

Report from the Serious Injury Subcommittee of the Alaska Scientific Review Group

**Kate Wynne, Jan Straley, Craig Matkin, Lloyd Lowry, and Sue Hills
March 2003**

Background

The Alaska Scientific Review Group (AKSRG) was asked by National Marine Fisheries Service (NMFS) staff to review a table of humpback whale entanglements planned for inclusion in the 2004 Alaska Stock Assessment Report ("SAR Table"). For each event, the group was asked to determine those events that would result in "Serious Injury or Death" and those that would not. No category was provided for outcomes that "Cannot Be Determined" and no place was provided to list "Criteria Used" in making the determination. Divergent responses were submitted which raised issues for discussion at the November 2003 meeting. SRG members raised concerns that, while dichotomous outcome determinations (Will vs Won't Die) are ideally suited for MMPA implementation, they were difficult to make based on the data provided. Several sources of uncertainty and interpretational discrepancies were discussed that led to differences among SRG responses. Given the management implications of this ambiguity, the ASRG suggested that the definition and determination of lethal entanglement should be a NMFS priority, warranting a joint discussion among SRGs and formal advice to NMFS.

To address this issue, AKSRG formed a subcommittee to provide more detailed response to NMFS regarding "Serious Injury" determinations. The subcommittee included five experienced Alaskan marine mammalogists (the authors), three of whom have received NMFS training in whale disentanglement assessment and response. The subcommittee agreed to reassess the outcome of humpback whale entanglement events in the "SAR Table" and identify the criteria they used to determine which events likely represented lethal interactions. For each entanglement, subcommittee members listed the anticipated outcome in three categories (Will Likely Die, Won't Likely Die, or Could Not Be Determined) and often listed criteria used to make their determination.

While doing this, the subcommittee encountered inconsistencies in information provided in the SAR Table that could alter their outcome determinations. The subcommittee requested clarification from NMFS staff and received a more detailed NMFS database ("Table 14") plus a sample of an original incident report. To evaluate how influential this additional information was on outcome determinations, three subcommittee members completed the exercise twice, once using information from the "SAR Table" and a second time with additional information provided in "Table 14".

Results

Committee members reviewed 46 events involving humpback whale entanglement or collision with vessels. Members independently assessed whether the event would likely result in the whale's death or if inadequate information was provided upon which to base an assessment. These assessments were then compiled into a

single table with committee member initials used to denote individual determinations (Table 1).

At least one member disagreed about the outcome of a whale entanglement or collision in 38 of 46 (82.6%) cases presented. Of the 8 (17.4%) entanglement events on which the committee agreed, two were cases where the whale “Will Likely Die”, five were cases where the whale “Won’t Likely Die”, and the outcome of one case “Could Not Be Determined”. In 15 (32.6%) cases, there were directly opposing opinions about how lethal the interaction was; in 12 (80%) of these cases, this involved a sole dissenting opinion (which was cast by each member at least once).

In 37 of 46 (80.4%) events, at least one subcommittee member felt the outcome could not be determined from the information provided. In 10 (21.7%) events, three members agreed that not enough information was provided from which to determine the outcome of the interaction.

Additional information on entanglement circumstances was provided for some but not all events in ‘Table 14’. Three subcommittee members provided “before and after” determinations of likely event outcome. If their response changed with added information, a superscript was used to denote their determination made before (1) and after (2) reviewing additional information (Table 1). Additional information led to changes in the outcome determination made by this subgroup in some but not all cases and the direction of change was inconsistent. With additional information, the outcome was changed to “Will Likely Die” ten times, “Won’t Likely Die” thirteen times, and “Can’t Tell” thirteen times (Table 2).

Committee members commented that their inability to determine an event’s outcome was most often due to a lack of details in the summaries provided. In particular, the group repeatedly cited the following details as critical for determining event severity but often found lacking in the details provided:

- Was the whale released completely?
- How much gear was left on whale, type, and where?
- What was extent of injuries? Condition of animal when last seen?
- What was behavior of whale: was mobility impaired?

Discussion

Procedural use of the phrase “Serious Injury or Death” by NMFS to describe a probable lethal outcome led to early confusion and ambiguity. For many events, members believed it reasonable to assume and report that the whale could have been injured but perhaps not lethally. To clarify the fact that a “Serious Injury” is to be considered lethal under current MMPA guidelines, the subcommittee suggested the categories be more simply and directly titled “Will Likely Die” and “Won’t Likely Die”. Although making such dichotomous outcome determinations may be desirable in mortality studies, it implies a certainty not warranted given current knowledge of mortality rates due to entanglement. It also precludes acknowledgement that an interaction may have resulted in sublethal injury to the whale.

Complete agreement by this group of marine mammalogists regarding the anticipated outcome of entanglement or collision occurred in less than 18% of the cases presented. Comments made by committee members indicated their difficulties making

objective outcome determinations were due to insufficient information and/or sources of subjectivity. In more than 80% of cases, at least one member believed the information provided was inadequate to determine the likely outcome of the incident. Three sources of subjectivity identified by subcommittee members are listed below with suggestions for their minimization.

Source 1: Original Input.

Event descriptions and the anticipated outcome or perceived degree of severity are subjectively reported by initial observers. This can be minimized to a degree by standardizing the initial recording of observations on forms that incorporate criteria for defining lethal interactions. However, the original observer's interpretations are still subjective and may differ from secondary interpretations. For example, even being on site at event #200127 which involved entanglement of a mother and large calf, subcommittee member K.W. felt she could not determine the likelihood of it being a lethal entanglement. During post-event review however, subcommittee member J.S. counted it as two mortalities.

Source 2: Distillation of original information into tables and reports

Significant differences were found in the details and descriptions of the same event when presented in the SAR Table and Table 14. In a few extreme cases, the fact that the whale was "*found dead*" or was "*thought to have died*" was stated in one table but not the other. In many cases, the information provided in the "Condition" category contradicted information provided in the "Outcome" category. As a consequence, with additional information, as many determinations were changed to the "Can't Be Determined" as to "Will Likely Die" or "Won't Likely Die" categories (Table 2).

Basing determination of entanglement event outcome on data in original reports rather than summary tables would help minimize this source of subjectivity. Ideally the information provided will include full descriptions of the gear and nature of entanglement/collision, completeness of gear removal, type and location of gear remaining on whale, and mobility/behavior/injuries of the whale following release/collision.

Source 3: Subjectivity at Reviewer Level when determining outcome

No clear criteria have been developed by NMFS for determining how lethal an interaction is likely to be. Lacking this information, outcome determinations in this exercise often reflected personal opinions of the reviewer. For example, if inadequate information was provided to determine outcome, some reviewers "erred on conservative side" and assumed the whale died even while acknowledging such information was not provided. In some cases, individual reviewers made assumptions and interpretations regarding the outcome expected when a whale is struck by a certain size vessel moving at a certain speed, how likely a line is to be shed by a whale or a hindrance, etc. For a few events, one subcommittee member had 'inside information' about an event that was not presented in the NMFS data; their determination often contradicted the rest of the subcommittee based on outcome facts that weren't (but should have been) in reports. Two members generally assumed that a whale still entangled when last seen (regardless of where or how) would likely die while others did not make this assumption.

The subcommittee identified two ways to minimize this source of subjectivity. Foremost is establishment of criteria for determining the likely outcome of an entanglement or collision. The committee encourages NMFS to synthesize existing

empirical data that may be used to estimate the rate of survival or mortality resulting from certain entanglement circumstances. For instance, through repeated observation of known individual Atlantic humpbacks, the number of animals subsequently dying or seen free of gear following documented entanglements may be estimated. (e.g. Center for Coastal Studies data).

Secondly, subcommittee members thought events should be reviewed and their probable outcomes determined by a group of experts, knowledgeable about regional fishing gear and whale behavior, rather than by an individual. Seeking the consensus a group of experts regarding the probable outcome of entanglement events could help override individual subjectivity.

CONCLUSIONS

This exercise demonstrated that determining the probable outcome of whale entanglement or collision is currently highly subjective. In this exercise, five 'experts' did not agree 83% of time. One significant source of difficulty was traced to the loss or absence of necessary information in distilled and summarized event reports. However, the committee noted that even original reports and supplemental details still often lacked the information needed to reasonably determine an entanglement/collision event's outcome. The committee concludes that determining the probable outcome of a large whale entanglement/collision event will remain subjective until empirical data on mortality/survival-following-entanglement rates are reported and used to develop clear determination criteria.

Table 1. ASRG Subcommittee SERIOUS INJURY Retest. Outcome determination made by C= Craig Matkin, J= Jan Straley, L= Lloyd Lowry, S= Sue Hills, K= Kate Wynne. Superscripts indicate a change in determination before (1) and after (2) receiving additional information.

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
1996	"Hawaiian waters"	Released alive	Disentangled from non-fishing gear		C K J	L	
1996	Oahu, HI	Injured; status unknown	Ship strike	J		C K L	J: SHIP => BIG= DEAD
1996	Oahu, HI	Injured; status unknown	Partial disentanglement from Hawaiian crab fishery gear; some gear around pectoral fin and mouth still attached	C K		L J	
8/2/96	Sand Point, AK 96025	Entangled; status unknown	Released from fishing gear, but appeared injured; thought to have died Gear consistent with salmon set net fishing (before net is set); see detailed for further details on release and condition of whale.	C K ¹ J S ¹	S ²	K ² L	TEXT: "THOUGHT TO HAVE DIED"
8/17/96	Juneau TEMP96a	Injured	Eggers reported to Heard that he witnessed "a humpback blow very close to [Heard's] boat on [the] port side. Immediately [the boat] went airborne (the entire boat was out of the water with a foot or better of air). " Heard reported that the collision occurred in his 26' I/O fiberglass vessel at 23 mph while traveling between Amalga Harbor and PR area. A "sudden and violent impact occurred"; neither the person at the helm nor a another party who'd been looking directly ahead of the boat saw anything before the impact. There was no damage to the hull, engine or outdrive although superficial damage is noted.	S L	J K ¹	C K ²	J: HAD INSIDE INFO ON CONDITION
9/2/96	Sitka 96032	Entangled	Sitka Sentinel article reports extensive salmon gillnet entanglement (scars criss-crossing back noted) with partial release (40 ft. of net left trailing from area behind dorsal fin to tail). Believed to be resighted the next day, temporarily stranded on a shoal, then seen later with injuries [witnesses, article assumed these caused by net vs. shoal]. Article available.	S C K L	J		J: KNEW WHALE RELEASED ITSELF FROM GEAR
9/24/96	Chatham Strait 96040	Entangled	Sharpe via Jorgensen reported most gear cut away and remaining line should not hinder whale. Video made. Unless video depicts, gear type and WOW details not available.		S C K L J		
1996	Alitak Beach, Kodiak Island, AK	Released alive	Released from commercial purse seine net		C K J	L	
1997	Island of Hawaii	Released alive	Alaska crab pot floats removed by U.S. Coast Guard		J	C K L	

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
1997	Shelter Island	Alive	Collision with skiff		C K L J		SKIFF
6/29/97	Bering Straits 1997063	Entangled	USCG observed netting wrapped around ~mid-section of body including flippers, orange buoy(s) trailing. Two hand drawn illustrations available, only one buoy common to both sightings.	C K L J S K			ORIG NOTES SAY "DEAD"
7/3/97	Peril Straits, AK 97030	Injured	As reported in Sitka Sentinel: entangled in line between shrimp pot buoy and the pot, appeared the buoy was preventing animal from diving but not from swimming; buoy was being 'towed at slow pace about 100 ft behind the whale; a second line from the buoy become tangled in the outboard of the skiff attempting to disentangle the whale...'the whale took off, spinning the [Boston] Whaler around and pulling it backward and down, until the stern of the boat and the motor were completely under water...the boat swamped and flipped...one person left hanging on the hull of the boat reported 'there were two tugs and the line snapped, as the whale attempted another dive'...another observer reported that '[the whale] seemed better off after that'. The buoy was retrieved. Unknown if/how much gear remained.	C		K L J S	
7/12/97	Juneau 97032	Injured, status unknown	As reported in the Juneau Empire: 16' skiff with engine turned off was turned over by surfacing whale, destroying the engine and causing \$10,000 in loss (gear and damages).		K J S	C L	J: "SKIFFS TYPICALLY CAUSE MINIMAL DAMAGE TO WHALE"
7/13/97	Shelter Island 97031	Injured	Tail stock showing flesh injury from crab pot line and buoy. No further details on tangle available.	S ²	C K J S ¹	L	OLD INJURY?
9/15/97	Admiralty Island 97051	Alive; entangled	Free swimming animal reported to be entangled in line and a 2ft. buoy. No further details on tangle available.	C S ² J		K L S ¹	
1998	Maalaea Bay, Lanai	Alive; entangled	Disentangled from gear, but some line still attached	C		K L J	
1998	Jakolof Bay	Alive	Disentangled from personal use pot gear		C K J	L	
7/18/98	Sitka, AK 98037	Alive; entangled	Lawrie reported thick green net (fishery cbd) around head and flippers -not impeding progress (animal keeping up with others). No further details available.	C J ² S	J ¹ K	L	J/K: 'NOT IMPEDING PROGRESS'

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
7/28/98	Petersburg 1998055	Alive; entangled	Whale trailing possible king crab buoy and line, attached to tail; surfaced a under boat, shifting boat (tangle AND collision); disentangled except for a loop of line around fluke.		J ¹ K S	C L J ²	
7/31/98	Ketchikan, AK 1998057	Entangled	Salmon purse seiner reported 'whale tore through net, went down and was not seen again"; dead floater seen in area 8/5/98 assumed to be same whale. Floater not seen again.	C L S J		K	K; DOES'T ASSUME IT DIED / WAS SAME FLOATER
8/11/98	Juneau, AK 1998060	Injured	Whale surfaced under and between hulls of forward idling whale-watch catamaran; reported to be "glancing blow"; whale seen to blow and fluke with no apparent injury nor were injured whales sighted in area.		C K L J S		
8/22/98	Juneau, AK 1998063	Entangled, alive	No further information available. Report not confirmed.	J ²		C K L S J ¹	J:"PRESUMED DEAD DUE TO NO INFORMATION"
8/23/98	Wrangell, AK 1998065	Entangled, alive	Crab buoy/line. Fadely reported via Nelson "buoy line wrapped on facial barnacles, trailing line, buoy was at dorsal fin area; whale could not submerge; buoy and line easily removed with boat hook."	J ¹	C K ¹ J ² S ²	K ² S ¹ L	
9/17/98	Homer, AK 1998072	Alive; entangled	USCG Reported via Matkin: Subsistence/personal tanner crab pot line and buoy wrapped 3-4 times around the tail stock, over the fluke and probably also around one foreflipper, the pot end of the line was draped over the fluke and the whale seemed semi-immobilized; float retrieved; several inch deep scars apparent.	L J ¹ S ¹	S ²	C K J ²	
9/24/98	Juneau, AK 1998074	Injured	ENF/CG investigated. Report via Brix of "24' whale watch boat traveling at 15-18 knts ran up on the dorsal surface of animal behind blowhole, tipped the boat; whale dove and hit the kicker(knocked loose) & port side bow(cracked hull). Other animals in the group came to injured whale, circled it & swam off together. Animals were observed for a while by other charter boats who observed no change in behavior or apparent injuries."	L	C K ¹ S J ¹	K ² J ²	
10/10/98	Sitka, AK 1998075	Entangled, alive	100# Pot, red line, buoy; Sitka news reported line gear around whale through mouth, around one flipper and tail stock (pot on tail stock line); released except for line in mouth	C J ² S	K	L J ¹	NEW TEXT
10/15/98	Ketchikan 1998077	Entangled, alive	Witness, nk via NMFS reported entanglement involved 30 fa of line, 2 buoys (possibly shrimp pot gear); freely swimming animal	C J ² S	K ¹	K ² L J ¹	

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
1/6/1999	Hawaii	Entanglement	Similar to tangles seen in Sitka 1998 and June 1999 (no match possible, per Straley). Photos show line just behind blowhole, snug once (unless this is actual a white scar) and then crossing over whale a bit further down but before dorsal fin, then connecting to a single float (cylindrical, orange and white (foam?)) lying on water behind whale around about 3/4 of body length.	C L J		K S	
6/9/99	Sitka 1999056	Entangled, alive	S. Neimi (NMFS OLE) reported line and buoy wrapped around whale starting near the pec fins; a bright orange buoy without visible markings was closer to tail (about 3/4 distance from front of animal); little or nothing dragging. Large whale was having no problems diving, breathing, or swimming. NMFS had difficulty keeping up while Spirit of Endeavor reported whale to be traveling at 2 knots (Endeavor also reported seeing 3 buoys). An attempt to relocate whale on the 11th for disentanglement was not successful.	C J	K ¹ S	K ² L	
6/26/99	Resurrection Bay 1999139	Alive, status unknown	ADN article reported that couple hooked a humpback on halibut hook (100#); fisher cut line.		C K L S J ²	J ¹	
7/7/99	Sitka 1999136	Alive	73' wooden sailboat at anchor stuck by whale causing 5' hole in hull. No witness, baleen left at site	S	J ² K ²	C K ¹ L J ¹	J ² : HAD MORE INFO ON INCIDENT
9/6/99	Sisters Island 1999133	Alive, status unknown	Lobed reported via Brix that "whale surfaced underneath sailboat and brought tail down on the forward deck & damaged hardware topside & put some spider cracks in fiberglass. Boat started to take on water~ 1"(?)/min. Vessel underway (power) when incident occurred. Boat taken to Hoonah where leakage stopped. No apparent injuries to whale."		C K L S J		J ¹ : HAD MORE INFO ON INCIDENT
10/1999	Prince of Wales Island 1999122	Entangled "RELEASED" IN T.14	Pot gear, fishery cbd; Brix reported (via Freitag, via fisher) "Fisher on site when MN got caught on line of his pot gear. Freitag relayed via USCG for fisher to apply pressure/ drag [?] gear to tire whale...fisher cut buoy free from whale's mouth. Whale swam off apparently ok."		C K L S	J	OUTCOME=RELEASED IN TABLE 14
1999	Homer 1999113	Entangled	Personal use crab pot gear; USCG news reported a "crab pot buoy close to the tail with a line trailing down in the water...the crew cut the line leading to the submerged crab pot releasing tension on the line around the fluke of the whale...the rest of the buoy and line on the whale came free after we cut the trap line."		C K L J S		NOTES SAY 'HEALTHY';GOOD AMT OF INFO

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
7/8/00	Lynn Canal 2000085	Entangled, released alive, status unknown	Seine gear completely entangling whale reported via Enfs, no further information available.	C J ² S ²		K L J ¹ S ¹	TEXT DIFFERS: NOT RELEASED ALIVE
10/16/00	Uyak Bay 2000130	Entangled, released alive	Some line removed, but gear remained. Wynne reported that gear on with knot on underside of whale; "could not fully extend head or flukes because they were bound together."	C K L J S			
11/2/99	Metlakatla 1999124	Injury; status unknown	Anon. via Brix reported "Pleasure craft-bayliner- struck a humpback whale while underway near Metlakatla. Skin left on bow of vessel." Skin not collected, no further details available.		K ¹ J ¹ S ¹	C K ² L J ² S ²	J ¹ : SMALL VESSELS=> MINIMAL DAMAGE
12/4/00	Skagway 2000131	Entangled, released alive	Shrimp pot gear released REMOVED except for single buoy. Straley and Gabriele report "tight wrap of line around whale's head (just above it's pectoral fin, on it's right-hand side. A second set of 4 buoys (some of which fisher added when he saw entangled whale) was trailing behind the whale on a 50 ft piece of ~1/2" leaded polypropylene line."	C	J S ²	K L S ¹	OUCOME= RELEASED J WAS THERE AND HAD MORE INFO
1/28/01	Kauai, Hawaii 200102	Entanglement, Injured	NMFS-MN-01-02-EA; crab line and buoy removed. No details on tangle available.		K ¹ S ²	C K ² L J S ¹	
5/28/01	Resurrection Bay 200124	Entangled, released alive	Mns0101; Mixed gear described as "a single loop through mouth with several ropes connecting to 3 orange buoys, a crab pot, 2 foam floats, 30# anchor, chain, ball of fishing line" by Aderholt as quoted by Little in AND.		C K ² J ² S ²	K ¹ L J ¹ S ¹	NEW INFO: "LEFT W/PERHAPS 10FT OF ROPE IN ITS MOUTH"
6/15/01	Kodiak 200127	Entangled	Disentanglement attempted but not successful; Fishery cbd (subsistence crab or shrimp possible). Wynne reported Mother and calf towing a single small orange buoy ~35'-30' behind and between them, two lines across the calf's rostrum just forward of the blowhole; line visible across adult's back.	C J S		K L	

Year	Area	Condition	Description	Will Likely Die	Not likely to Die	Could Not be Determined	Criteria
6/19/01	Dixon Entrance 200112	Possibly injured	USCG reported Naushon traveling 12kts when "whale surfaced approximately 10 ft in front of cutter. Cutter immediately backed down and then came to all stop as the whale dived under the cutter. After a couple of minutes the lookout sighted the whale off the starboard quarter. The whale surfaced and then dived again. Personnel in forward berthing reported hearing a thump just prior to the cutter backing down. No unusual vibrations were detected when testing propulsion nor was there any blood in the water. No indications of whale strike above the waterline were evident....There were no whale sightings in the vicinity prior to the encounter."	J ²	C K L S J ¹		J: "ERR ON CONSERVATIVE SIDE"
8/7/01	Sitka 2000147	Entangled	Green net, fishery cbd, reported to be seen on top of rostrum	C		K L J S	
8/13/01	Hoonah Sound 2000148	Entangled, released alive	Shrimp pot gear; Brix recorded 'wounds on dorsal ridge and tail stock from line'; also that whale had been' tethered by the right side of mouth, with free end (which has been attached to buoy) exiting the left side of it's mouth with about 40 -50ft of nylon floating line; anchored to pot gear'	S	J K ²	C K ¹ L	K: 'INFO SAYS WHALE RELEASED'
9/19/01	Lynn Canal 2000 162	Entangled, release alive, status unknown	Shrimp pot gear wrapped on tail according to T- with Chilkat Crusies via Enfs	J ²		C K L S J ¹	
10/30/01	Sitka 2001 127	Entangled, release alive, status unknown	Longline, no further information provided by Anon boater via FWS			C K L S J	WRONG INFO; LAST SEEN SWIMMING W/GEAR

Table 2. Changes in outcome determination based on additional information.

Number of Times	<u>Will Die</u>	<u>Won't Die</u>	<u>Can'tTell</u>
Votes changed INTO this column w/more info	10	13	13
Votes changed OUT OF this column w/more info	5	14	17
Opposite direction of change by two+ members	0	1	3