Report on a Turtle and Cetacean Assessment Survey to the Kunene River Mouth, Northern Namibia – January 2014

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Project Background: The Benguela Current Large Marine Ecosystem (BCLME) off the coast of Namibia is one of the highest regions of marine productivity in the world. A characteristic of the northern BCLME is the high biomass of jellyfishes (Roux *et al*. 2013), a potential food source for several species of marine turtles. Although the climate of coastal Namibia is too cold for successful nesting to occur, the BCLME may act as a regionally important feeding area for turtles. Leatherback turtles (*Dermochelys coriacea*) have been found in Namibian waters for many years, most often in the summer months (Hughes 1989, Elwen and Leeney 2011), with records dating back several decades at least (Namibian Dolphin Project Strandings Database). In recent years, tag returns and satellite telemetry have provided growing evidence that leatherbacks from several globally significant nesting populations in the Atlantic (De Padua *et al*. 2014) and the Indian Ocean (Lambardi *et al*. 2008) use Namibian waters as an important foraging ground, probably because of the abundance of jellyfish in these waters (Lynam et al. 2006).

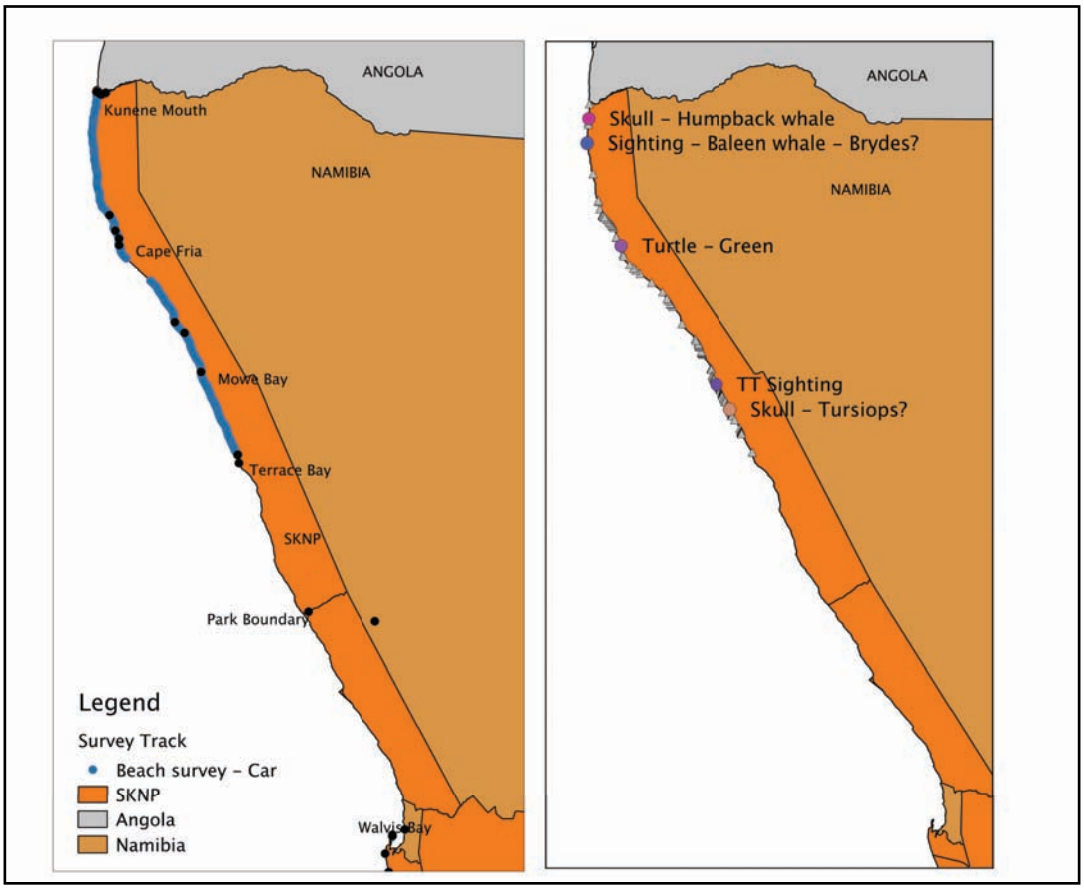

Figure 1. Maps showing study area and survey tracks (left), and (right) location of live sightings and whale and turtle remains. “TT Sighting” shows location of probable live sighting of 2 common bottlenose dolphins (*Tursiops truncatus*).

In addition, the Kunene River mouth plays host to at least two species of turtles, the green turtle (*Chelonia mydas*) and the Nile softshell turtle (*Trionyx triunguis*), which are known to aggregate (probably for feeding) in the river mouth and occasionally haul out on land (Tarr 1987, Simmons *et al*. 1993, Weir *et al.* 2007). The Kunene River is the southern most point on the Atlantic coast of Africa where either of these species can be encountered with any regularity.

The Kunene River mouth lies at the Angolan-Namibian border and at the very northern limit of the Skeleton Coast National Park in Namibia. No roads run north of Möwe Bay (Fig. 1) and accessing the coast beyond this point is limited to driving on tracks or the beach with 4x4 vehicle access only. In addition, diamond exploration at several points within the National Park means that additional clearance permits are required to access the northern limits of the park for research purposes. The area is thus logistically challenging to access.

Survey goals:
1) To assess the density, number, species and distribution of turtles using the Kunene River mouth area.

2) To assess number and species of stranded cetaceans (whales and dolphins) and turtles along as much of the Skeleton Coast National Park as possible, with a focus on the more remote northern areas.

Research Protocol: A seven-day trip was undertaken from Swakopmund to the Kunene River mouth by 4x4 vehicle, following a coastal route. The northward leg was a fast transit achieved in one day by the majority of the team. Three nights were spent at the Kunene Mouth allowing for two days of surveying of the river and surrounds, and three nights at Möwe Bay to allow for surveying of the beaches for stranded cetaceans.

Surveys at the Kunene River mouth were undertaken by the co-authors on foot or by boat (4 m rigid inflatable). Almost the entire coast between the Kunene River mouth and Möwe Bay was surveyed by the co-authors using a 4x4 vehicle with one observer on the back. The survey ran on either the high or low beach depending on tide. Due to the length of coastline surveyed and number of very old whale skeletal remains, not all specimens were examined in detail. Basic data including position and remains type (e.g. balaenopterid skull, balaenopterid jaw bone, delphinid skull) were recorded for all observed cetacean and turtle remains. All fresh or reasonably fresh cetacean and turtle remains were examined in greater detail to take a suite of standard measures and genetic and stable isotope (bone or skin) samples where possible.

Results: *Kunene River Mouth Survey—* Conditions at the Kunene River mouth: The river widens considerably into a flood plain in the last 2-3 km prior to meeting the sea, however, only a narrow channel, approximately 100 m wide actually exits to the sea. The majority of the flood plain area near the mouth of the river is very shallow with extensive sand banks making boat based surveys very challenging, especially at low tide, while in the mouth exit channel there is a strong current, especially on a dropping tide. The river was very muddy throughout the survey and nothing could be observed below the surface, potentially decreasing the ability to spot turtles. The presence of crocodiles in the river makes foot-based traverses of the river unwise (Fig. 2).

Figure 2. Green turtle and Nile crocodile in the mouth of the Kunene River.

Only two days were available for surveys of the Kunene River. A single survey up river from the Diamond Camp to the first rapids, revealed no turtles (Fig. 3). A one-hour shore based observation from the Camp site area (approximately 1.6 km upstream from the mouth) revealed only a single large Nile softshell turtle (Fig. 4).

At low tide, we observed a maximum count of 9 – 12 green turtles and 3-5 Nile softshell turtles all clustered in the mouth area. At high tide, turtles were observed to come much further into the lagoon, with animals observed regularly at least 500 m upstream from the mouth.

Figure 3. Angled google earth view of the Kunene Mouth from river mouth to furthest point surveyed.

The co-authors conducted several shore based watches at the river mouth itself, spending some time developing an appropriate technique to assess the number of animals using the area; counting them being complicated by the short surfacing times, long dive times and total lack of underwater visibility.

Two assessment periods were conducted during low tides (mornings of 29th and 30th) and one at high tide (afternoon of 30th). During low tides, all turtles were aggregated in or very close to the river exit channel with some animals (a count not possible due to distance and waves) seen further out to sea on the back of the breakers. The entire river exit channel can be easily surveyed by two observers.

A thorough count using naked eyes for the channel and binoculars for the lagoon areas (scanning slowing across the entire lagoon with 15 sec per binocular viewing area before moving to the adjacent segment) resulted in a maximum count of 46 turtles in the lagoon and a further ~20 in the exit channel, suggesting a total of 60-70 green turtles at least within ~500 m of the river mouth and a further 5 -7 Nile softshell turtles. Throughout observations, the vast majority of turtle surfacings occurred facing into the river current suggesting that animals were feeding on items washing down in the current (Fig. 5).

Beach surveys for stranded cetaceans and turtles: Almost the entire beach was surveyed by 4x4 between the Kunene River Mouth and Terrace Bay. Due to the distances involved and challenges of travelling on the high

beach, it was preferred to travel on the low beach at low tide whenever possible. It was not always possible to simultaneously observe both the entire low beach (where fresh strandings are more likely) and high beach (where longer term remains are more likely) from the vehicle, thus the data presented here should be considered a minimum and not an exhaustive count of cetacean and turtle remains in the northern parts of the Skeleton Coast National Park.

Figure 4. Nile soft shelled turtle in the Kunene River mouth.

Figure 5. Green turtle surfacing facing into the river current.

No fresh cetacean strandings were found. A single stranded green turtle was found (Table 1; Fig. 6). A single live balaenopterid whale, probably a Bryde's whale (*Balaeoptera edeni*) was observed 1 km offshore near Rocky Point on 28 January, in conjunction with many feeding seals and sea birds suggesting that it was feeding.

Counting only skulls where more than half was present, 108 Balaenopterid skulls were counted, mostly in two areas north of Angra Fria and north of Möwe Bay. One humpback whale skeleton was found at Rocky Point. The jaw bone of a single sperm whale was found approximately 10 km south of Angra Fria. In addition, the remains of three smaller animals were found, one entire back bone which could not be identified to species, and the skulls of two delphinids, one an unidentified blackfish (e.g. killer whale, pilot whale or false killer whale) and one tentatively identified as a bottlenose dolphin.

Summary and suggestions for future work: Although brief, our surveys of the Kunene River confirm previous observations (Tarr 1987, Simmons *et al*. 1993) of the high numbers of green turtles using the river mouth. Given the high currents, murky water and presence of crocodiles, catching turtles for taking samples or fitting satellite tags would be very challenging. Anglers have reported some success with catching turtles on a rod and line with turtles both taking bait and becoming entangled in lines. Using a net would be challenging due to the high currents, however it might be feasible to set a small area, large mesh net in the river mouth and control it by having ropes anchored on both sides of the river mouth.

Figure 6. Freshly dead green turtle north of Cape Fria.

Table 1. Details of the green turtle stranding

Description		Length	Unit
Species - Green Turtle			
Sex – Male			
Date Attended – 31 January 2014			
Location – 10 km N. of Cape Fria – 18° 22.854' S 12° 0.142' E			
SOL - Straight Overall Length		75	cm
COL - Curved Overall Length		82	cm
SCL - Straight Carapace Length		57	cm
CCL - Curved Carapace Length		61	cm
SCW - Straight Carapace Width		46	cm
CCW - Curved Carapace Width		57.5	cm
TTL - Total Tail Length (from Plastron)		5	cm
MBD - Max Body Depth (straight)		23	cm
SFF - Straight Flipper to Flipper (tips)		88	cm
CFF - Curved Flipper to Flipper (tips)		95	cm
Flippers - Wrist to Tip	L: X	R: 36	cm
Weight		X	kg
Tag presence?		X	
Tag Details		X	

Beach surveys found only a single freshly-dead animal. However the majority of the coastline has an eroding nature so there is a low likelihood than animals would remain on the beach for long unless stranded near the spring high tide mark. The vast majority of older skeletal remains are very old, suggesting they are a result of animals killed in commercial whaling activities in the 18th, 19th and 20th centuries. If DNA can be extracted from these remains, they provide a potentially valuable resource for comparison of haplotypes with extant stocks.

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