

Wild Animal Mortality Investigation: Southern Resident Killer Whale L112 Final Report
And comments by KC Balcomb for the Center for Whale Research

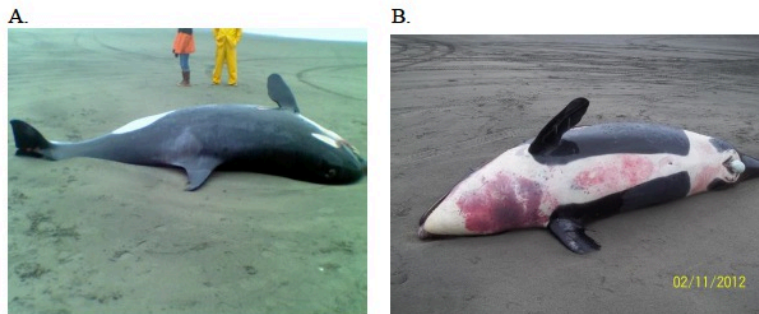


Figure 1. A. Female killer whale stranded on Long Beach February 11, 2012. Laying on right side. Note red discoloration of the skin on left side of head near gape and “rub” posterior to flipper. B. Note red discoloration on ventral surface of head, neck, and anterior chest.



Figure 2. Detailed photograph of extensive red discoloration of the skin on left side of head.

Page 2

“The acoustic data suggest that L-112 had likely been in central Oregon to northern Oregon-southern Washington waters at the time of her death. Members of L pod were photographed in Discovery Bay, WA on February 7, 2012 but L-112 was not seen there.”

[COMMENT: the acoustic data do not and cannot possibly indicate that L112 was actually heard in central Oregon-southern Washington waters just prior to the time of her death. To say this was her likely location at the time of her death is very misleading. These whales normally swim 75 miles per day, and can travel the entire coastline from California to Washington State in less than a week. (The NMFS report indicates that L

Re:http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/l112_stranding_final_report.html Page numbers refer to NMFS report

pod whale calls were detected off Fort Bragg, CA on 30 January and later off Westport, WA and San Juan Island, WA on 5 February. That evidence and satellite tracking of SRKW's and Transient KW's indicate that these animals can and do frequently travel back and forth between central California and the Washington coast in less than one week, one way.) Furthermore, L112 was already dead or mortally injured by 7 February 2012, so it is ridiculous to use her non-presence in Discovery Bay as evidence to further mislead one into entertaining relevance of the location hypothesis based upon the stale hind-cast of sketchy acoustic data. The surmise that can reasonably be made from the anomalous occurrence of K and L pod members in Discovery Bay on 7 February was that they might have fled there from the military activities in and around the Strait of Juan de Fuca for the previous three days. And then, apparently, not all of the whales may have made it to safety.]

Page 3

“Sonar and small underwater explosive activity was confirmed by the Royal Canadian Navy on February 4, 5, and 6, 2012 in Canadian waters off Vancouver Island and in the Strait of Juan de Fuca, but no marine mammals were observed during the training activities. The activities occurred too far to the north and downwind of the stranding location (prevailing winds and currents were from the south) to be a consideration. “

“In conclusion, blunt trauma to the head and neck is the prime consideration for the cause of mortality. Despite extensive diagnostic evaluation, the cause of the head and neck injuries could not be determined.”

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“In addition, it should be noted that it is common for L pod to split up and travel for extended periods in subgroups.”

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“Based on the external examination, the initial estimated time of death was from 2 to 4 days to 1 week prior to discovery. The estimated window for time of death was later expanded to as long as 10 days based on the degree of post-mortem autolysis noted on histopathology.”

Page 11

“Dissection of the tympanic bullae revealed that the right bulla was less firmly attached to the skull and significantly looser than the left bulla.”

[COMMENT: **both** bullae were dislocated from their bony attachment to the skull (displaced bony fragments cited in necropsy report and CT scans). While the NMFS statement is correct, it discounts this significant bilateral ear displacement evidence of blast trauma.]

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“The absence of right cerebral hemisphere and right cerebellum of the brain was secondary to loss of tissue during disarticulation of the head. Significance is uncertain based on imaging alone, but unilateral loss of brain tissue is unusual”.

[COMMENT: UNUSUAL! The right cerebral hemisphere and cerebellum were completely

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mushed (axonal shearing and cellular disintegration?) and there was evidence of hemorrhage in the calvarium, both significant findings of brain damage from a blast impact. The observations **are** consistent with blast trauma, and significance should not be discounted!]

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“Skeletal flensing, cleaning, and disarticulation of the skeleton revealed no bone fractures. However, CT scan of the cervical vertebrae detected a defect in the dorsal lamina and no dorsal spinal process of C7. Based on follow up gross examination of the vertebra, it was concluded that this malformation was likely congenital and pre-existing the stranding and likely not because of physical trauma.”

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“Between 08:00 and 09:00 on February 5, 2012, S16 calls (used by both K and L pods) were heard on the recorder located about 5 miles west of Westport, a distance of 531 miles north of the Fort Bragg recorder, indicating an average speed of approximately 4.5 miles per hour if this was the same group of whales. After the December 15, 2011 detection the Cape Flattery offshore hydrophone did not detect SRKW calls again until March 4, 2012.”

[COMMENT: What happened to the inshore hydrophone at Cape Flattery? Do any of the hydrophones deployed by NMFS or DFO or Project Neptune have evidence of SONAR or explosions or SRKW vocalizations in the February 4-6 2012 timeframe?? It would be very interesting to review acoustic evidence on 5 February off Westport of whales that may have travelled to Discovery Bay by 7 February 2012.]

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“The acoustic recordings support the hypothesis that a group of whales possibly including the L4 sub-group and L-112 were present and could have been transiting in the area of the Columbia River plume during the time frame of the mortality and subsequent stranding.”

[COMMENT: It is pretty strong wording to say that the acoustic data **SUPPORT** the NMFS preferred hypothesis when such **conclusion** based upon this evidence is impossible.]

“ERD further advised that floating debris arriving from the open sea to the west or north of Long Beach would have been carried northward by the current to be deposited elsewhere on the Washington or British Columbia coasts, not on Long Beach near the mouth of the Columbia River. Figure 11 depicts patterns of surface drifters deployed by the University of Washington off the mouth of the Columbia River in 2005. These patterns illustrate the eddy circulation in the region. The cyan surface drifter tracks (from August 17) represent conditions that are most similar to the winds and currents off the Washington and Oregon coasts in February 2012. The tracks further substantiate the potential for objects floating in the plume to be deposited on Long Beach. Moreover, drift patterns from the prevailing winds and currents for this period indicated a northward flow along the Washington and Oregon coasts so that a floating object from far off of the Washington coast or farther to the north would be unlikely to have been deposited on the southern end of the Long Beach Peninsula.”

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“**Acoustic Recordings and External Inquiries for Information:** On February 6, 2012, researchers monitoring hydrophones deployed in the inland waters of Washington detected sounds identified as military mid-frequency sonar and possibly explosions. The researchers

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linked the sounds to a Canadian Navy exercise in the Strait of Juan de Fuca involving the HMCS Ottawa. The researchers accessed Automatic Identification System data from Marine Traffic to retrace the movements of the HMCS Ottawa as it departed and returned from the North Pacific off Vancouver Island in the days prior to the exercise in the Straits. Reports of the sonar detections and accompanying impulsive sounds were published in the media and prompted considerable public interest and concern over potential sonar impacts to SRKW's. The concern intensified with the discovery of L-112 stranded on Long Beach 5 days later on February 11."

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"NOAA Fisheries requested information on naval activities from the Royal Canadian Navy. The Canadian Navy confirmed the use of sonar and small under water charges in Canadian waters west of Vancouver Island and in the Strait of Juan de Fuca. On February 4, Canadian naval exercises using a small (1.4 kg) explosive charge and sonar were conducted in Canadian waters approximately 85 miles northwest of the Strait of Juan de Fuca. According to the Navy report, the "kill radius for a human diver from the type of charge used is approximately 15 yards." Sonar was operated for approximately 8 hours at this general location. A similar exercise occurred approximately 90 miles northwest on February 5 when two small charges were deployed, one in the morning and one in the afternoon, and sonar was operated for approximately 11 hours in this general location. After the offshore exercises, the HMCS Ottawa returned to the Strait of Juan de Fuca using sonar while in transit to Constance Bank. On February 6, 2012, two small explosive charges were deployed in the morning as part of an anti-submarine warfare exercise near Constance Bank. In each case, the HMCS Ottawa adhered to their Marine Mammal Mitigation Policy prior to deploying the small charges and while using ships' sonar. Marine mammals were not detected in the area of the exercises by shipboard lookouts nor passive sensors, according to the Navy's report (Appendix F)."

[COMMENT: The US Navy report on dolphin mortalities resulting from a similar small explosive charge near Silver Strand Training Complex in southern California indicated that a 640 yard mitigation zone was in effect for that event which still killed at least three dolphins. One of the mortally injured dolphins from the Silver Strand military exercise came ashore "68 km north of the detonation site, 3 days later". It seems most gratuitous of the NMFS report of investigation of L112's death to state: "In each case HMCS Ottawa adhered to their Marine Mammal Mitigation Policy prior to deploying the small charges..." when the RCN report only specified a lookout survey of the area prior to deploying the **first** explosive charge on 4 February. The question should be posed to RCN whether lookouts were also employed prior to deploying the explosive charges on 5 and 6 February 2012, and whether any of these activities were in US waters (requiring authorization?). NMFS additionally indicates that passive sensors were also used for mitigation, but there is no mention of such mitigation in the RCN report appended to the NMFS summary finding (Appendix F). Hydrophone sensors at Folger Deep off Barkley Sound, Neah Bay, Lime Kiln, and Orca Sound all indicated SRKW's were in the operating area at the time of the "Ottawa" and "Algonquin" SONAR and explosive exercise.]

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"Law Enforcement Investigation: An initial investigation into cause of death was

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undertaken by the NOAA Office of Law Enforcement. No subjects or witnesses with knowledge of the circumstances associated with or leading to the death of L-112 were identified. The case was closed due to a lack of evidence to support that a crime occurred.”

[COMMENT: No evidence to support that a crime had occurred? This necropsy report and investigation are prima facie evidence that a crime or crimes occurred. For starters, one might ask if the RCN had a US harassment permit to conduct SONAR and explosive activities in US waters during the 23 hours of SONAR and four explosive detonations that are admitted in Appendix F. And, one might question whether the NMFS report is intended to mislead, or simply not the truth, the whole truth, and nothing but the truth.]

Page 23

“Head imaging studies (CT scans) (Appendix E) and gross dissection showed disruption of the right cerebral hemispheres with marked accumulation of clear fluid, variably extensive hemorrhage, and collapse of the dura. Microscopic examination of brain sections disclosed tissue fragmentation and breakdown with no associated hemorrhage, fluid accumulation, or protein loss. These changes were consistent with freeze artifact and tissue breakdown because of post-mortem decomposition (autolysis) rather than a traumatic insult. Imaging studies also detected multiple bone fragments with soft tissue associated with the left ear bullae, and gas was noted in the right bullae. Conclusions from the CT scan of the right and left bullae at 1-mm slices did not show any evidence of fractures, dislocation, or crushing. The soft tissue or fluid attenuating material in the cochleae could be either pre- or post-mortem. There was no definitive evidence of acoustic damage to the boney ear structures of this whale identified from the CT study.”

Page 26/7

“The flow models and drift card studies indicate that current conditions off the Long Beach Peninsula are largely influenced by eddies created by flows from the mouth of the Columbia River. In the days prior to the stranding, eddies would have flowed northward under the influence of the prevailing wind and currents, allowing floating debris trapped in eddies to be deposited on Long Beach. Floating debris arriving from the open sea to the west or north of Long Beach would have been carried northward by the current to be deposited elsewhere on the Washington or British Columbia coasts. Because of prevailing currents and eddies it is unlikely that L-112 died in Canadian waters or the Strait of Juan de Fuca and drifted south, but instead likely died in the Columbia River plume or farther to the south along the coast of Oregon. Given the state of decomposition at the time of stranding the body was either carried by eddies for several days or may have drifted a substantial distance from the south before being trapped by the eddies and cast ashore on

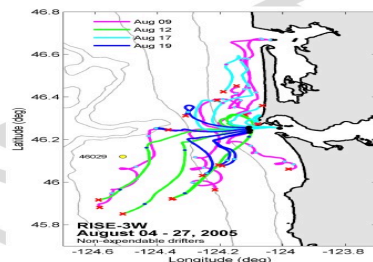
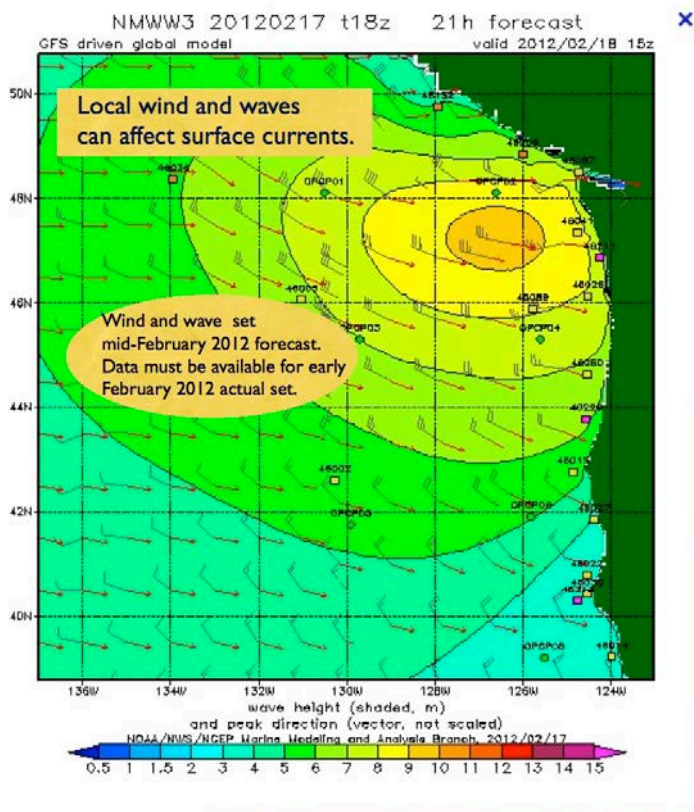


Figure 11. Patterns of drift for surface drifters deployed by the University of Washington off the mouth of the Columbia River from August 9-19, 2005.

the Long Beach Peninsula.”



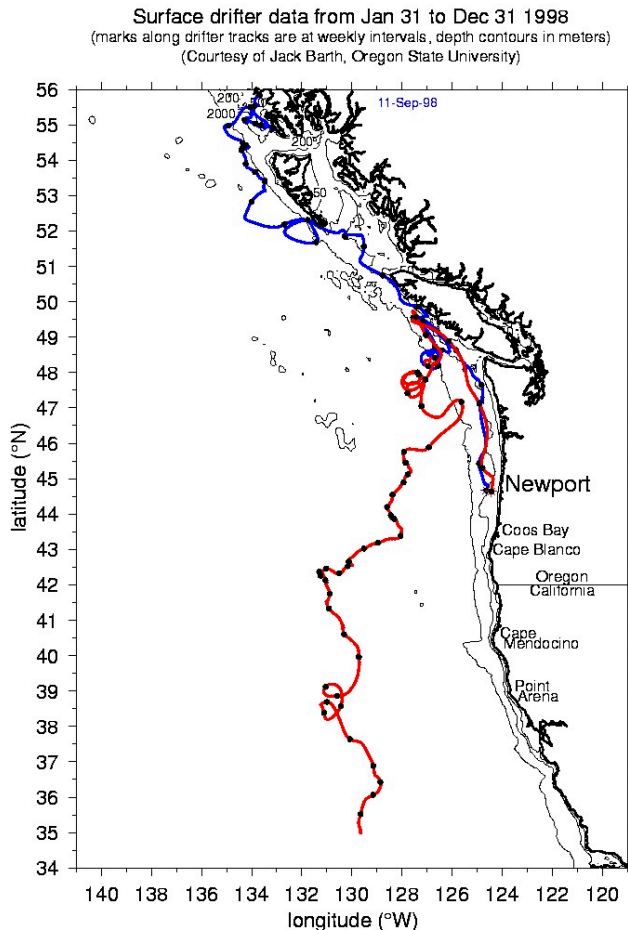
[COMMENT: These drifter patterns are from devices deployed near the entrance to the Columbia River in August 2005 (summer pattern)! Yet they are used to illustrate assumed surface current patterns in February 2012 (winter pattern). The general near-coastal surface current patterns are very different in winter versus summer, though it is true that the general winter pattern is for near coastal currents to be north-setting, whereas summer pattern is generally south-setting. There are variations and anomalies in the surface current patterns that are caused not only by winds, but also by water masses of different temperature moving around. The diagram on the next page shows drift patterns from two drifters released near Newport Oregon on 31 January 1998 (winter pattern). Four weeks later both drifters were off the west coast of Vancouver Island near Location A indicated in the Canadian Royal Navy response. One of the drifters (red) then meandered in a southerly direction, while the other (blue) at first meandered in a southerly direction and then meandered in a northerly direction. The drift patterns can be quite different from year to year, as well as from season to season, or even week to week. It is regrettable that drifters were not deployed near the west entrance to the Strait of Juan de Fuca in February 2012. There was a NOAA cruise in these waters at that time, and I asked the chief scientist to deploy drifters or some identifiable devices to ascertain the real time drift pattern at that time. One can surmise from the temperature regimes that were documented real-time that there was an anomalous cold water regime moving in a southerly direction in February 2012, but there were no current measurements.

<http://wattsupwiththat.com/2012/03/08/february-2012-sea-surface-temperature-sst-anomaly-update/>

At the very least, I think it advisable to deploy drifters at the time and location of ANY

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explosive or SONAR operations that are conducted in these waters by either the US or Canadian armed forces. These waters are, after all, either designated critical habitat or high use areas by SRKW's, and it is risky to conduct known lethal activities in their habitat. The deployment of drifters would provide extremely valuable information for investigation of any potential mortalities that were not observed at the time of military operations (Exercise).]



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“As a result of inquiries for information on military exercises we learned that no U.S. or Canadian military activities involving sonar or explosives, except those reported from Canada and the Strait of Juan de Fuca, were undertaken off the coast of Oregon or Washington where L-112 appears most likely to have been at the estimated time of her death. Similarly, there were no in-water construction or seismic activities using explosives either permitted or reported in the area of the stranding, nor were any explosive events detected on the hydrophones deployed near Westport, Washington, or Newport, Oregon at the time. The CT results showed no evidence of bone fractures or damage to the middle or inner ear bones. These results do not conflict with gross observations and the proposed cause of acute or peracute death by blunt force trauma; however, blast- or seismic-related injuries cannot be entirely discounted.”

[COMMENT: upon gross dissection **both** tympanic bullae were found to be dislocated from their fragile bony pedestals anchoring them to the cranium. While it may be accurate to say

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that no evidence of fractures or damage to the middle or inner ear bones on the CT scans, it is misleading to infer that no damage was evident to the ears (see page 11 of Necropsy report).]

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“The primary signs of injury reported from aggressive attacks are rake marks, musculoskeletal and/or intra tissue trauma (bruising, tearing) attributed to ramming and sometimes death. Contrary to the cases reported in the literature, L-112 was a juvenile animal (older and larger than a calf or neonate), and the examiners did not document tooth rake marks associated with the signs of hemorrhage they observed during the gross examination. Nevertheless, we cannot rule out the possibility that L-112 suffered injuries from an aggressive attack, such as ramming, by a larger animal.”

[COMMENT: The presumed hypothesis suggested by the last sentence is absolutely preposterous, given the evidence of a massive single traumatic event causing the mortal injury. To not rule out the attack hypothesis while ruling out blast trauma is ludicrous.]

I request that this entire investigation be re-opened, and that my comments on the report itself be addressed, including submission of additional evidence of the oceanographic situation in February 2012, and such other evidence as may present. I consider the evidence presented in the NMFS report to be selected and filtered to depict a preferred hypothetical scenario, rather than one that may be more realistic.

I further request that the investigation team thoughtfully consider the relevant cetacean epimeletic behavior appended in a pdf of Caldwell and Caldwell, 1966 titled Epimeletic (Care-giving) Behavior in Cetacea [In] Norris, Whales, Dolphins and Porpoises, UC Press.

And,

Aquatic Mammals 1994, **20.1**, 53–56

Carrying of dead calves by free-ranging Texas bottlenose dolphins (*Tursiops truncatus*)

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Observed and inferred epimeletic (nurturant) behaviour in bottlenose dolphins

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For awhile I was concerned that my alternate epimeletic hypothesis was not parsimonious, and I was reluctant to propose it; but, upon deep reflection I consider the conduct of military activities known to be injurious to living animals in their critical and well used habitats, together with invoking ephemeral surface currents, to be even less parsimonious. It is not sufficient mitigation to “spin-doctor”, post mortem, the accounts of actual evidence of impacts to accept a preferred hypothesis that permits unmitigated continuation of these activities.

In my discussions with forensic members of the investigation team, the main “evidence” for discounting RCN involvement is that on post-mortem day 6 (5 Feb 2012) or day 7 (4 Feb 2012) the distance reported by RCN from Location A to Long Beach 215 nautical miles away = 35.8 NM per day (1.5 knots) or 30.7 NM per day (1.3 knots) – too far for a carcass to drift. But, what if the carcass was not drifting? The average speed of travel for a SRKW is about 3.75 knots unimpaired. If a whale is pushing or carrying a carcass of its offspring, presumably the average swimming speed would be reduced. It is well documented that mother killer whales will sometimes support and push their dead offspring for days. Astonishingly, the epimeletic factor was not even considered by the investigation team although it is a well-known behavioral response of cetaceans since the time of Aristotle (see Caldwell and Caldwell, 1966, excerpts attached.) Furthermore, there is abundant scientific literature describing this behavior, e.g., the bibliography presented by Fertl and Schiro:

ungulates (B. Smuts, pers. comm. in Connor & Smolker, 1990). As noted by Connor and Smolker (1990) and iterated by Lodi (1992), only with continued in-depth reporting of such apparently maladaptive behavior can an understanding of this phenomenon be reached.

Acknowledgements

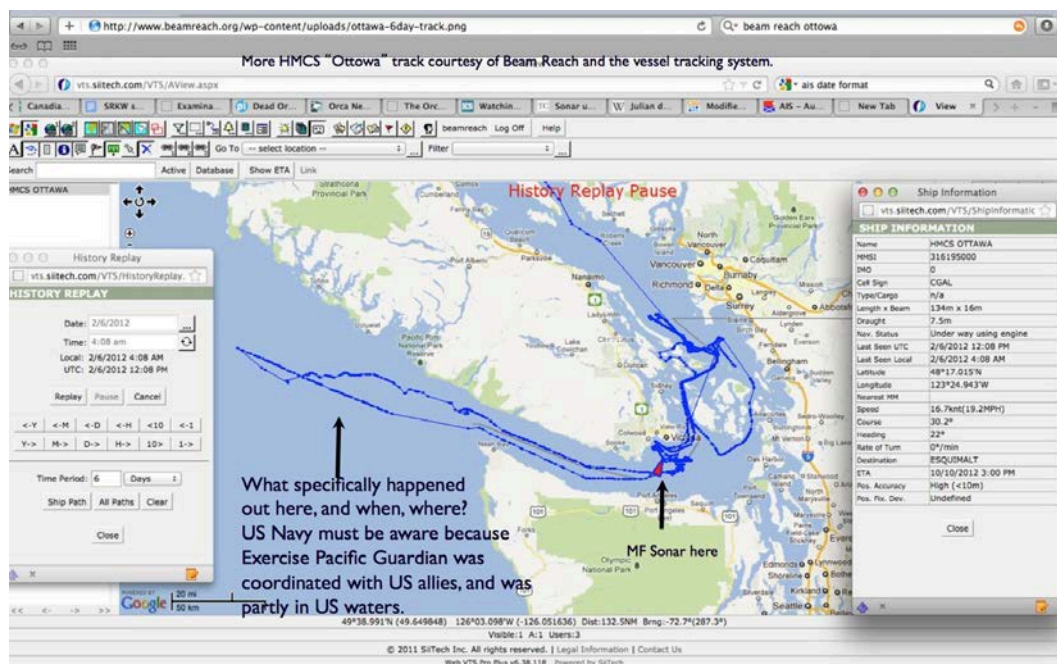
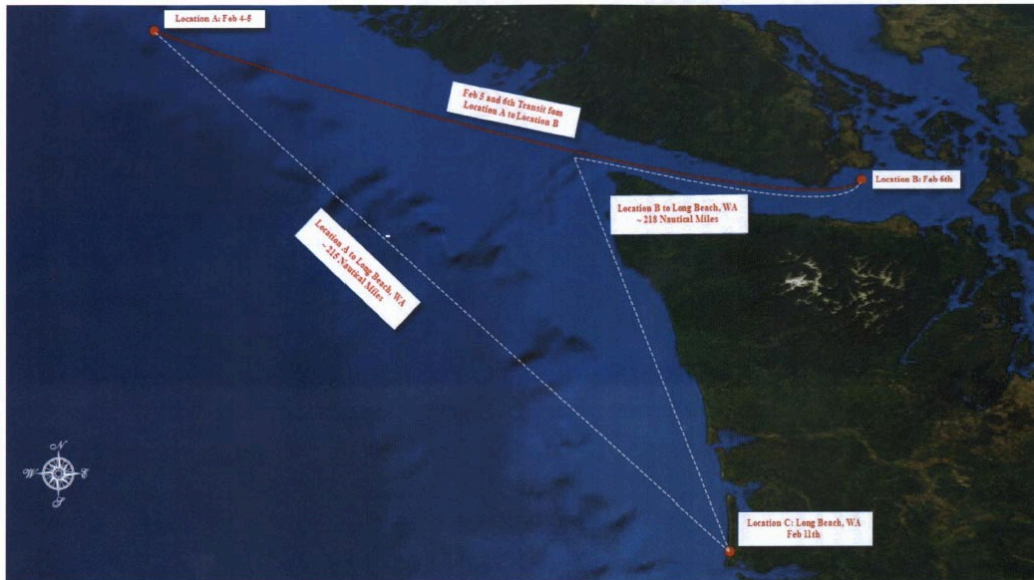
We thank Graham Worthy, the Texas Marine Mammal Stranding, Network, Linda May, and Danielle Waples for allowing us to publish the anecdotal reports. Bernd Würsig and Graham Worthy improved this manuscript with their comments. This represents contribution No. 29 of the Marine Mammal Research Program, Texas A & M University at Galveston.

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Hoyt (1981) in “Orca, the whale called killer” on page 92 states: “Among cetaceans, and especially the dolphin family (including orca), care-giving behavior to sick or wounded family members seems exemplary. Moby Doll was supported by members of his family after he was harpooned in 1964. On another occasion off the B.C. coast, a young killer whale was hit by a government ferry boat, the propeller accidentally slashing its back. The ferry captain stopped the boat and watched a male and a female supporting the bleeding calf. Fifteen days later, two whales supporting a third – presumably the same group- were observed at the same place.” Compare the following two images of the actual events. Which is more honest?



Re: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/l112_stranding_final_report.html Page numbers refer to NMFS report

See: <http://m-e-e-r.de/index.php?id=559&L=2>



Re:http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/l112_stranding_final_report.html Page numbers refer to NMFS report

These comments are dedicated to L86 and L112, the most overtly affectionate mother/offspring pair of whales that I have ever seen. Rest in Peace L112, we miss you.

Kenneth C. Balcomb 23 March 2014 San Juan Island