Satellite tagging of south-bound female humpback whales in the Kimberley region of Western Australia: field report

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Introduction

The population of humpback whales that migrate along the west coast of Australia and calve in the Kimberley region of Western Australia is increasing in size but has not yet recovered from industrial whaling. The latest abundance estimate suggests this west coast population is now over 20,000 individuals and is probably increasing at a rate greater than 10% per year (Hedley *et al.*, 2009).

Although the general timing of the migration and approximate distribution of migrating whales has been described for this population the specific migratory routes, habitat use, resting areas, calving areas and the individual behaviours of the males, females and mothers with calves are not well described (Jenner *et al.*, 2001). A greater understanding of the movement and migratory behaviours of these whales is consequently desirable to better inform the management of proposed and existing industrial activities within or close to the calving and migratory areas and to maximise conservation outcomes for whales.

The specific objective of this project was to deploy satellite tags on 30 south-bound humpback whales in or near their known calving grounds in the Kimberley region of Western Australia. Females with calves were preferentially tagged as it is the behaviour of these animals that is of most interest to conservation managers and other stakeholders as it is these animals that are likely to be the most sensitive to industrial activities and other anthropogenic disturbance.

Methods

The field-based research team for this project was Vanessa Boladeras, Mike Double, Curt Jenner, Micheline Jenner, Rebecca McCauley and Dale Peterson. *R/V Whalesong II* was used as the primary

sightings platform throughout; however, all tags were deployed from a 5 metre rigid-hulled inflatable *Mega*.

The tags and tagging methods are described in detail by Gales et al. (2009). Only pods identified to include mothers with their calves were approached for tagging. To minimize disturbance, no biopsies were taken for genetic sexing; all tagged animals were assumed to be female because they were accompanied by a young calf. Following each deployment, we used a hand-held receiver to check that the tag was transmitting.

Whenever possible all the whales encountered during the research period were photographed for photo-identification studies and detailed photographs were taken of each tag deployment. For each deployment we also recorded deployment time, deployment location, tagging distance, gun pressure, percentage implantation of the tag, pod size, pod composition, the whale's reaction to the deployment and the weather and sea conditions.

Preliminary Results and Discussion

Twenty-three satellite tags were deployed during 14 days of fieldwork from the 24th august to 6th September 2009 (Table 1); all were deployed on female humpback whales accompanied by a calf (Table 2). The tags were deployed in three regions: Camden Sound (5); Buccaneer Archipelago (6); and Pender Bay (12) (Table 2; Figure 1).

Generally the females were wary of our approach and often became evasive so tagging opportunities were few. Opportunities to deploy tags were also restricted by a scarcity of whales in the Camden Sound and Buccaneer Archipelago regions and also due to unsuitable weather caused mainly by the occurrence of a strong sea breeze most afternoons.

Tag performance up to the 22nd September is summarised in Table 3 and the tracks are presented in Figure 3. Generally tag performance was disappointing; three tags failed to provide any location data, and a further seven failed to provide any location data after the day of deployment. Tag longevity as of the 29th September is presented in Figure 3. The tag performance is the poorest of the last three deployment projects conducted by the AMMC (Figure 4). It is highly likely that the tag performance is lower for the Kimberley and the Evans Head (northern NSW) deployments because at these points of their migration the whales are in shallow waters where it is possible for the whales to damage the tag on the sea floor. Also, for Kimberley deployments where all the tagged animals were cows with calves, the tags may be damaged by the calf or by adult males chasing or courting the female.

Despite the high tag attrition, as at the 22nd September the dataset included 191 whale-days of location data and 947 locations of B class and above (Table 3). The migration behaviour of eight female humpback whales was obtained for the region between Pender Bay and Eighty Mile Beach, the section of greatest interest for this particular study due to the proposed development at James Price Point (Figure 2).

Once all tags have ceased transmitting and the dataset is complete the location will be analysed in detail with a focus on migration routes, migration diversity, distance offshore, traveling speeds, resting periods and resting locations.

Acknowledgements

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References

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Table 1. Summary of field activities and the temporal distribution tag deployments over the 14 day field project.

Day	Date	Activity	Number of tags deployed
1	24/08/2009	Left Broome for Camden Sound	
2	25/08/2009	Arrived Camden Sound	1
3	26/08/2009	Full day tagging	2
4	27/08/2009	Full day tagging	1
5	28/08/2009	Traveled to Buccaneer Archipelago	1
6	29/08/2009	Full day tagging	2
7	30/08/2009	Full day tagging	4
8	31/08/2009	Traveled to Pender Bay	0
9	1/09/2009	Full day tagging	2
10	2/09/2009	Full day tagging	3
11	3/09/2009	Full day tagging	1
12	4/09/2009	Full day tagging	3
13	5/09/2009	Full day tagging	2
14	6/09/2009	Returned to Broome	1
		Total	**23**

Table 2. Deployment information for the 23 satellite tags deployed on female humpback whales between August 25th and September 6th 2009.

Number	Tag number	Date	Time (local)	Place	Latitude	Longitude	Sex	Age	Pod
1	96396	25/08/2009	14:20	Camden	15.6267	124.1333	Female	Adult	Cow/calf
2	96406	26/08/2009	9:15	Camden	15.4450	124.3667	Female	Adult	Cow/calf
3	96381	26/08/2009	10:05	Camden	15.4433	124.4000	Female	Adult	Cow/calf
4	96384	27/08/2009	15:22	Camden	15.5175	124.3167	Female	Adult	Cow/calf
5	96392	28/08/2009	11:50	Camden	15.4883	124.4500	Female	Adult	Cow/calf
6	96388	29/08/2009	10:12	Buccaneer	16.0847	123.3667	Female	Adult	Cow/calf
7	96379	29/08/2009	12:27	Buccaneer	16.0617	123.6333	Female	Adult	Cow/calf
8	96399	30/08/2009	8:44	Buccaneer	16.0733	123.6333	Female	Adult	Cow/calf
9	96408	30/08/2009	10:25	Buccaneer	16.0500	123.6500	Female	Adult	Cow/calf
10	96400	30/08/2009	15:15	Buccaneer	15.9250	123.7000	Female	Adult	Cow/calf
11	96397	30/08/2009	15:50	Buccaneer	15.9150	123.7000	Female	Adult	Cow/calf
12	96409	1/09/2009	11:57	Pender Bay	16.5300	122.7000	Female	Adult	Cow/calf
13	96402	1/09/2009	13:24	Pender Bay	16.5800	122.6833	Female	Adult	Cow/calf
14	96382	2/09/2009	9:39	Pender Bay	16.6833	122.6500	Female	Adult	Cow/calf
15	96410	2/09/2009	10:16	Pender Bay	16.6767	122.6500	Female	Adult	Cow/calf
16	96394	2/09/2009	14:01	Pender Bay	16.6200	122.6167	Female	Adult	Cow/calf
17	96389	3/09/2009	11:35	Pender Bay	16.6467	122.6667	Female	Adult	Cow/calf
18	96393	4/09/2009	8:33	Pender Bay	16.6850	122.7000	Female	Adult	Cow/calf
19	96411	4/09/2009	10:22	Pender Bay	16.6850	122.6667	Female	Adult	Cow/calf
20	96407	4/09/2009	11:32	Pender Bay	16.7150	122.6333	Female	Adult	Cow/calf
21	96383	5/09/2009	8:28	Pender Bay	16.6717	122.6667	Female	Adult	Cow/calf
22	96387	5/09/2009	8:46	Pender Bay	16.6800	122.6667	Female	Adult	Cow/calf
23	96391	6/09/2009	9:05	Beagle Bay	16.8433	122.4000	Female	Adult	Cow/calf

Table 3. The performance of the 23 satellite tags as at the 22nd September 2009 (UTC). The tags in bold are those still providing regular location data. The location grades (3 to B) indicate the approximate accuracy of each location ranging from <250m (3) to greater than 1.5km (0). The accuracy of A and B graded locations cannot be estimated (www.argos-system.org). All dates are derived from Argos satellite data and so are reported in UTC.

Number	Tag	Start Date	Last Date	No. of days	No. of locations	3	2	1	0	A	B
1	96396	25/08/2009	29/08/2009	5	26	5	6	6	1	5	3
2	96406	26/08/2009	26/08/2009	1	1	0	0	0	0	1	0
3	96381	26/08/2009	26/08/2009	1	12	2	1	4	2	1	2
4	96392	26/08/2009	26/08/2009	1	0	0	0	0	0	0	0
5	96384	27/08/2009	20/09/2009	25	139	13	46	32	12	16	19
6	96388	29/08/2009	2/09/2009	5	37	6	12	8	4	4	3
7	96379	29/08/2009	29/08/2009	1	10	1	2	3	2	0	2
8	96399	31/08/2009	9/09/2009	10	15	1	1	1	1	4	7
9	96408	30/08/2009	17/09/2009	19	116	11	41	29	10	13	10
10	96400	30/08/2009	20/09/2009	22	137	13	46	32	16	15	15
11	96397	30/08/2009	30/08/2009	1	12	5	3	1	2	1	0
12	96409	1/09/2009	1/09/2009	1	7	1	3	2	0	0	1
13	96402	1/09/2009	1/09/2009	1	0	0	0	0	0	0	0
14	**96382**	**2/09/2009**	**22/09/2009**	**21**	**71**	**7**	**9**	**14**	**4**	**23**	**14**
15	96410	2/09/2009	7/09/2009	6	27	2	5	8	1	4	7
16	96394	2/09/2009	2/09/2009	1	0	0	0	0	0	0	0
17	**96389**	**3/09/2009**	**22/09/2009**	**20**	**63**	**4**	**5**	**14**	**6**	**15**	**18**
18	96393	4/09/2009	9/09/2009	6	28	5	3	8	3	4	5
19	96411	4/09/2009	11/09/2009	8	42	2	16	14	2	6	2
20	96407	4/09/2009	11/09/2009	8	45	5	7	18	7	5	2
21	96383	5/09/2009	5/09/2009	1	4	0	0	0	2	1	1
22	96387	5/09/2009	5/09/2009	1	1	0	0	0	1	0	0
23	**96391**	**6/09/2009**	**22/09/2009**	**17**	**105**	**18**	**34**	**23**	**7**	**10**	**12**

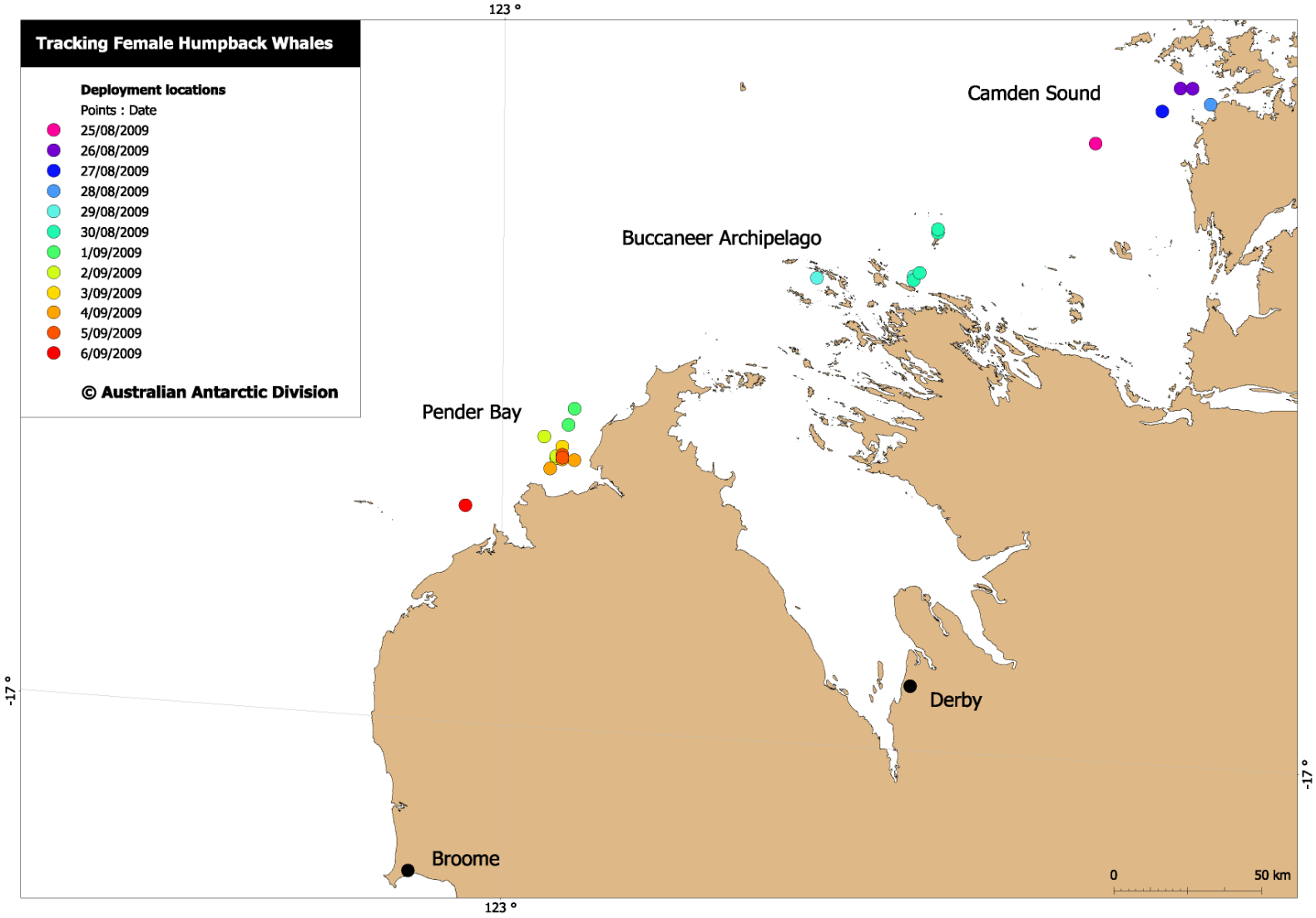

Figure 1. Deployment locations of the 23 satellite tags.

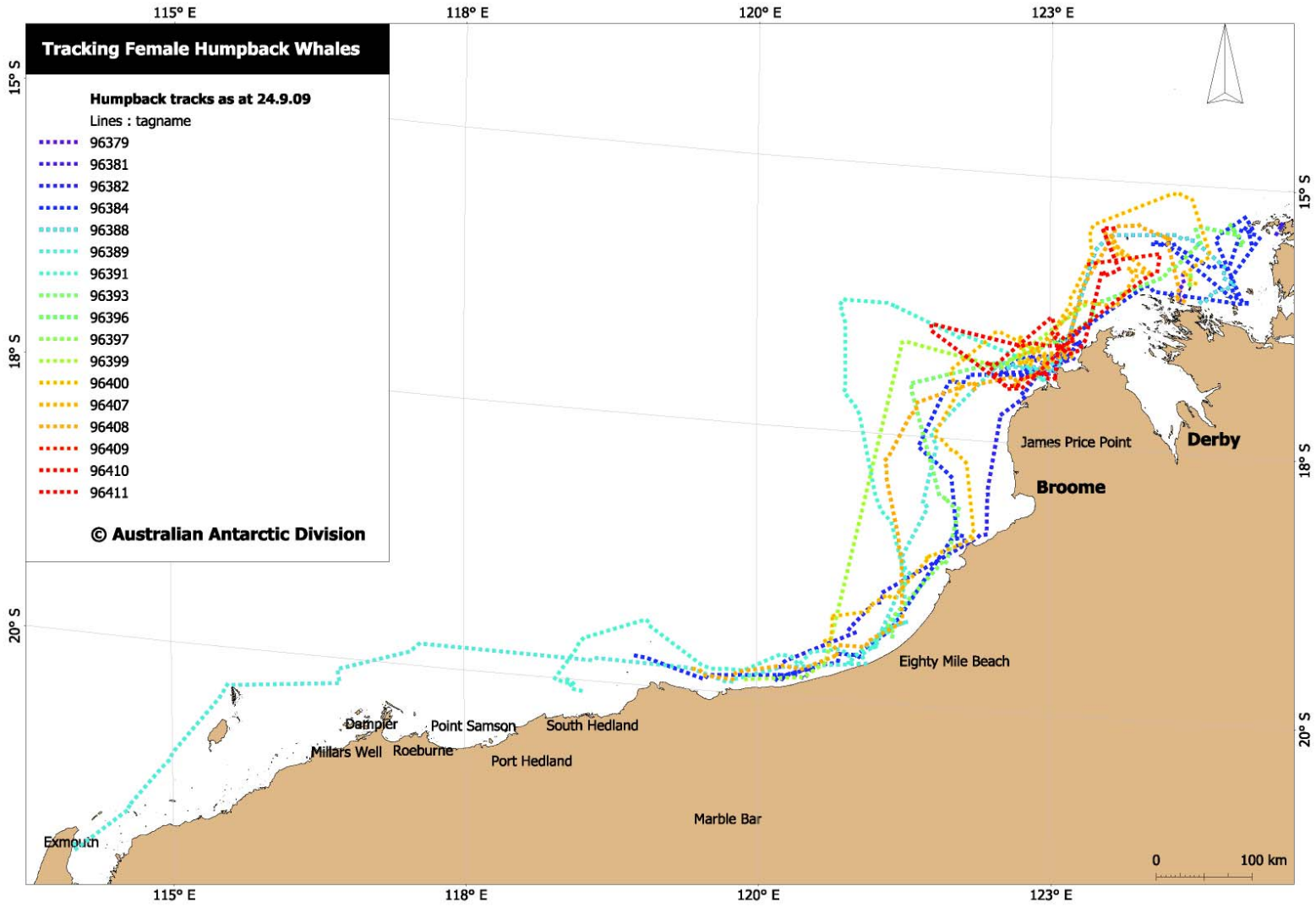

Figure 2. Tracks obtained from 17 of the 23 satellite-tagged female humpback whales. Six tags provided few or no location data and therefore do not appear in this figure.

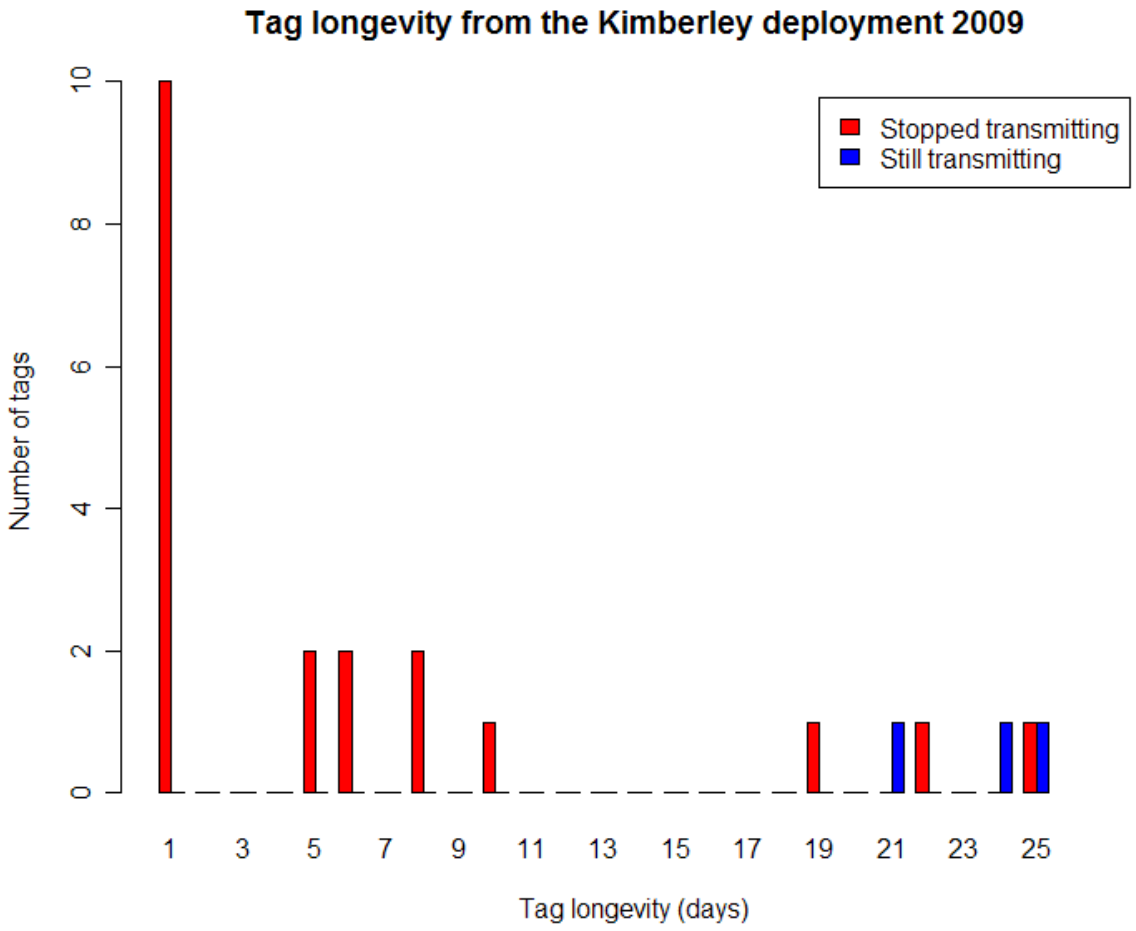

Figure 3. The longevity of the 23 tags deployed on female humpback whales off the Kimberley (as at 27th September 2009).

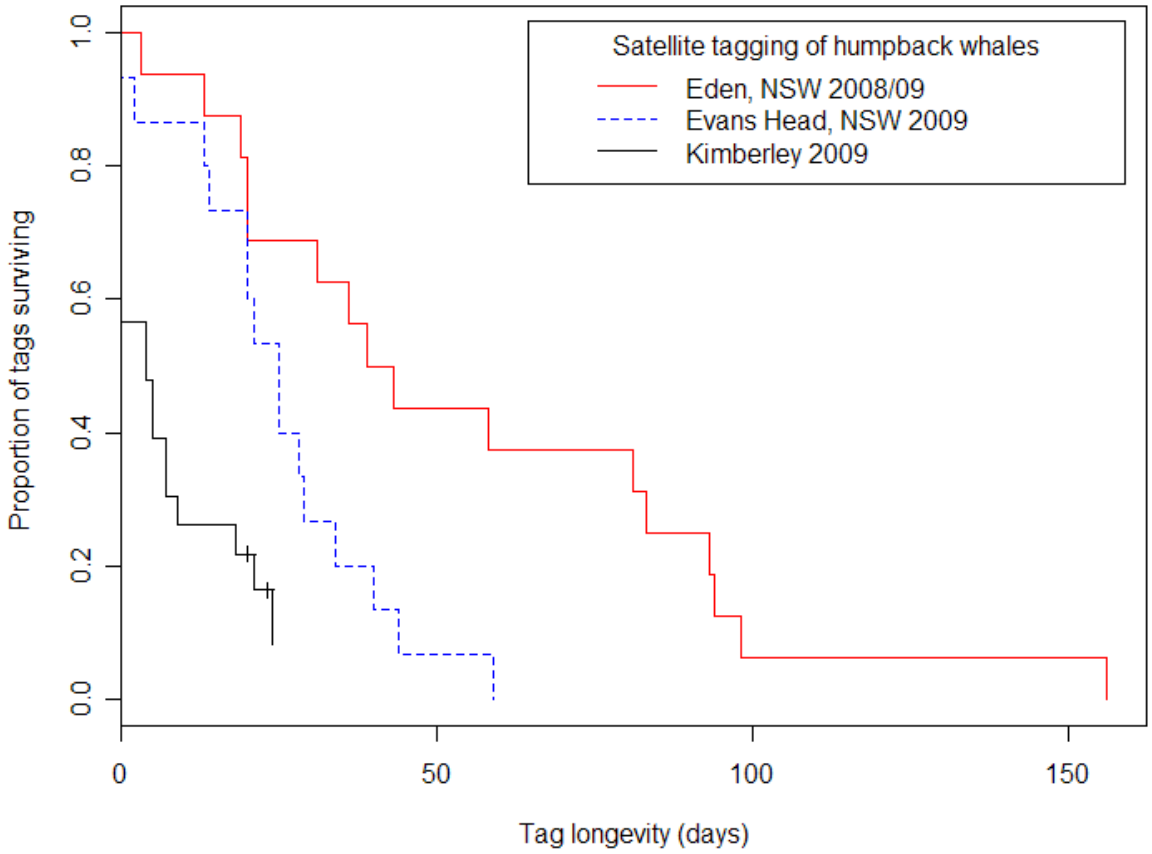

Figure 4. Summary of tag survival from the last three satellite tag deployment projects conducted by the AMMC.