

Research Article

Rediscovery of Cameroon Dolphin, the Gulf of Guinea Population of *Sousa teuszii* (Kükenthal, 1892)

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Since the 1892 discovery of the Atlantic humpback dolphin *Sousa teuszii* (Delphinidae), a species endemic to coastal western Africa, from a skull collected in Cameroon, not a single record has been documented from the country or neighbouring countries. Increasing concern about the continued existence of the Gulf of Guinea population of *S. teuszii* or “Cameroon dolphin” prompted an exploratory survey in May 2011. Shore-based effort, on foot (30.52 km; 784 min), yielded no observations. Small boat-based surveys (259.1 km; 1008 min) resulted in a single documented sighting of ca. 10 (8–12) Cameroon dolphins in shallow water off an open sandy shore near Bouandjo in Cameroon’s South Region. The combination of a low encounter rate of 3.86 individuals (100 km)⁻¹ suggesting low abundance and evidence of both fisheries-caused mortality and of habitat encroachment raises concerns about the Cameroon dolphin’s long-term conservation prospect. Our results add to indications concerning several other *S. teuszii* populations that the IUCN status designation of the species as “Vulnerable” may understate its threat level.

1. Introduction

Here we describe coastal survey effort implemented in Cameroon in an attempt to relocate the “Cameroon dolphin,” that is, the Gulf of Guinea population of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892) [1]. This population has been “lost” to science since 1892 when German zoologist Willy Kükenthal described the new dolphin species *Sotalia teuszii*, later reassigned to the genus *Sousa*. The discovery was based on a single skull collected by the then head of plantations Mr. Eduard Tëusz at Man O’War Bay, near Douala, in Cameroon’s Southeast Region. Although a second specimen was collected in 1925 in Senegal, it remained unrecognised till 1965 [2]. No other cases were documented for half a century and Cameroon remained the only known

range state of *S. teuszii*, earning the species its vernacular name in several languages, for example, Cameroon (river) dolphin [3–6], Kamerun Delphin, Kamerun-Flussdelphin [6–8], and Dauphin du Cameroun [2, 6]. Finally, in 1943, a specimen was captured in a shark net off M’Bour, Senegal [9], while the first live individual was retrieved from a beach seine at Joal in 1956 [10]. Further *S. teuszii* records followed in western Africa, ranging from Dakhla Bay, Western Sahara, south to Angola [2, 11, 12]. As the species, after its discovery, was not reported again from Cameroon between 1892 and 2011, its historical link with the country faded and the species became known as the Atlantic humpback dolphin [6, 8].

Despite a bizarre mix-up of the Man O’War dolphin skull with a shark-scavenged carcass apparently of an African manatee (*Trichechus senegalensis*), considering that its head

showed “paired nostrils” and its stomach contents were exclusively vegetarian [1, 13], there is no reason to doubt that the *S. teuszii* holotype skull shipped to Jena University originated from Cameroon. Uncertainty about a possible herbivorous dolphin persisted until Cadenat [10] found exclusive fish remains in the stomach of a freshly captured animal in Senegal.

An exhaustive review of the biology of *S. teuszii* [11, 12] proposed eight preliminary stocks based largely on distributional grounds, amongst which the “Cameroon Estuary Stock” of unknown status because supported only by the holotype skull [1]. The lack of dedicated survey effort was assumed to be the main reason for the absence of later records in Cameroon. However, when *S. teuszii* was not found in Ghana despite significant port monitoring and the documentation of hundreds of small odontocetes comprising at least 12 species, the possibility of local extirpation could no longer be ignored [14–16].

In 2011, increasing concern about *S. teuszii*'s status in Cameroon prompted an exploratory survey in its coastal waters as reported below. At the same time it was considered crucial to document any anthropogenic threats to *S. teuszii*, in particular to verify whether dolphin captures occurred and whether an active market in cetacean bushmeat for human consumption has become established as it has in Ghana and Nigeria [15–17].

2. Materials and Methods

2.1. Study Area and Ecology. Cameroon's coastline stretches over 402 km from the mouth of the Akwayafe River (N04°40') bordering Nigeria south to the mouth of the Ntem River (N02°20') bordering Rio Muni (Equatorial Guinea), between longitudes E08°15' and E09°30' (Figure 1). The wide continental shelf occupies ca. 10,600 km². At Douala and Kribi-Campo the 200 m isobath lies some 40 km offshore while off the Rio del Rey basin, it lies up to 80 km offshore. Due to significant erosion, especially in Southwest Region, the estuaries and mangroves are characterised by high turbidity extending up to 30 km offshore from Bakassi and the estuaries of “Bouches du Cameroon” [18, 19].

Coastal surface waters (20–30 m layer) are warm (>24°C) throughout the year [20]. Salinity is low due to high rainfall and a dense river network. Peak salinity reaches 20‰ at 15 km from Douala port in the dry season and less than 12‰ in the rainy season [21]. The effects of the semidiurnal tides with variable amplitudes (0.3–3 m) are felt in the estuarine complexes. Up to 1973, mangroves covered some 2700 km² and despite much destruction still constitute a predominant feature on Cameroon's coast [22]. Mangrove-lined, wide estuarine channels comprise a primary habitat for *S. teuszii* in Senegal, Gambia, and Guinea [2, 11, 23]. Coastal work in Senegal, Gabon, and Angola demonstrated that this obligate nearshore species can be visually surveyed from small boats and from shore [2, 24, 25]. Both methods were implemented in four areas of Cameroon (Table 1), 7 May–5 June, 2011: (i) Limbe-Idenau coast (Southwest Region; sandy coast and mangrove); Amba Bay and environs of Bota

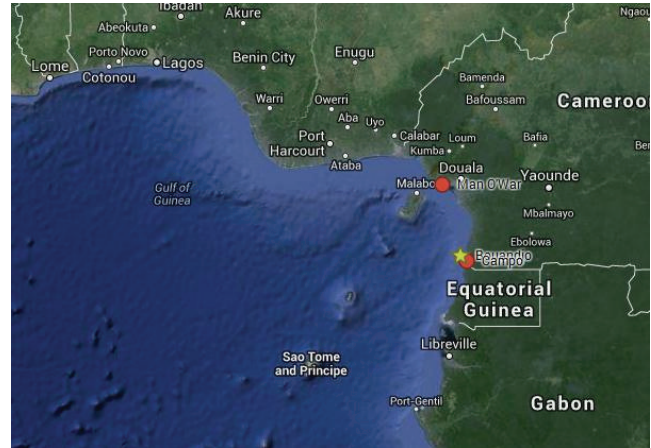


FIGURE 1: Coast of Cameroon as study area in the eastern Gulf of Guinea. Locations of three authenticated records of Cameroon dolphins *Sousa teuszii* are plotted: two specimens (red dots) including the 1892 holotype skull near Douala and a specimen captured at Campo in 2012; single sighting (yellow star) of ca. 10 free-ranging individuals at Bouandjo in 2011.

Islands; (ii) Douala-Edea Wildlife Reserve, southern shores of the Cameroon Estuary (Littoral Region, mangrove channels alternating with open sandy coast); (iii) area north of Ntem River estuary (South Region) bordering Equatorial Guinea; and (iv) Dibamba and Sanaga tidal rivers. The type locality, Man O'War Bay (N03.94839°, E009.22416°), occupied by a military garrison, was not accessible.

2.2. Survey Methods. In five days of small-boat surveys (Table 1), either from a 4 m dug-out canoe with a 8 hp outboard engine or a 4.5 m fibreglass boat with a 40 hp engine, three observers searched 180° ahead mostly by naked eye. Visibility was good to excellent and Beaufort sea state ranged 0–2. Total boat-based survey effort covered 259.1 km over 1,008 min. Shore-based effort (784 min), on foot, covered 30.52 km of beaches, mainly north of the Ntem River. Two observers slowly walked along the high-water line alternately scanning the sea and inspecting flotsam for any skeletal remains washed ashore. At 10 min intervals inshore waters were scanned with 8 × 40 mm binoculars. Distances were calculated with the odometer function of a hand-held GPS (Garmin Oregon 450t).

Several locals at 20 fish landing sites were casually queried regarding any recent cetacean bycatches or sightings [26]. In addition a structured interview, supported by photographs of expected cetaceans, was conducted of the first encountered fisherman at each site who gave coherent and detailed replies ($n = 17$), except at three locations where 3–4 persons were interviewed as a group and their consensus view was summarized. All 25 fishermen interviewed were asked about the presence of coastal cetaceans including Cameroon dolphin, common bottlenose dolphin *Tursiops truncatus*, and humpback whale *Megaptera novaeangliae*.

TABLE 1: Details of visual survey effort for Cameroon dolphin on the coast of Cameroon, from 07 to 28 May, 2011.

Date	Departure point	Destination (arrival time)	Effort	Comments
Boat-based surveys			Total: 259.1 km (1008 min)	
17/05/11	Campo, N02°22.861', E09°49.465' (09:25 h)	Ebodjé, N02°34.550', E09°49.497' (13:00 h)	22.5 km (215 min)	Coastal strip Campo-Ebodjé. 2 observers, small canoe, 8 HP outboard
21/05/11	Limbé, N04°00.012', E09°12.551' (09:40 h)	N04°00.012', E09°12.551' (11:05 h)	20.2 km (85 min)	Limbé harbour and environs. 2 observers, canoe, 40 HP outboard
23/05/11	Mouanko, N03°38.371', E09°48.060' (14:54)	Mbiako, N03°35.317', E09°38.934' (16:28)	33.91 km (94 min)	Downriver Sanaga and short estuary excursion; 3 observers, fibreglass boat; 40 HP outboard
24/05/11	Mbiako, N03°35.317', E09°38.934' (10:30 h)	Sitan, N03°28.347', E09°44.183' and return to Mbiako (13:14)	42.56 km (164 min)	100–200 m off beach, return 300–500 m off beach; 3 observers, fibreglass boat, 40 HP
24/05/11	Mbiako, N03°35.317', E09°38.934' (14:27)	Bolondo, N03°48.731, E09°33.470' (16:23 h)	35.65 km (116 min)	150–300 m off beach, 3 observers, fibreglass boat, 40 HP
25/05/11	Bolondo, N03°48.731, E09°33.470' (09:15)	Manoka N03°52.004', E09°37.761' (12:00 h), penins.tip, N03°49.273', E09°32.711' (14:57)	50.88 km (201 min)	Survey of main creeks and estuary, 3 observers, fibreglass boat, 40 HP
26/05/11	Bolondo, N03°48.731, E09°33.470' (11:41 h)	Mouanko, N03°38.371', E09°48.060' (13:54 h)	53.40 km (133 min)	Coastal strip; 13:03 h entering Sanaga river and upriver survey.
Beach-based surveys			Total: 30.52 km (784 min)	
16/05/11	River Ntem mouth (06:00 h)	River Ntem estuary, right bank (07:30 h)	0 km (90 min)	1 observer, stationary position
16/05/11	N02°21.104', E09°49.397' (10:20 h)	N02°24.384', E09°49.345' (14:35 h)	6.45 km (255 min)	2 observers, on foot, NE direction
16/05/11	N02°24.384', E09°49.345' (14:35 h)	N02°22.861', E09°49.465' (15:45 h)	2.95 km (70 min)	2, on foot, SW direction
17/05/11	N02°21.104', E09°49.397' (07:30 h)	N02°22.861', E09°49.465' (08:35 h)	3.50 km (65 min)	2, on foot, NE direction, low tide
19/05/11	Idenau, N04°13.045', E08°59.133' (10:25 h)	N04°13.629', E08°58.537' and return to Idenau (11:55 h)	3.75 km (90 min)	3, on foot, NW/NE, rising tide
19/05/11	Seme, N04°03.358', E09°03.181' (15:06 h)	N04°03.579', E09°02.726' and return	2.22 km (86 min)	2, on foot, high tide
25/05/11	Northern tip peninsula, N03°49.273', E09°32.711' (15:12 h)	N03°47.722', E09°33.724' and return to Bolondo, N03°48.731, E09°33.470' (18:20)	11.65 km (128 min)	2, on foot

3. Results and Discussion

No dolphins were seen, nor remains found, during the shore-based effort. The boat-based surveys resulted in a single *S. teuszii* sighting on 17 May, 2011 (11:05 h GMT+01), the first ever sighting record in Cameroon (Figure 2). The encounter lasted for 10 min under optimal conditions, including excellent visibility and 1 Beaufort sea state. With a speed of 9 km·hr⁻¹, the canoe's distance from the open sandy shore fluctuated from 250 to 500 m while avoiding sand banks and submerged rock formations. The somewhat dispersed group of ca. 10 Cameroon dolphins (low, 8; high, 12) was encountered at N02°28.708', E09°48.661' near Bouandjo, South Region. The group moved in turbid, shallow water, 250–600 m from the surf zone. The largest three individuals, evidently adults, presented a strongly developed dorsal hump. Smaller, juvenile specimens had a much fainter hump. Behavioural cues suggested foraging as individuals moved independently and rapidly with continuous changes in

direction and speed, either subsurface or alternating with up to 4–5 min long dives. Aerial display was limited to a single full-body leap by one adult. Despite our unobtrusive approach, dolphins reacted with avoidance after just a few minutes, scattering in offshore direction, and moved out of sight ca. 600 m from shore. The single sighting translating into a boat-based encounter rate of 0.386 sightings (100 km)⁻¹ or 3.86 individuals (100 km)⁻¹ suggests that the present abundance of *S. teuszii* in Cameroon may be very low.

Surveys of the Sanaga River on 23 and 26 May 2011 yielded no sightings (Figure 3). During 6 hrs on 3 and 4 June 2011, one of us (I. Ayissi) made small-boat surveys of the tidal Dibamba River but encountered no dolphins. This is in concordance with claims by local fisherfolk who deny the presence of dolphins in the Sanaga and Dibamba Rivers.

The original plan to survey the extensive northern mangrove channels including Rio-del-Rey was frustrated by Idenau port authorities denying permission for security reasons



FIGURE 2: Two adult Cameroon dolphins *Sousa teuszii*, part of a small group of ca. 10 individuals foraging nearshore at Bouandjo, 17 May, 2011. This is the first authenticated sighting and the first evidence since 1892 of the presence of *S. teuszii* in Cameroon. Photo: K. Van Waerebeek.



FIGURE 3: Despite its historical name “Cameroon River dolphin” implying potential riverine habitat, we encountered no dolphins in Cameroon’s wide Sanaga River; their absence was confirmed by local fishermen. Photo: K. Van Waerebeek.

including piracy. Artisanal fishing effort and nearshore boat traffic were very intense near Idenau. Dozens of large canoes equipped with high-powered outboard engines transported merchandise and passengers to and from Nigeria. These noisy, high-speed crafts would almost certainly disturb and chase away any humpback dolphins, if present.

The only specimen evidence of *S. teuszii* in Cameroon (since 1892) consisted of a dolphin captured and landed by small-scale local fishermen on an indeterminate date in 2012 near Campo (N02°22.861', E09°49.4654') in southern Cameroon (Figure 4). Although 81% of interviewed fishermen had seen dolphins from shore, none positively recognised *S. teuszii* from photographs, and 87.5% answered a resolute “never seen.” In contrast, almost all fishermen recognised *T. truncatus*, a species not encountered during our surveys. However, a photo of a common bottlenose dolphin landed at Yoyo II (N03°40', E09°38') in 2003 and examined



FIGURE 4: A Cameroon dolphin captured by artisanal fishermen near Campo, southern Cameroon, on an indeterminate date in 2012. Photo by unnamed fisherman from Campo.

by the authors confirmed the presence of *T. truncatus* in Cameroon.

So-called rapid gillnet bycatch assessments, based primarily on interviews with fishermen, indicated that cetacean bycatches occur but failed to obtain data on species and numbers [27, 28]. The underperformance of interview surveys was consistent with our own findings [26] stressing the need for corroboration through direct monitoring of fisheries backed by specimen and photographic evidence. Besides *S. teuszii* and *T. truncatus*, photo evidence now exists for specimens killed in fisheries interactions of another four cetacean species in Cameroon, that is, humpback whale *Megaptera novaeangliae*, sperm whale *Physeter macrocephalus*, striped dolphin *Stenella coeruleoalba*, and a long-snouted form of common dolphin, *Delphinus* sp. [26].

4. Conclusions

After almost 120 years without humpback dolphin records in Cameroon, documentation of the unique Bouandjo sighting in 2011 and a single specimen captured at Campo in 2012 evidenced the continuing occurrence of Cameroon dolphins in the country. As new cases emerge in the Gulf of Guinea, the “Cameroon Estuary stock” (*sensu* van Waerebeek et al. [2]) may have a wider distribution and population structure will need revisiting. We suggest that a combined lack of surveys and marine mammalogists, low encounter rate, and small, inconspicuous group sizes are the primary reasons for the historical absence of *S. teuszii* records. Low abundance underscores the legitimacy of concern about

long-term conservation of Cameroon dolphins. A similar situation was reported in Angola's Namibe province, where only 10 individuals were photo-identified despite extensive field effort [12, 25].

No dolphins were sighted in Cameroon's mangrove channels nor in the Sanaga and Dibamba rivers. While our effort was limited in scope, fishermen living along the river banks reported no dolphins in these rivers. Tidal currents may be very strong: 1–1.5 m/s Influx and up to 2.6 m/s for reflux [29]. Numerous sandbanks falling dry at low tide represent high stranding risk and may discourage humpback dolphins from venturing inside rivers. Nonetheless a final conclusion is premature.

Future surveying and photo-identification efforts should be expanded to cover all seasons and most of the coastline to obtain more robust density estimates. While economical and widely available, dug-out canoes can only offer low eye-height while surveying is restricted to Beaufort sea state 0-1 and low or no swell. The fibreglass boat offered a higher eye-height, faster speed, and superior functionality and stability.

The nearshore or estuarine habitat of *S. teuszii* magnifies its susceptibility to anthropogenic threats. Bycatch mortality in artisanal fisheries, prey depletion, disturbance, and cetacean bushmeat acquiring market value (fomenting direct captures) are of major concern. With increasing nearshore boat traffic, injurious or lethal collisions between fast craft and slow-swimming Atlantic humpback dolphins are an emerging threat, as documented for Chinese humpback dolphins *Sousa chinensis* in Hong Kong and Chinese waters [30, 31]. Not only does the boat avoidance behaviour of *S. teuszii* complicate surveying and photo-identification attempts [2, 8, 25] but dense boat traffic may also lead to Cameroon dolphin communities abandoning home ranges in search of quieter, possibly poorer, feeding areas. Habitat encroachment from urban expansion, port and industrial construction, overfishing [32–34], chemical and acoustic pollution, and ghost nets [35] constitutes additional conservation problems. Scarcity of information on the fine-scale distribution and on stock structure, abundance, and ecology of the Cameroon dolphin prevents an efficient evaluation of the impact of threat factors and hinders efforts to raise public awareness [2, 8, 11, 25].

While the IUCN categorizes *S. teuszii* as “Vulnerable,” the species is listed on CMS Appendix I/II as well as on CITES Appendix I. Most experts consider IUCN's “Vulnerable” classification to be an understatement of its true conservation status. Circumstantial evidence suggests that the species is already endangered in view of its low abundance throughout a fragmented range, unprecedented deterioration of its obligate shallow-water habitat, and significant fisheries-caused mortality coupled with an increased demand for marine bushmeat in western Africa [2, 8, 25, 36]. To date, *S. teuszii* has not been reported in Ghana or Benin despite significant monitoring of cetacean landings [2, 16, 37] suggesting the species has become very rare and perhaps even locally extinct. Equatorial Guinea and Nigeria are unconfirmed but highly probable range states, considering their extensive mangrove-lined coast. Promotion of the historic significance of *S. teuszii* as a flagship species for Cameroon and the Gulf of

Guinea (the only aquatic mammal taxon first discovered in this region), underscored by its rediscovery, may help foster national awareness for the conservation of aquatic mammals in general. Even so, safeguarding a future for the iconic Cameroon dolphin will prove a formidable challenge and will depend on whether the implementation of proactive conservation measures, in particular installing nearshore marine protected areas, will succeed in the face of accelerating anthropogenic pressures. Inaction could result in the loss of one of Africa's most emblematic marine mammals.

Conflict of Interests

The authors declare that they have no conflict of interests regarding the publication of this paper.

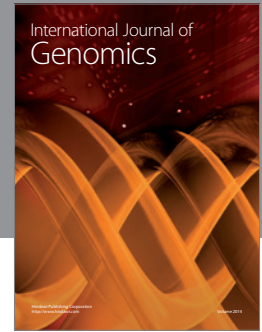
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