, who continues to help in so many ways and whose Entanglement Response Facebook page has really shown its value in sharing and gathering of information. Then there is Rachel Finn, who has also continued to do so much for the cause, from maintaining the website, preparation, participating in the responses and research, to all the analysis of the data gathered. What would we do without her? Lastly, there is the staff of the Hawaiian Islands Humpback Whale National Marine Sanctuary, especially Jean Souza, Paul Wong, Bo Petty, Derek (Mac) McGuire; the staff from the regional office of NOAA Fisheries Protected Resources, especially Nicole Davis, Jamie Thomson, Aliza Milette-Winfree, Dave Nichols, and David Schofield; the staff of NOAA's Pacific Islands Fisheries Science Center, especially Chad Yoshinaga; and Jamison Smith and the rest of the staff of NOAA Fisheries' Office of Protected Resources, who assist in so many ways and yet typically remain behind the scenes. The fact is all these people, and many more, go above and beyond. Everyone should be commended.

Several people were instrumental in maintaining and operating our response vessel, which ends up being one of our most valuable assets towards the response efforts. These were LTJG Carmen DeFazio, the NOAA Corps Officer assigned to the Sanctuary, Lee James, Ted Grupenhoff, and Grant Thompson. Their efforts are very much appreciated.

Gratitude is also extended to the men and women of the U.S. Coast Guard, especially Stations Kaua'i and Maui and the Command Center on O'ahu. The USCG was involved in all (100%) of the entanglement response efforts this season, providing everything from transport, safety and perimeter support, search and rescue (SAR) assets, logistics support, some direct entanglement response, and much more. A response effort off Kaua'i would not have been possible without the assistance and support of USCG Station Kaua'i.

Large whale entanglement response also requires funding, and it is important to acknowledge and thank those that have contributed support. First, the Office of National Marine Sanctuaries, including their small boat program, have provided funding, personnel (salaries), and contributed both a response boat, the *Koholā*, and approach inflatables – all critical to the response program. NOAA Fisheries' Office of Protected Resources – the Pacific Islands Regional Office and the Alaska Regional Office (through shared resources) have supplied additional funds toward the costs of training and response, equipment, and services, such as those required for the telemetry tags. The National Marine Sanctuary Foundation, including the local chapter, have contributed to the cause and supported the response vessel. Past and present, grants from the Hawai'i Tourism Association, Sea Grant program, Orange County Community Foundation (OCCF), and Whale Tales have provided support. Recent grant support from OCCF provided much-needed support

toward supporting Rachel Finn. Private donors, like Michael and Deborah Rybak, Dave and Laurel Stiles, Jeff Pantukhoff at the Whaleman Foundation, Jerry Stowell (Maureen Stowell Memorial Fund), Lou Douros of North Yuke, Jackie Lyons, Kate Eifler, Jim Peckarsky, Mara Kerr, Mark DiOrio, and other individual donations, have provided financial support (and in many cases, in-kind support). Businesses, like Ultimate Whale Watch, Captain Steve's *Sea Fire*, MacGillivray Freeman Films, Oceanology LLC/ Whalers Village Museum, Maui Ocean Center, Pacific Whale Foundation, Hawai'i Surf and Sport, Second Wind, and B&B SCUBA have provided funds and/or merchandise (equipment) at cost and/or contributed in-kind support. The Maui Nui chapter of the National Marine Sanctuary Foundation, as well as, the National Marine Sanctuary Foundation has helped with merchandise sales and donations. The Kaho'olawe Island Reserve Commission has assisted through shared use of their shore-side facility in Kihei, providing a much-needed location for vessel repairs. Lastly, network members have contributed to the cause, either directly or through in-kind contributions, like covering fuel costs or providing a piece of equipment. In short, and in addition to their time, many people and organizations have contributed a broad range of support, and it is all greatly appreciated.

Lastly, special thanks go to those who each and every year attend trainings, prepare themselves, and remain on-call, even when they may not be called or not have the opportunity to respond directly, especially these last two seasons. Large whale entanglement response is not only dependent on receiving reports, but being able to mount a response that demands risk assessment and adhering to proven protocols. Trained and appropriately prepared network members are extremely valuable toward meeting these protocols and fulfilling roles that make response efforts possible. Their efforts, and especially those of volunteers, are greatly appreciated.

MAHALO



From left to right – Grant Thompson, LTJG Carmen DeFazio, and Lee James with nearly 800 feet of cable removed from humpback whale off Maui

¹ Represents line greater than or equal to 3/8” diameter.

² Age class determination based on size, rather than known age of animal.

The Hawaiian Islands Humpback Whale National Marine Sanctuary is jointly managed via a cooperative federal-state partnership between the National Oceanic and Atmospheric Administration Office of National Marine Sanctuaries and the State of Hawai‘i through the Department of Land and Natural Resources

All response activities conducted under the authority of NOAA Fisheries’ Marine Mammal Health and Stranding Response Program Permit (MMHSRP, # 18786-1)

All research activities conducted under NOAA Fisheries Pacific Islands Fisheries Science Center permit (# 15240) or NOAA MMHSRP (permit # 18786-1), and state of Hawai‘i PMAL permit (#2016-212)

