Working Paper for IWC Workshop on
WELFARE ISSUES ASSOCIATED WITH THE ENTANGLEMENT OF LARGE WHALES

SOUTH AFRICAN NATIONAL REPORT ON ENTANGLEMENT OF WHALES INCLUDING SPECIES, LOCATIONS, TYPES OF ENTANGLEMENT, GEAR TYPES AND RELEASE ATTEMPTS ***(FOLLOWING OUTLINE FOR THIS SECTION IN*** IWC/61/WKM&AWI 7)

Prepared by Michael Meÿer[1], Peter Best[2], MichaelAnderson-Reade[3] and Steve Kirkman[1]

[1] Marine and Coastal Management, Department of Environmental Affairs and Tourism, Private Bag X2, Roggebaai, South Africa 8012.
[2] Mammal Research Institute, University of Pretoria, c/o Iziko South African Museum, P.O. Box 61, Cape Town, South Africa, 8001
[3] KwaZulu-Natal Sharks Board, Private Bag 2, Umhlanga Rocks 4320, South Africa

mmeyer@deat.gov.za

Introduction

Approximately forty species of whales and dolphins occur in South African waters. They are mainly pelagic, occurring off the continental shelf. Only eight species regularly occur inshore, within the influence of static fishing gear. These include three large whale species, namely the southern right whale (*Eubalaena australis)*, humpback whale (*Megaptera novaeangliae)* and Bryde's whale *(Balaenoptera brydei)* and several small delphinid species. Known occurrences of large whale entanglement in static fishing gear have involved only southern right and humpback whales, but Bryde's whales are also vulnerable in this regard. In KwaZulu-Natal (KZN) mainly southern right and humpback whales have been caught in KwaZulu-Natal Sharks Board (KZNSB) shark meshing nets that are used for beach protection. Fewer numbers of minke (*Balaenoptera spp*.), sperm (*Physeter macrocephalus*) and bryde's whales have also been caught in the shark nets.

Historically, whale entanglement within South African waters was low in comparison to internationally reported levels. Since 1999, however, incidents of entanglement have increased substantially. In response, the South African Whale Disentanglement Network (SAWDN) was formed under the auspices of the then Department of Environmental Affairs and Tourism (DEAT), becoming operational in 2006. In KwaZulu-Natal (KZN), large meshed gill nets (shark nets) have been set off popular tourist beaches since 1952 to reduce the risk of shark attack. The KwaZulu-Natal Sharks Board (KZNSB), formed in 1964, is responsible for maintaining these nets and has always attempted to disentangle entrapped whales, with record-keeping dating from 1981. Disentanglement methods have been refined since the late 1990s, however, in response to an increased incidence of entanglements. The majority of whale entanglements recorded in South Africa have been attributed to fishing gear from the rock lobster industry and the shark nets off the KZN coastline. This study reports on all known records up to 2009, including species, locations, types of entanglement, gear types and release attempts.

Methods

Whale entanglement information was sourced from KZNSB records and records from other sources, including the media, compliance officers, fishing vessels, NGOs, Port Radio Control and stranding reports that are held jointly by Best and Meÿer. Since the KZNSB data have been collected in a standard manner since 1981 and are concerned exclusively with static meshing operations along the KZN coastline, these data are reported separately from entanglement incidents on the rest of the coastline. Since 2006, data collection outside of the KZNSB sphere of operations has become centralized and more formalized with the establishment of SAWDN (which now incorporates the KZNSB).

It was not always possible to discriminate between different gear types (particularly for incidents reported by members of the public), therefore gear on the whale was characterized according to the items of equipment remaining i.e. buoys, rope etc. Records documented by the KZNSB since the late 1990s as "suspected whale encounters" refer to large holes found in the shark nets that are assumed to have been caused by whales breaking free without having been observed. Annual and seasonal catches of southern right and humpback whales in the KZN nets are presented for the period 1981-2009, and data for "suspected whale encounters" are presented for the period 2000-2009.

Results and Discussion

Shark net installations maintained by the KZNSB

Entanglement events: species, location and gear types

At present there are 38 shark net installations, some consisting of a combination of nets and baited drumlines, situated at intervals along a 325 km stretch of coastline between Richards Bay and Port Edward (Fig 1).

A side effect of the shark nets is by-catch of marine animals, including large whales. Large whales are caught in the nets mainly between July and October (Figure 2). This period corresponds with the breeding migration of humpback whales along the KZN coast and the breeding season of southern right whales. Together, these two species comprised, 85.0% (n=68) of the large whales caught in shark nets between 1981 and 2009. The other 15.0 % consisted of minke (*Balaenoptera* spp.) (n=10), sperm (*Physeter macrocephalus*) (n=1) and Bryde's whales (n=1). Three of the 10 minke whales caught were positively identified as dwarf minke whales (*B. acutorostrata*).

Greater numbers of humpback whales (n=49, 61.3%) than southern right whales (n=19, 23.8%), were caught in the nets, probably because relatively low numbers of the latter occur in KZN waters, which is at the northern edge of their present distribution. Bimodality is apparent in the catches of humpback whales, with a peak in August (n=13) at the height of their northward migration to their winter breeding grounds, and another peak in October (n=13) corresponding with the return migration. There have also been 357 "suspected whale encounters" since the late 1990s, when occurrences of "holes" or missing panels in the nets were first recorded (these incidents have been annotated separately).

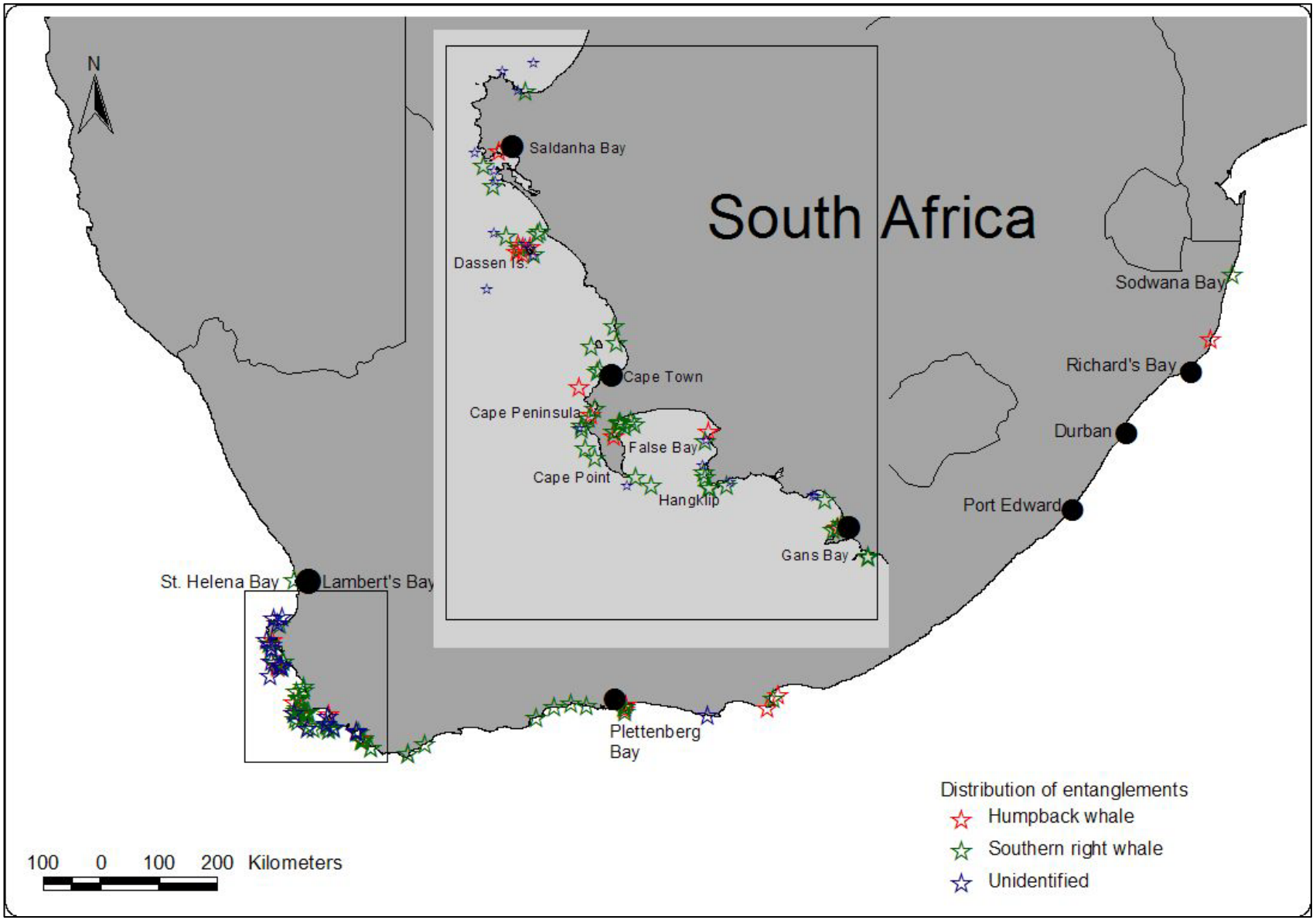
N
South Africa
Saldanha Bay
Dassen Is.
Cape Town
Cape Peninsula
False Bay
Cape Point
Hangklip
Gans Bay
Sodwana Bay
Richard's Bay
Durban
Port Edward
St. Helena Bay
Lambert's Bay
Plettenberg Bay
Distribution of entanglements
Humpback whale
Southern right whale
Unidentified
100 0 100 200 Kilometers

FIG 1: Map of South Africa showing the positions of recorded whale entanglements (excluding entanglements in KwaZulu-Natal shark nets) and locations mentioned in the text.

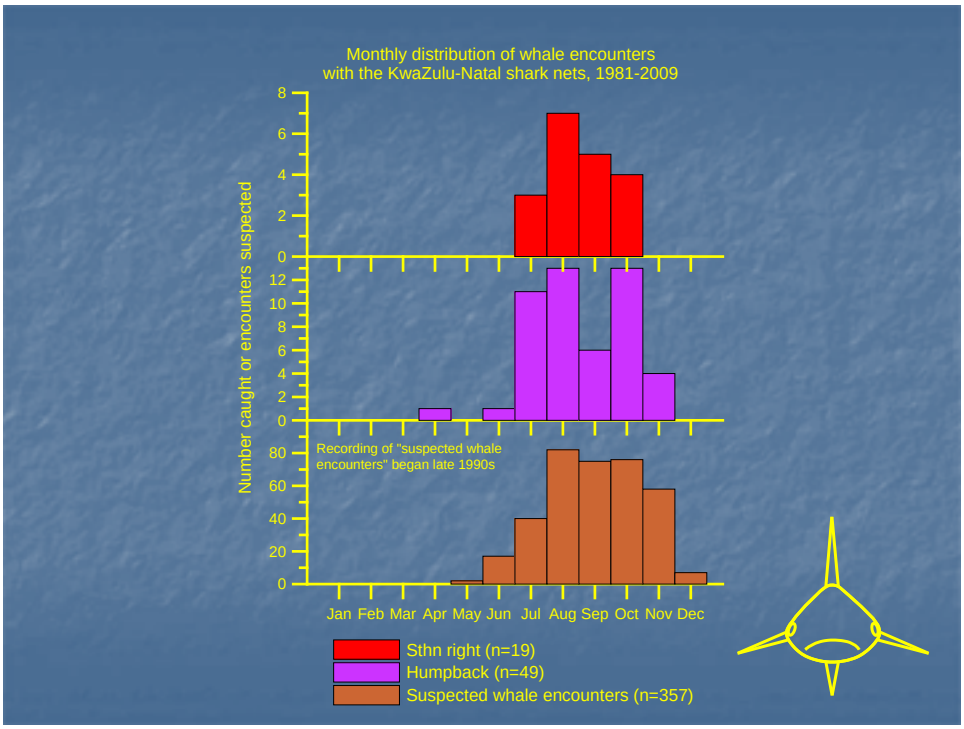

FIG 2: Monthly distribution of whale encounters with the KwaZulu-Natal shark nets, 1981-2009 (southern right and humpback whales only)

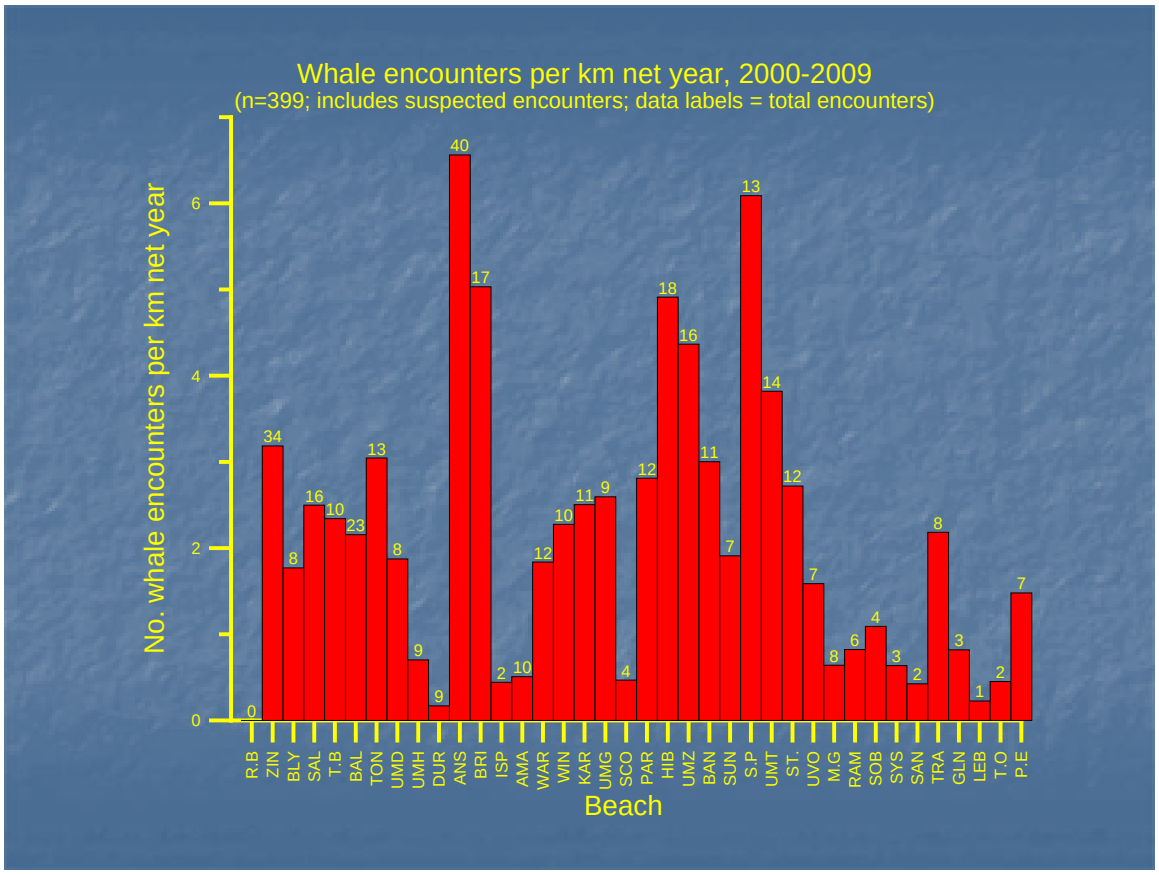

FIG 3: Whale encounters (southern right and humpback whales only) per km net year at locations where shark nets are deployed along the KwaZulu-Natal coast from Richard's Bay (RB) in the north to Port Edward (PE) in

the south, over the period 2000-2009. The data labels represent the total number of encounters (n = 399), including suspected encounters.

The CPUE of whales in shark nets along the KZN coast (in terms of number of total whale encounters per km net year) for the period 2000-2009 varied considerably between the 38 different net installations. A cursory analysis indicated that beaches associated with higher CPUEs tended to occur on promontories (e.g. headlands) of the coastline (e.g. Anstey's Beach with 6.6 and Brighton Beach with 5.0), while beaches with lower CPUEs tended to occur in bays (e.g. Richard's Bay with 0, Durban (0.2), Umhlanga (0.7) and Amanzimtoti with 0.5). This can possibly be explained by a tendency for humpback whales (with the possible exception of cow-calf pairs) to navigate from headland to headland and avoid bays during their migrations along the coastline (Fig. 2). However, this remains speculative until it is further investigated.

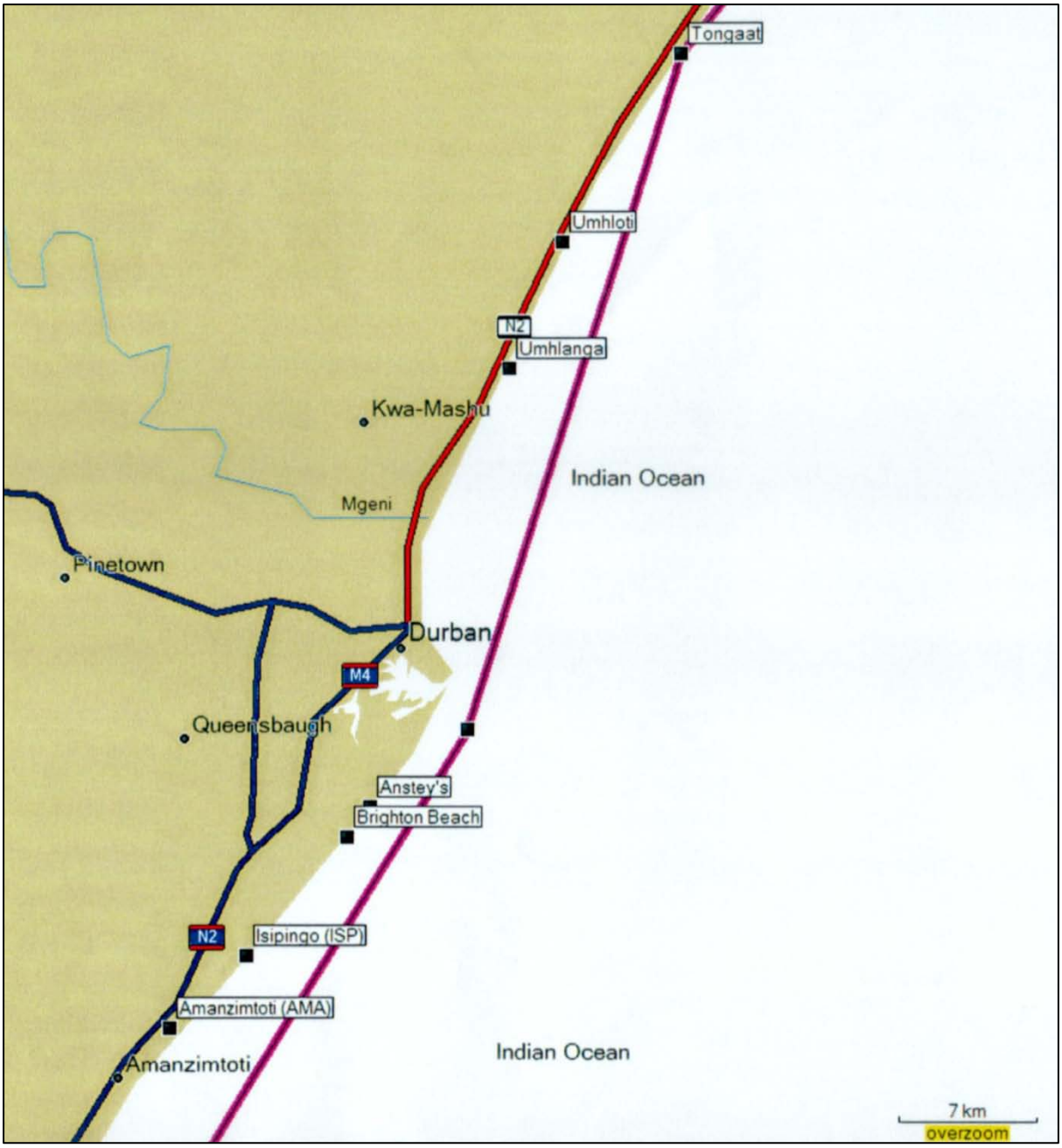

Fig 2: Hypothetical route (purple line) taken by migrating humpback whales along part of the KZN coastline, showing that a strategy of direct movement between headlands may account for the variability of catch rates in shark nets between beaches (see Fig. 3)

Whale catches in the KZN nets showed a steady increase from the early 1990s until about 2003. Since then, there appears to have been some stabilisation in the numbers of "suspected whale encounters" and humpback whales caught (Figure 4). This pattern may partly be a result of inter-annual variability but the total length of netting deployed on the KZN coast was reduced by 39% between 1999 and 2007 and this is highly likely to have had the effect of reducing numbers of encounters. Catches of southern right whales in the shark nets have generally been relatively low throughout the time series, except for a spike when 6 animals were caught in 2003.

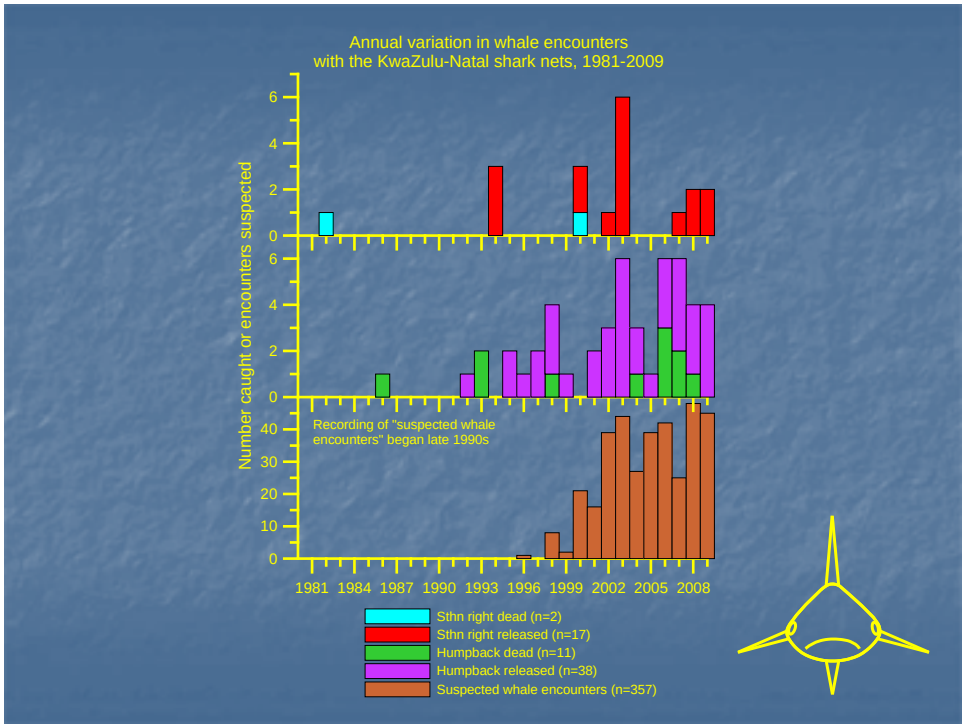

FIG 4: Annual variation in total whale encounters with the KwaZulu-Natal shark nets. 1981-2009

Entanglement events: outcomes

Long before the formation of SAWDN the KZNSB established and trained their own disentanglement teams to release whales caught in the shark meshing operations. Of the two whale species primarily caught in the nets, 17 southern right whales (89.5%) and 38 humpbacks (77.6%) were released alive, for an overall success rate of 81%, although in a small number of these cases the whales were observed to break free of their own accord without human assistance. In fact, every disentanglement attempt can be regarded as having been successful because all thirteen mortalities were discovered dead, or close to death. Most of the deaths were due to asphyxiation within nets, and not due to specific attachments (Anderson-Reade unpubl. data).

Of the two species, humpbacks are presently the most vulnerable to shark nets due to their transitory migration past the KZN coast-line, and probably account for most of the "suspected" whale damage to nets. It appears that many of the whales involved in suspected whale encounters may be able to discard panels of net provided they are not wrapped in head or foot ropes, given the

few sightings of animals in shark mesh along the east coast by boat-based whale-watching (BBWW) operators.

Outside KZNSB areas

Entanglement events: species, location and gear types

Records of 96 events where large whales interacted with or became entangled in fishing gear between 1975 and 2009, are reported (Table 1). The geographical distribution of these events ranged between Lambert's Bay on the west coast and north of Sodwana Bay in northern KZN, close to the border with Mozambique (Fig 1).

Of these incidents, 60.4% (n=58) involved southern right whales and 16.7% (n=16) involved humpback whales, with the remaining 22 (22.9%) unconfirmed (Fig 5). The majority of incidents in the Western Cape occurred between St Helena Bay and Gans Bay (see insert) with "hotspots" located near three main areas; Dassen Island on the west coast (n=16), the Cape Peninsula (n=22) and Hangklip (n=10), due to intensive fishing for rock lobster in these areas.

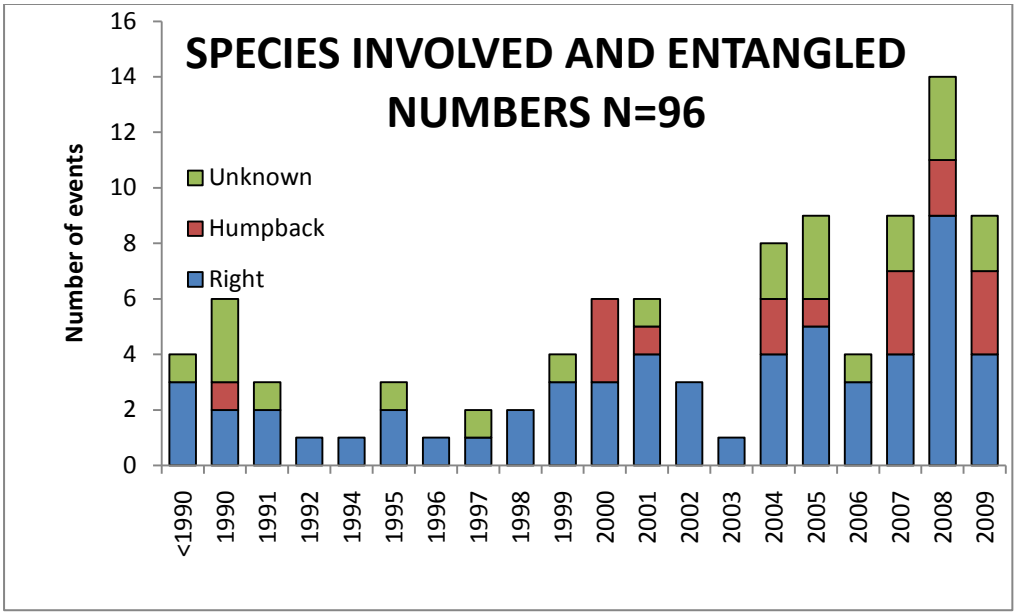

FIG 5: Long term trends in the entanglement of large whales in South Africa (n=96) excludes those netted in KZNSB beach protected areas.

With KZNSB areas excluded, a moderately bi-modal seasonality in whale entanglement was apparent (Fig 6) with a peak during August to October and a smaller, secondary peak in December to February (around Dassen Island on the west coast). This pattern was mostly attributable to entanglement of southern right whales which, between August and October are mainly distributed from False Bay (close to Cape Town) eastwards to Plettenberg Bay, where they assemble on established nursery grounds.

TABLE 1: RECORDS OF ANTHROPOGENIC EFFECTS ON WHALE SPECIES OFF SOUTH AFRICA (EXCLUDING NSB NETTED AREAS) 1975 - 2009

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
22-Nov-75	Unid.	2 mi off Slangkop 34 08.96S, 18 17.67E	Crayfish trap lines - 5 traps missing	Rope + buoys	No Intervention
18-Oct-81	SRW	Kommetjie 34 08.18S, 18 18.13E	Orange rope round tail stock, attached to sea floor, round body	Anchor line	No Intervention
08-Sep-84	SRW	Voorsteklip, Walker Bay 34 32.30S, 19 22.20E	Stranded, entangled in longline round tail stock	Long line	Died
27-Aug-87	SRW	Sedgefield 34 02.05S, 22 48.10E	Stranded, entangled in longline round flippers, tail	Long line	Died
07-Aug-90	Unid.	Hermanus 34 25.50S, 19 15.05E	Skiboat anchor line - cut, swam off	Anchor line	Disentangled
08-Aug-90	SRW	De Kelders, Gansbaai 34 33.72S, 19 21.11E	Stranded, longline and buoy round tail stock	Long line	Died
17-Nov-90	SRW	3 n mi S Vondeling 33 09.28S, 17 56.44E	Crayfish trap line	Rope only	Disentangled
24-Nov-90	Unid.	Jutten Is/South Head 33 05.56S, 17 56.86E	Entangled in rope - small adult	Rope only	No Intervention
07-Dec-90	Unid.	3 km N Vondeling Is 33 08.22 S, 17 57.12E	Crayfish nets, ropes and buoys - 15-18 m adult	Rope + traps	Partly disentangled
14-Dec-90	HBW	Saldahna Bay 33 01S, 17 58E	Ensnared in buoy line of crayfish trap - 6.15 m female	Rope + buoys	Died
21-Feb-91	SRW	Off Yserfontein 33 21.16S, 18 07.45E	Yellow and blue ropes plus float - crayfish trap line?	Rope + buoys	No Intervention
06-Nov-91	SRW	Off Olifantsbos 34 16.24S, 18 21.35E	Crayfish trap line - 12-15 m whale	Rope only	Disentangled
10-Dec-91	Unid.	1 n mi off Stompneus light 32 41.28S, 17 58.84E	Crayfish trap line + buoy	Rope + buoys	No Intervention
17-Nov-92	SRW	Stoney Hd - Vondeling Is 34 22.94S, 18 53.89E	Crayfish trap pline - 4-4.5 m whale	Rope only	Disentangled
22-Dec-94	SRW	Yserfontein 33 20.63S, 18 08.01E	Rope + 2 buoys round tail stock - crayfish trap line/	Rope + buoys	No Intervention
03-Jan-95	Unid.	12 n mi SW Dassen Is 33 34.61S, 17 55.08E	Crayfish trap lines + a number of buoys - ca 14 m long	Rope + buoys	Disentangled
20-Sep-95	SRW	False Bay 34 07.87S, 18 31.10E	Fishing net	Net	No Intervention

Table 1 (cont)

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
08-Oct-95	SRW	Moonlight Bay, Hangklip 34 23.59S, 18 49.57E	Possible entanglement, rope and chain involved?	Anchor line	Died
18-May-96	SRW	Lamberts Bay 32 05.61S, 18 17.69E	Yellow rope round tail stock and rear half of body	Rope only	No Intervention
15-Sep-97	Unid.	Bettys Bay 34 22.24S, 18 54.77E	Anchor line of inflatable	Anchor line	Disentangled
04-Dec-97	SRW	5-6 km N Dassen Island 33 21.64S, E17 59.585	Rope + floats - crayfish trap line, possibly through mouth	Rope + buoys	No Intervention
14-Aug-98	SRW	Rhyspunt, De Hoop 34 37.338S 20 19.102E	3 loops of green rope and red buoy	Rope + buoys	No Intervention
23-Aug-98	SRW	Kalk Bay 34 07.82S, 18 27.44E	Rope and buoy behind head	Rope + buoys	No Intervention
27-May-99	SRW	Off St James, False Bay 34 07.52S, 18 27.66E	Grey rope and buoy round tail stock	Rope + buoys	No Intervention
27-Jun-99	SRW	5 mi S Slangkop 34 13.89S, 18 19.22E	Crayfish trappings implicated	Rope + buoys	No Intervention
28-Sep-99	Unid.	Nr Buffeljagsrivier 34 46.13S, 19 38.02E	Nets, ropes and a few buoys round peduncle	Net	Partly disentangled
10-Oct-99	SRW	Off Glencairn, False Bay 34 09.65S, 18 26.11E	Trailing buoy	Rope + buoys	No Intervention
07-Apr-00	HBW	1 mi W of Robben Island 33 48.86S, 18 20.48E	Trailiing 100m rope + buoy	Rope + buoys	Disentangled
12-Aug-00	SRW	Walker Bay 34 33.86S, 19 20.01E	Rope and buoy round tail	Rope + buoys	Disentangled
22-Aug-00	SRW	Plettenberg Bay 34 03.35S, 23 24.34E	3 rope strands over top jaw and head, 3-4 buoys	Rope + buoys	No Intervention
19-Sep-00	HBW	Algoa Bay 33 51.89S, 25 45.95E	100 m crayfish trap line, buoys, 1 trap	Rope + traps	Partly disentangled
13-Oct-00	SRW	Rhyspunt 34 29.7S, 20 28.8E	Net? Round tail - cow with calf	Net	No Intervention*
04-Nov-00	HBW	5 km off Oudekraal 33 58.89S, 18 17.76E	Rope and buoy round tail	Rope + buoys	Disentangled
29-Jan-01	Unid.	Steenbras River mouth 34 11.71S, 18 48.80E	Orange buoys + ropes	Rope + buoys	No Intervention

Table 1 (cont)

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
09-Aug-01	HBW	2 n mi W Dassen Is 33 25.50S, 18 02.42E	Green nylon rope round belly	Rope only	Disentangled
15-Sep-01	SRW	Saldanha Bay 33 04.35S, 17 53.97E	St Joseph's net round left flipper, tail, anchored	Net	Partly disentangled
04-Oct-01	SRW	Ecorner of Die Kelders 34 32.6S, 19 22.3E	Rope "lasso" round tail stock - loose	Rope only	No Intervention
18-Oct-01	SRW	Hout Bay 34 04.28S, 18 21.46E	Rope entanglement of calf	Rope + buoys	Disentangled
23-Oct-01	SRW	Pearly Beach 34 40.34S, 19 28.57E	Rope + 2 buoys round tail	Rope + buoys	No Intervention
09-Oct-02	SRW	Groot Brak river 34 04.2S, 22 12.9E	Net + 4-5 yellow buoys round tail	Net	No Intervention**
29-Oct-02	SRW	2 km from Dassen Is 33 24.78S, 18 03.02E	Anchor rope in mouth?	Anchor line	Freed itself
16-Dec-02	SRW	Close to Jacobs Reef 32 58.7S, 17 51E	Net + yellow floats round peduncle	Net	No Intervention
12-Sep-03	SRW	Kalk Bay - S'stown, False B 34 07.65S, 18 27.59E	Rope 6 times round tail stock + buoy	Rope + buoys	No Intervention
23-Jan-04	Unid.	40 deg 7 mi from Sandy Pt 32 39.20S, 18 06.52E	Rope and buoy	Rope + buoys	No Intervention
14-Jul-04	SRW	Off Blaauwbergstrand 33 47.90S, 18 26.93E	2 buoys round tail	Rope + buoys	No Intervention
19-Jul-04	SRW	Gordons Bay - Kogelbaai 34 12.16S, 18 48.46E	Rope and buoy on side	Rope + buoys	No Intervention
27-Aug-04	SRW	Algoa Bay 33 55.71S, 25 41.99E	Net over head	Net	No Intervention
14-Sep-04	SRW	False Bay, nr Cape Point 34 20.96S, 18 31.54E	Ropes and buoys round tail	Rope + buoys	Disentangled
23-Oct-04	HBW	Off Noordhoek 34 05.80S, 18 20.66E	Rope and 2 floats round tail	Rope + buoys	Disentangled
24-Oct-04	HBW	Seaview, Port Elizabeth 34 03.82S, 25 36.20E	Trailing 10-15 m net, rope and buoys	Net	Partly disentangled
21-Dec-04	Unid.	Near Vondeling Isl 33 10.82S, 17 59.02E	Towing crayfish buoy	Rope + buoys	No Intervention

Table (cont)

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
20-Jan-05	Unid.	Dassen Island 33 23.61S, 18 04.39E	Rope round tail + buoys, broke free of traps	Rope + traps	No Intervention
23-Feb-05	SRW	Clifton/Bantry Bay 33 55.19S, 18 22.22E	6-9 loops yellow rope round head/body, pink buoy on back	Rope + buoys	No Intervention
14-Jul-05	SRW	Off Cape Hangklip 34 23.59S, 18 49.88E	Entangled in ropes	Rope only	No Intervention
30-Jul-05	HBW	Gordons Bay 34 09.84S, 18 49.42E	Long rope plus 3 buoys	Rope + buoys	Partly disentangled
15-Sep-05	SRW	False Bay, nr Rocky Bank 34 23.13S, 18 35.31E	Rope entanglement + crayfish traps (7 removed)	Rope + traps	Disentangled
25-Sep-05	SRW	Melkbosstrand 33 43.88S, 18 26.11E	Yellow rope round flipper insertion	Rope only	Died
25-Sep-05	Unid.	The Bellows, False Bay 34 22.97S, 18 29.58E	None	No Info	No Intervention
01-Oct-05	Unid.	Hermanus 34 25.75S, 19 15.61E	None - second hand report	No Info	No Intervention
03-Oct-05	SRW	False Bay 34 08.62S, 18 28.90E	12 mm rope	Rope only	No Intervention
12-Jan-06	Unid.	10 miles off Yserfontein 33 20.86S, 17 56.85E	None	No Info	No Intervention
30-Jan-06	SRW	SW Dassen Island 33 29.01S, 18 02.55E	Juvenile female rope around body, head and tail, one? trap	Rope + traps	Partly disentangled
11-Jul-06	SRW	St Helena Bay 32 46.04S, 18 04.28E	Entangled in gill net - partial grey morph (mullet net). Small piece left but may have freed itself when last seen	Net	Partly disentangled
22-Aug-06	SRW	Plettenberg Bay off river 34 02.70S, 23 23.42E	At least 5-6 rope turns on bonnet and through baleen - brindle animal	Rope only	No Intervention
31-Jul-07	SRW	Plettenberg Bay 34 05.20S, 23 23.73E	Green rope + yellow float around tail stock and flukes. Twice around L. fluke. Rock Lobster current buoy	Rope + buoys	No Intervention
14-Aug-07	HBW	Plettenberg Bay 34 01.11S, 23 25.61E	Thick rope round body between head and dorsal fin	Rope only	No Intervention
15-Aug-07	SRW	Wilderness 33 59.95S, 22 34.58E	Yellow rope around head, unconfirmed report, shore sighting	Rope only	No Intervention

Table (cont)

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
15-Aug-07	SRW	Plettenberg Bay 34°07.50'S, 23°23.57'E	Rope around flukes	Rope only	No Intervention
18-Aug-07	HBW	St Lucia, KZN 28 22.18S, 32 26.48E	Rope (anchor-line?) round pecs and body behind fin + 100 m	Anchor line	No Intervention
25-Aug-07	Unid.	Pringle Bay, False Bay 34 18.00S, 18 48.00E	Pink buoy at flukes and rope	Rope + buoys	No Intervention
08-Sep-07	HBW	Simonstown 34 11.05S, 18 26.15E	12mm x 25m Yellow rope + pink buoy and 4x floats around tail stalk and flukes	Rope + buoys	Disentangled
11-Sep-07	Unid.	Northern KZN 27° 22'S, 32° 47'E	Rock Lobster, Long Line, 3turns around head, 2turns flippers, 250 fathoms+ 3 deflated floats. Deep scaring on back and tail	Long line	No Intervention
09-Oct-07	SRW	Pringle Bay / Muizenberg 34 19.88S, 18 48.16E	2 x Red buoys + 6 x floats and 110mx17mm + 50mx10mm yellow rope - Rock lobster trap	Rope + buoys	Disentangled
05-Jan-08	SRW	Pringle Bay, False Bay 34 20.819S, 018 48.440E	11h10 reported, SRW + calf, Cow trapped in Rock lobster ringnet rope around head, animal sped off.	Rope only	No Intervention
11-Jan-08	HBW	Off Dassen Island 33 24.49S, 018 03.83E	Ropes and buoys from 2 x RL traps through mouth, over body, around LHS flipper and tail stock. 9m whale.Small piece of rope left through-mouth.	Rope + buoys	Partly disentangled
15-Jan-08	HBW	Off Dassen Island 33 23.8S, 018 02.6E	Ropes and 6 x buoys from at least 3 x RL traps through mouth, over body, around RHS flipper and tail stock.	Rope + buoys	Disentangled
15-Feb-08	Unid.	1 nm S Dassen Island 33 26.43S, 018 06.33E	Swimming slowly with RL gear	Rope + buoys	No Intervention
20-Feb-08	SRW	Dassen Island 33 26.22S, 018 06.41E	Red buoy, yellow float, red cork and yellow rope from rock lobster trap - 10m	Rope + buoys	Disentangled
26-Feb-08	Unid.	Dassen Island 33 24.66S, 018 05.72E	Blue/white buoy and rope from rock lobster trap	Rope + buoys	No Intervention
03-Apr-08	SRW	Chapmans Peak/Kommetjie 34 06.58S, 018 19.93E	Complete R/lobster trap with yellow 12mm rope + red buoy, + yellow 12mm rope + red bouy from 2nd trap. Small section rope left in mouth but working it way out due water resistance.	Rope + traps	Partly disentangled
05-Jun-08	SRW	Glentana + Plettenberg Bay 34 03.29S, 022 18.38E	Yellow + Green polypropelene rope around head and tail stalk, "Mooring rope".	Anchor line	No Intervention
26-Jun-08	Unid.	Thys Point, St Francis Bay 34 11.13S, 024 40.89E	Rope + orange buoy trailing	Rope + buoys	No Intervention
08-Aug-08	SRW	Struisbaai/Pearly 34 45.83S, 020 03.48E	Green + yellow ropes, pink bouy + white float	Rope + buoys	No Intervention

Table (cont)

Date	Species	Locality Position	Details of entanglement	Type of gear	Result
16-Aug-08	SRW	Struisbaai 34 45.83S, 020 03.48E	Longline around flukes and tail stock, (orig. reported as net as well but incorrect)	Long line	No Intervention
23-Aug-08	SRW	Dana Bay (Mossel Bay) 34 12.65S, 022 02.43E	8-10m brindle. Tuna longline through mouth, over body from both sides, trailing float. Float removed – life threatening.	Long line	Partly disentangled
05-Sep-08	SRW	False Bay 34 07.20S, 018 30.25E	Entanglement scars on tail stalk - no entanglement present	No Info	Freed itself
05-Dec-08	SRW	Hermanus 34 26.48S, 019 17.95E	12mm Bue/white ski-rope and Yellow + red floats	Rope + buoys	Disentangled
04-Jan-09	HBW	Dassen Island 33 24.33S, 018 05.49E	Yellow rope + red buoy around tail + trailing	Rope + buoys	No Intervention
20-Jan-09	SRW	Sea Point - 33 54.56S, 018 22.74E	Thick Yellow rope + large Orange bouy around head, trailing behind	Rope + buoys	No Intervention
20-Feb-09	Unid.	Tabakbaai - Saldahna 33 01.14S, 017 51.99E	Red / orange Rock Lobster buoy was seen trailing behind a whale	Rope + buoys	No Intervention
27-Mar-09	HBW	Dassen Island 33 26.11S, 018 03.80E	Yellow rope, ~7m whale	Rope only	Disentangled
27-Jun-09	HBW	Walker Bay 34 33.39S, 019 21.14E	50 m yellow 20 mm rope + 2 buoys, one red & white, one yellow around flukes and tailstock	Rope + buoys	Disentangled
28-Jun-09	Unid.	Brandhuis - St Helena Bay 32 45.72S, 018 02.57E	Brandhuis - St Helena Bay buoy seen at head	Rope + buoys	No Intervention
15-Aug-09	SRW	Pearly Beach 34 40.60S, 024 40.89E	Yellow rope + 2x white floats, whale ~8m. Rope through mouth, down length and wrapped around caudal peduncle. Avoided vessel – life threatening thin (barnacles present)	Rope + buoys	No Intervention
19-Sep-09	SRW	Keurbooms river Mouth 34 02.55S, 023 23.68E	Yellow nylon rope around body + tail	Rope only	Freed itself
20-Sep-09	SRW	Glencairn 34 09.87S, 018 26.10E	Long line Octopus trap + flagged buoy	Long line	Freed itself

TABLE 2: KNOWN SOUTH AFRICAN WHALE MORTALITIES AND TYPES OF ENTANGLEMENT RESULTING IN DEATH (1975 - 2009) EXCLUDING NATAL SHARKS BOARD NETTED AREAS

Date	Species Age	Locality Position	Details of entanglement	Type of gear	Result
08-Sep-1984	SRW Juvenile	Voorsteklip, Walker Bay 34 32.30S, 19 22.20E	Stranded, entangled in longline round tail stock, 121m of braided nylon, 18m green cable rope, 43m of monofilament nylon tracer, metal release clips were also present. Longline fishery for Hake (Best, 1984)	Long line	Stranded Dead
27-Aug-1987	SRW Adult	Sedgefield 34 02.05S, 22 48.10E	Stranded, entangled in longline round the base of the left flippers, and the body at about the level of the anus tail, Same braided nylon. Gear resembled pelagic longline fishery for tuna (Best 2001)	Long line	Stranded Dead
08-Aug-1990	SRW Juvenile	De Kelders, Gansbaai 34 33.72S, 19 21.11E	Stranded, longline and buoy round tail stock, A sample indicated it was identical to the brown braided nylon as the Walker Bay Juv.(Best 2001)	Long line	Stranded Dead
14-Dec-1990	HBW	Saldanha Bay 33 01S, 17 58E	Ensnared in buoy line of crayfish trap - 6.15 m female (Best 2001)	Rope + buoys	Died in gear
08-Oct-1995	SRW Adult	Moonlight Bay, Hangklip 34 23.59S, 18 49.57E	Possible entanglement, rope, buoy and 12m chain possibly involved found nearby, covered in buttery whale fat? (Best 2001)	Anchor/ mooring line?	Stranded Dead
25-Sep-2005	SRW Juvenile	Melkbosstrand 33 43.88S, 18 26.11E	Dead (1 week?). 5m of 12mm yellow rope round R flipper below insertion and rope burn on left flipper (from RL Trap). Some skin remaining on flipper and RHS head - dense barnacles. (DEAT unpubl,)	Rope only	Stranded Dead

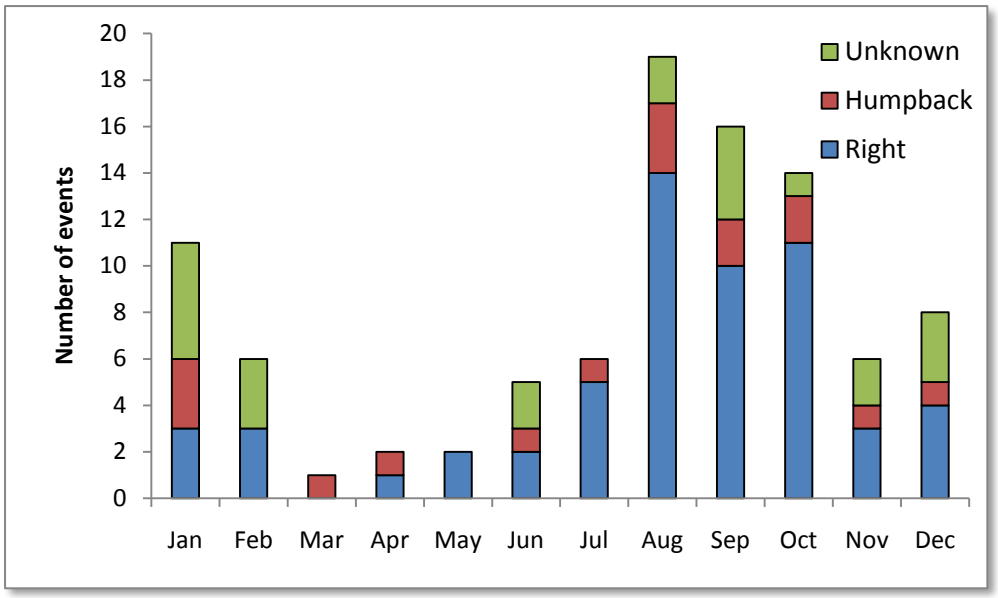

Fig 6: Seasonality of entanglement for humpback, southern right and unidentified whales. (N= 96 excluding the areas monitored by the KwaZulu-Natal Sharks Board)

It is believed that due to localized productivity at upwelling sites off the west coast (between St Helena Bay and Saldanha Bay, see Fig 1) some southern right whales and humpback whales either do not complete their southern migration or else delay their return south and remain in the area to feed on zooplankton in the region (Barendse et al., in press; Mate et al., in press). Consequently, significant numbers of either species pass through or close by an area around Dassen Island with a high concentration of lobster traps, resulting in an increased entanglement rate for this area between December and February and accounting for the secondary peak in Fig 6.

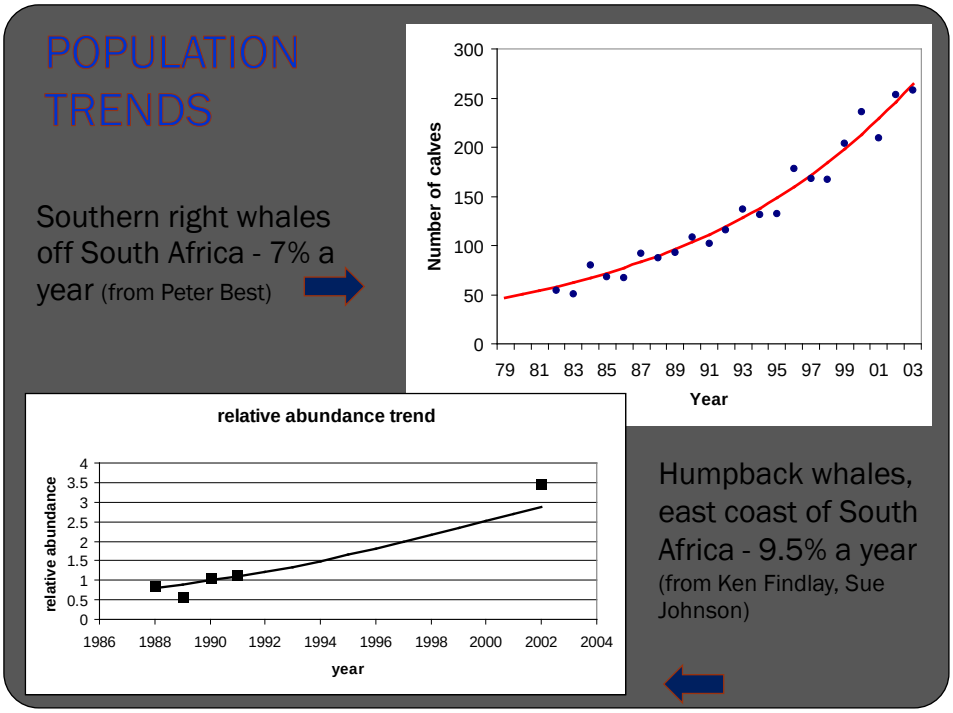

FIG 7: Population trends, southern right and humpback whales

The population of southern right whales in South Africa has been increasing at an average annual rate of 7% since 1979 (Best et al., 2001a) and entanglement of this species has also been on the increase in the country (Fig 7). Humpbacks have been increasing at 9.5% per year on the east coast of South Africa (Ken Findlay, Sue Johnson), but entanglement of this species appears to have fluctuated from year to year without increasing. Best (2000) showed that there has also been a westwards shift in the distribution of southern right whales in South Africa, corresponding with their population increase. In recent years, there has been simultaneous eastward shift in the distribution of fishing effort for rock lobster, in response to a shift in distribution of this resource that may be associated with large-scale ecosystem changes (Cockcroft et al. 2008). A consequence of these changes has been increased spatial overlap between southern right whales and the rock lobster industry, with a focal point at the Cape Peninsula/False Bay region.

Each year, catches of rock lobster commence in November near the vicinity of Dassen Island and progress southwards as the rock lobster moult increases in the north. Once the lobster quota for Dassen lsland has been attained or closure of the fishery has been forced by the moult (usually in July), the industry's vessels move south, operating off the west coast of the Cape Peninsula or at the mouth of False Bay (off Cape Point or Hangklip) up to about October, depending on quota extensions. False Bay BBWW operators sight the most whales in early summer (September and October) as animals pass through this area before heading south (Fig 1). In the process many of these animals come into close proximity to the closely laid trap lines of these concentrated fishing areas as they swim in and out of False Bay or around the Cape Peninsula.

In all 93 cases of whale entanglement for which the type of entangling material was identified, some form of fishing gear that is static and deployed on the bottom such as rock

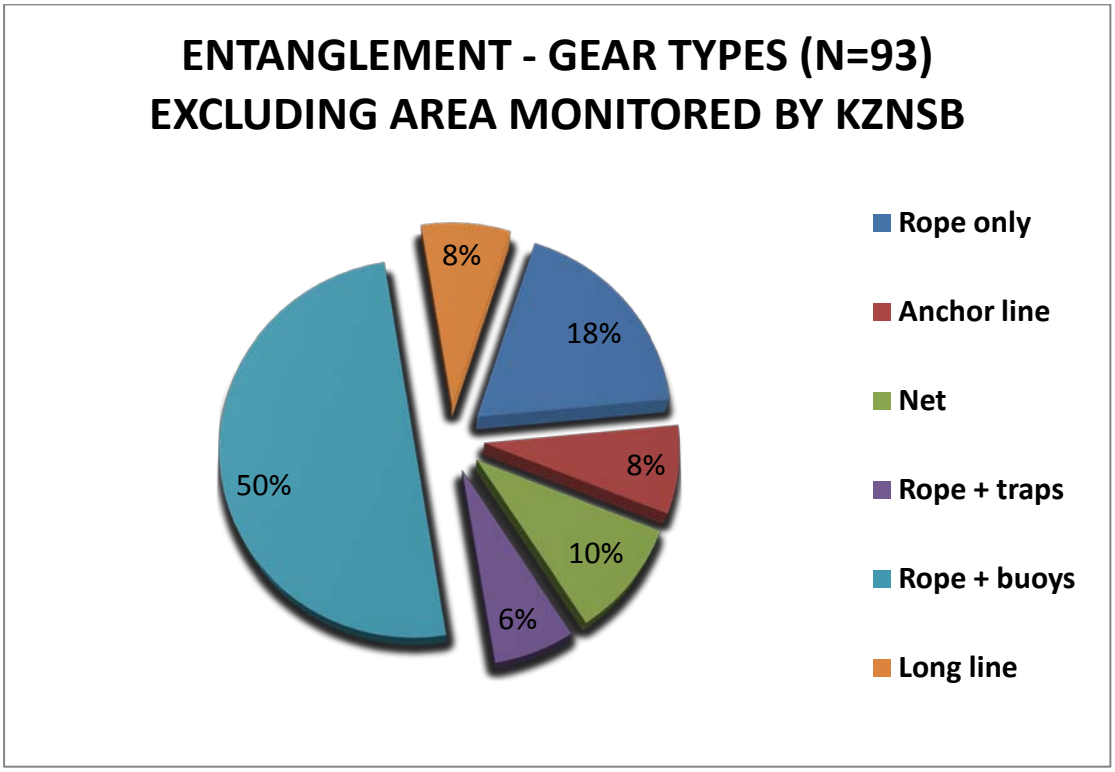

FIG 8: A breakdown of static fishing gear types described by observers of entangled whales. N= 93 (excluding areas monitored by KwaZulu-Natal Sharks Board)

lobster traps (73%) or parts thereof (in most instances ropes and buoys), was involved (Fig 8.). Only six (6.5%) of all whales were restrained to the seabed by gear, while the majority of whales having broken free, were free swimming.

Since 1979, aerial surveys to photograph right whales for individual identification purposes have been flown annually along the south coast of South Africa in mid-October. Such surveys have concentrated on cows accompanied by calves, and images have been processed up to and including the 2006 survey. These images contain data, in the form of scarring patterns on the dorsum, that can be used to assess minimum levels of non-fatal entanglements, subject to certain assumptions (including the assumption that such scarring is permanent).

Of the total catalogue of 954 cows, 25 (2.6%) were recorded as having peduncle scars (or in one case with an actual net around the peduncle). Only one of these scarred animals was definitely photographed before and after acquiring the scars, suggesting that most of the incidents must have taken place before the animals were first photographed (or while they were still immature). Over time, the incidence of peduncle scars seems to have declined (Fig 9), from an annual average of 4.92 + 0.67 (SE) % prior to 1996 to a mean of 3.04 + 0.29 (SE) % thereafter. However this reduction may be partly an artefact of the method of analysis, which assumes that whales were unscarred unless they were recorded to be scarred. In likelihood, there would be a smaller probability of recording scarring for less photographed individuals, thus more recent estimates of scarring rate may be biased downwards(Best unpbl.)

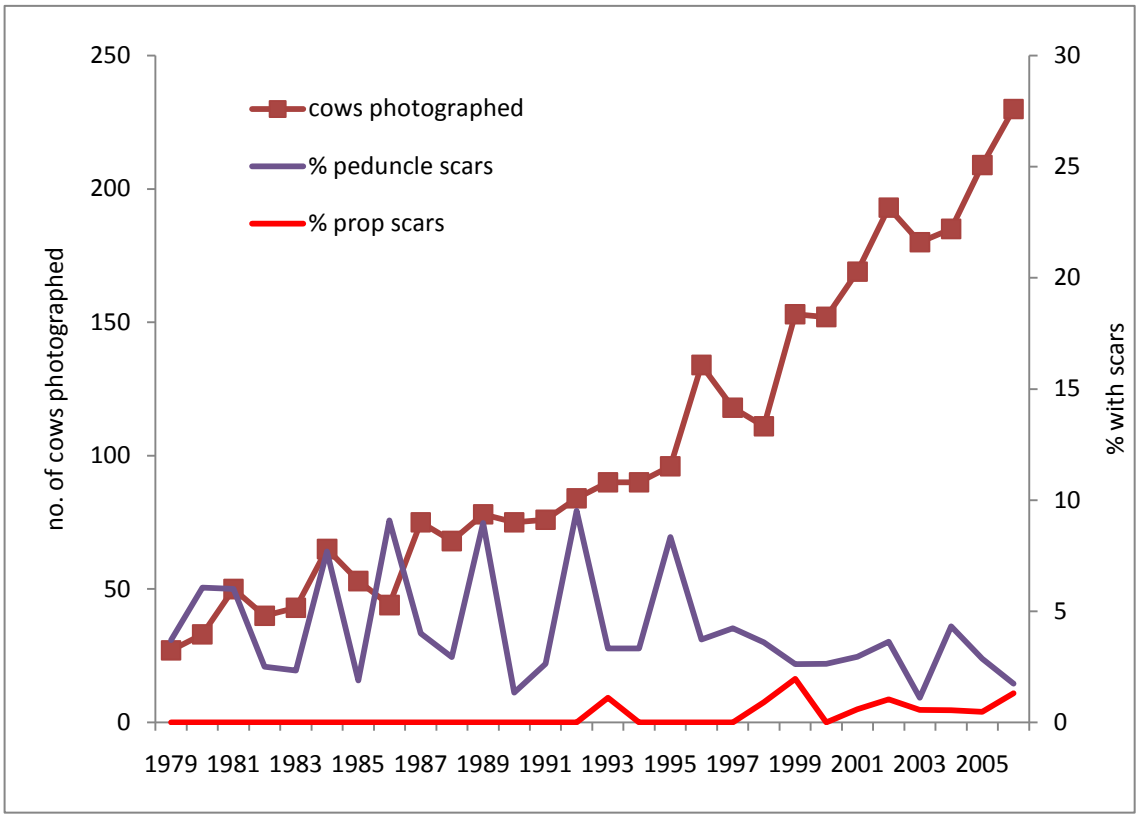

Figure 9: Trends in numbers of cows with calves photgraphed on the South African coast, 1979-2006, and the percentages exhibiting peduncle scars and prop scars.

Entanglement events: outcomes

Presently SAWDN (other than the KZNSB), has no access to dedicated aircraft and many whales reported as entangled are lost due to delays in reaching the locations of sightings. This accounts for the high frequency of "no interventions" in Figure 10. Reported entanglements have steadily increased over the last 20 years, reaching a maximum of 14 incidents in 2008 including 6 (43%) without intervention and 1 (7%) that managed to free itself.

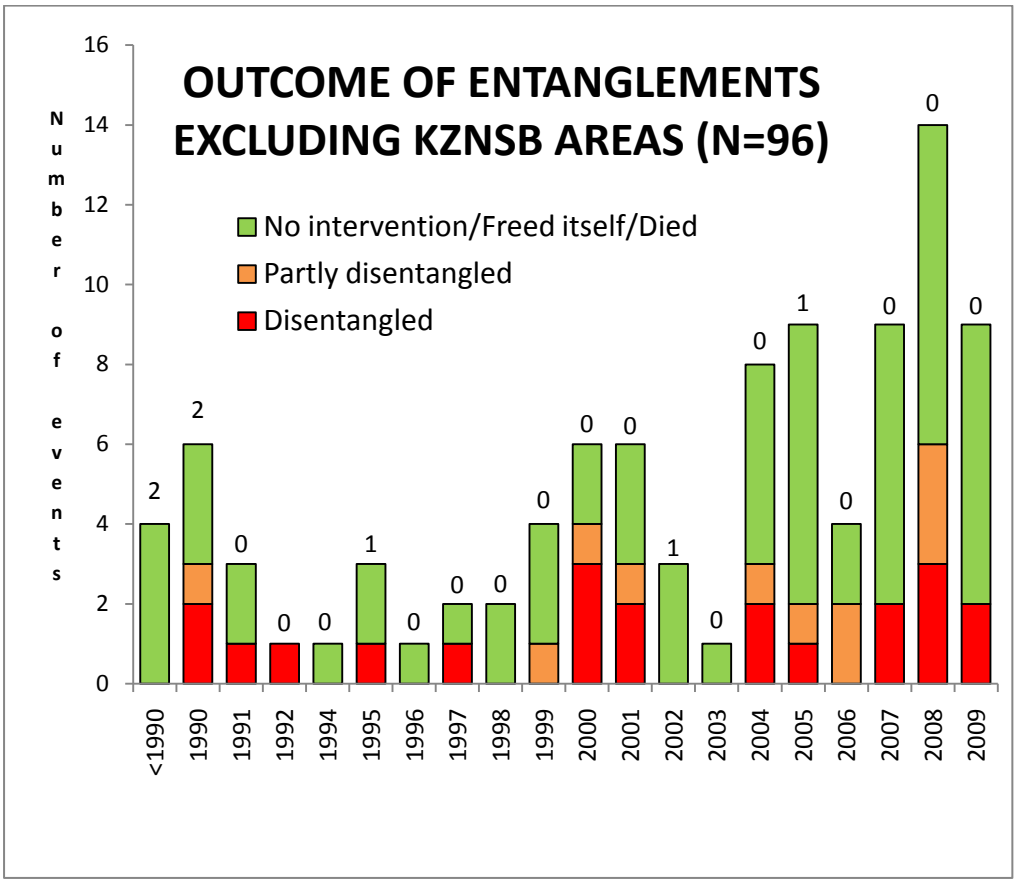

FIG 10: Outcome of entanglements, with data labels indicating the number of whales that have died due to entanglement. N=96 (excluding KwaZulu-Natal Sharks Board Monitored Areas)

Six entangled whales that stranded are the only known mortalities of whales in southern Africa that could be attributed to entanglement since 1975 (exclusive of the KZNSB). These included five southern right whales and one humpback (Table 2). Three southern right whales were entangled in longlines, one in rock lobster gear and one in an anchor or mooring line. Primarily, it was the tailstocks and flippers of the whales that were entangled. Best *et al.* (2001b) noted that while most live entanglements of right whales were in rock lobster trap lines, longlines tended to cut deeper as a result of the thinner braided nylon and monofilament lines which tended to bind making it difficult for the gear to come off naturally.

Southern right whales are particularly vulnerable to entanglement in static fishing gear such as inshore fishing traps as they are often close inshore (often within 2 km), within sheltered bays (Elwen and Best, 2004) or around islands and appear attracted to drifting or anchored objects Best *et al.* (2001b). In addition, a substantial proportion of their distribution in South Africa overlaps the

rock lobster fishery area but more animals may become vulnerable to entanglement in shark nets as the population continues to recover in numbers and if its distribution along South Africa's coastline expands. Over the past three years SA entanglements have averaged 17 incidents, with southern right and humpback whales both averaging 7.3 cases and a further 2.3 animals unidentified.

Best *et al.* (2001b) concluded that as the SA right whale population was increasing at a rate close to the maximum biologically possible, present anthropogenic factors did not seem to be adversely affecting their recovery. Continued monitoring of the population since then has shown that it continues to increase at the same rate. Assessment of the C1 humpback whale population (that which breeds along the East African coast) suggests that it has now recovered to at least 65% of its initial abundance (IWC, 2009). The only conservation concern arising from entanglement in South African waters may be for the assemblage of humpback whales that visits the west coast in spring and summer: although a comprehensive assessment of the West African population still has to be completed, indications from recent resightings and genetic evidence are that this may be a relatively small and maternally directed subpopulation that could be relatively vulnerable to incidental mortalities such as entanglement.

Literature Cited

Barendse, J., Best, P.B., Thornton, M., Pomilla, C., and Rosenbaum, H.C. Accepted. Migration redefined? Seasonality, movements and group composition of humpback whales *Megaptera novaeangliae* off the west coast of South Africa. *Afr. J. Mar. Sci.*

Best, P.B. 2000. Coastal distribution, movements and site fidelity of right whales *Eubalaena australis* off South Africa, 1969-1998. *S. Afr. J. mar. Sci.* 22: 43-55.

Best, P.B., Brandao, A., and Butterworth, D.S. 2001a. Demographic parameters of southern right whales off South Africa. *J. Cet. Res. Mgmt* (Special Issue 2): 161-169.

Best, P.B., Peddemors, V.M., Cockcroft, V.G., and Rice, N. 2001b. Mortalities of right whales and related anthropogenic factors in South African waters, 1963-1998. *J. Cetacean Res. Manage. (special issue)* 2: 171--76

Cockcroft, A.C., Van Zyl, D. and Hutchings, L. 2008. Large-scale changes in the spatial distribution of South African West coast rock lobsters: an overview. *Afr. J. Mar. Sci.* 30(1): 149-159.

Elwen, S., and Best. P.B. 2004. Environmental factors influencing the distribution of southern right whales (*Eubalaena australis*) on the South Coast of South Africa I: Broad scale patterns. *Mar. Mammal Sci.* 20 (3): 567-582.

IWC. 2009. Chair's Summary Report of the 61st Annual Meeting, Madeira, Portugal, June 2009. Available at http://www.iwcoffice.org/meetings/meeting2009.htm.

Mate, B.R., Best, P.B., Lagerquist, B.A., and Winsor, M.H. Accepted. Coastal, offshore and migratory movements of South African right whales revealed by satellite telemetry. *Mar. Mammal Sci.*