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**Status and distribution of desert-dwelling elephants in
the Hoarusib, Hoanib, and Uniab River drainages**

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Summary and Significance

We compiled data from our research (2006-2018) along with published accounts dating back to 1975 on the desert-dwelling elephant population in our study area of Skeleton Coast National Park and western Kunene region. This includes the Hoarusib-Hoanib, and Uniab subpopulations. Our analysis of the data reveal the profound influence that human-caused mortality has had on the population. An initial precipitous decline occurred due to wartime poaching (1980s). That was followed by three decades of low-level human-caused mortality of adult elephants, which in addition to natural mortality and a low reproductive rate, has prevented recovery of these subpopulations to prewar levels. Despite recent gains from calves born (i.e. 2016-2017), the low number of breeding age bulls remaining in the Hoarusib, Hoanib (downstream of Sesfontein), and Uniab subpopulations (2, 2, and 3 breeding age bulls respectively) is a significant conservation

concern. First, reproduction will cease if these last few bulls are killed or die prematurely. And second, with so few bulls remaining, the danger of inbreeding is greatly increased.

The current number of resident elephants in the Hoarusib-Hoanib subpopulation is 34 (based on exact counts of known individuals). This number is down from 2017 when there was a total of 36 elephants, because two deaths occurred in 2018. In the Uniab drainage study area, all of the elephants had gone out of the study area and into the surrounding mountains following the rains, so we were not able to observe them. The estimate from 2017 of ~50 elephants remains the most current estimate.

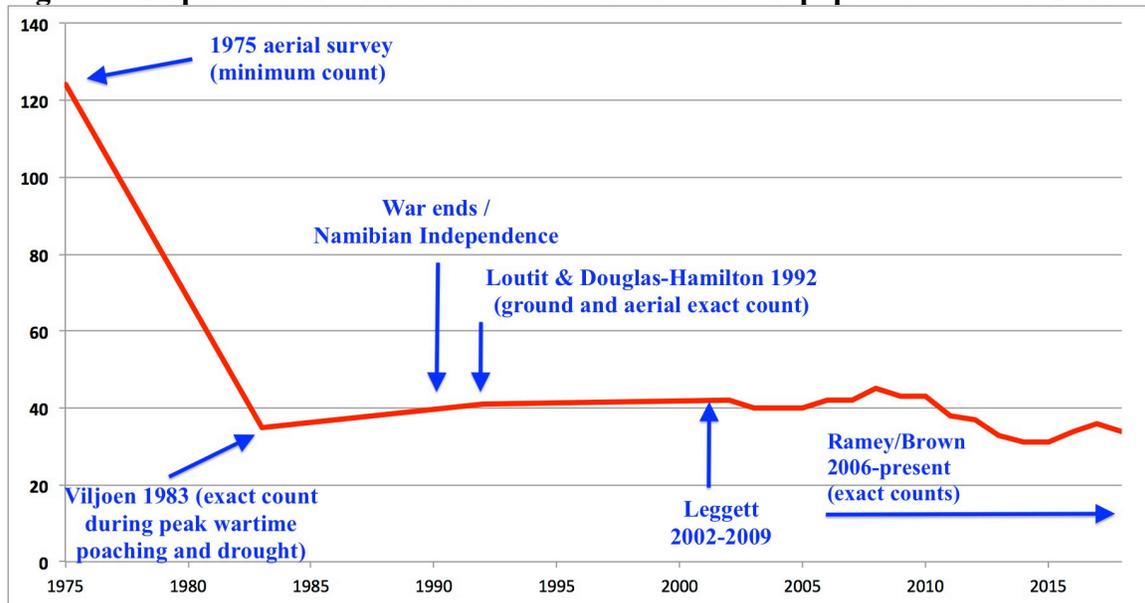
The total for these three study areas is ~84 elephants. By comparison, Viljoen (1987) documented 86 individuals in the same area in 1981, during the height of drought and poaching.

Our analysis of the data show that temporary population gains made during the mid-late 2000's have been lost, primarily due to the additive effects of human-caused mortality, which account for over half of the adult mortality (see 2015 and 2016 reports). In the long-term, it is doubtful that the desert-dwelling elephant subpopulation will be sustainable if there is continued human-caused mortality.

As previously reported by Viljoen (1987) and us (Ramey-Brown annual research reports), while some dry-season calf mortality can be expected, the observations of calves suggest that drought is not currently a limiting factor to these subpopulations.

Our long-term research data shows that for both desert-dwelling elephants and transitional area elephants, home range and migration routes span multiple conservancies, and are therefore a shared responsibility.

Figure 1. Elephant trends in the Hoarusib and Hoanib subpopulations: 1975-2018.



Detailed Results

The following data on elephants of the Hoarusib, Hoanib, and Uniab river drainages is based on exact counts of known individuals from our ID photo database.

1) Hoarusib River elephants = 16 total total.

The home range and migration routes of these elephants include: Skeleton Coast National Park, and the conservancies of Sesfontein, Puros, Okondjombo, Ombujokanguindi, Otjiu-West, and Ongongo.

In the **Lower Hoarusib River** (between the coast and Puros valley), just one breeding female remains (WKF-7). Her companion, the distinctive female called Left Fang/Skewetand (WKF-16) died in April 2018, probably of illness or starvation due to old age, as photographs of her taken by local guides showed her in poor condition during early April. Her carcass, with tusks still intact, was found north of Puros in November 2018 by conservancy staff. This female was very likely the same female as #5765, satellite radio-collared and studied by Lindeque and Lindeque (1991). Her age at death was estimated at ~47 years (Figure 2).

Following her death, Left Fang's two-year-old male calf was being cared for by his 18-year-old brother, which is highly unusual elephant behavior. This pair of orphans had migrated from the Hoarusib to the Hoanib floodplain at the end of May 2018, across the gravel plains and bypassed the Ganias spring by 0.5km. We observed them in the floodplain grazing on lush, deep grass from June 9-13, 2018. Food was plentiful there and they were in good condition at the time of last sighting in June 2018 (Figure 3).

Figure 2. Left Fang/Skewetand and calf in 2016. Left Fang died in April 2018 of unknown ailment, her carcass was found in November 2018 by Puros Conservancy staff.



Figure 3. Left Fang's 18-year old son and 2-year old orphan calf together in the Hoanib Floodplain during June 2018. The two made a waterless migration there from the Hoarusib River, 70km away, and returned to the Hoarusib River a month later.



In the **Lower Hoarusib River** (Puros valley and down to the coast) there are only 7 resident elephants remaining in this group:

- 1 female of breeding age WKF-7 (~45 years)
- 3 juvenile males (11, 16, 18 years; sons of resident females)
- 1 calf (male, born May 2016 to WKF-16/Left Fang, and now an orphan)
- 1 calf (female, born April 2017 to WKF-7)
- 1 male of breeding age (~27 years, also son of resident female)

In the **Upper Hoarusib River** (Ongongo, Otjiu West, and upper Hoarusib gorge) there are only 9 resident elephants remaining in this group:

- 4 females of breeding age (16, 21, 32 and ~50 years)
- 3 juveniles (4, 8, 12 years)
- 1 male subadult (22 years)
- 1 male of breeding age (~31 years)

Even though there are four breeding age females in this Upper Hoarusib group, there has been very little reproduction and no new calves have survived since 2014. The reason is not known, but it should be noted that there is only one breeding age bull in this population that is unrelated to the females.

Four of the nine Upper Hoarusib elephants are in what we call “the Orphan Group,” as three of them have lost their closest family members to poaching, and have since bonded together as unrelated individuals.

This Upper Hoarusib group of nine mostly resides in the Upper Hoarusib gorge above the town of Puros, and only occasionally travels below Puros.

2) Hoanib River = 18 elephants total.

In the Hoanib River west of Sesfontein, 18 elephants remain.

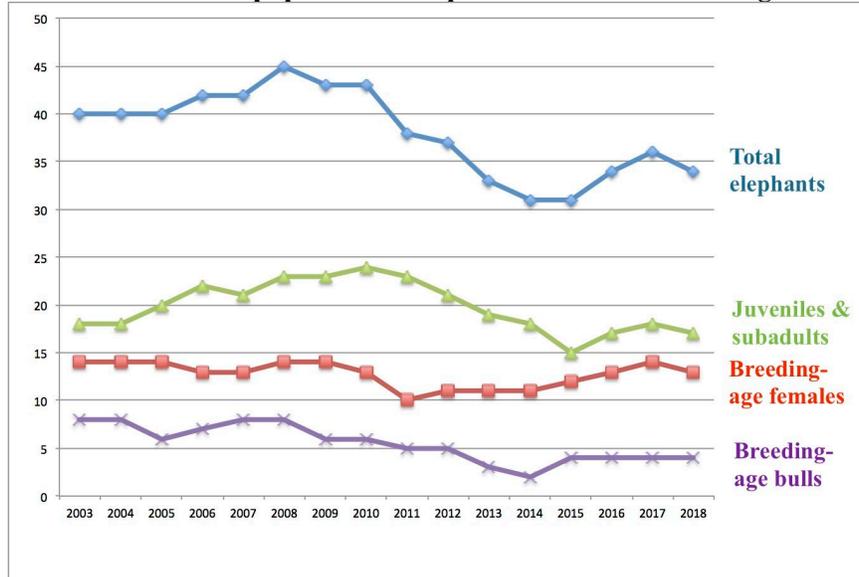
A two-year-old calf died in May 2018 in the floodplain, of unknown cause. He was healthy when last observed, but disappeared shortly thereafter, possibly due to an accident. The carcass was not found.

The home range and migration routes of these elephants include: Skeleton Coast National Park, Sesfontein Conservancy, and Palmwag Concession Area. This group consists of:

- 8 females of breeding age (12, 14, 18, 19, 23, 31, ~46, ~46 years)
- 6 juveniles (5, 6, 7, 7, 8, 8 years)
- 2 calves under age two (born 2016 and 2017)
- 2 males of breeding age (26 and 33 years)

During the course of our 14-year study, elephants from the upper Hoanib catchment (upstream of Khowarib Schlucht), or from the mountains north of Warmquelle (Otjomatempa area), have not been documented to overlap in range with the Hoanib elephants west of Sesfontein. While there may have been historic movements between these areas, our observations and data over the past decade indicate that these are now separate subpopulations. The loss of older female and male elephants (poached or killed as problem animals), with long-acquired knowledge of the landscape and migration routes, is likely to have contributed to this isolation, along with the increase in human presence and habitation which may hinder elephant movement. The decline in the number of breeding-aged bulls in the Hoarusib and Hoanib (four total) is a concern due to the potential for inbreeding (Figure 4).

Figure 4. Hoarusib-Hoanib subpopulation composition from 2002 through 2018.



3) Uniab River

This subpopulation primarily inhabits the Palmwag Concession Area and immediate surroundings during the dry season. The home range and migration routes of these elephants includes: Skeleton Coast National Park, Palmwag Concession, Etendeka Concession, Torra Conservancy, and #Khoadi//Hôas Conservancy.)

For 2018, the Uniab drainage has a population estimate of ~50 elephants.

During our field season in May-June 2018, the Uniab elephants had gone out of the Palmwag concession following the rains and into the Grootberg mountains, so we were unable to locate them for a count. The following population estimate from 2017, ~50 elephants, is the most current information:

In Nov-Dec 2017 a group of 19 elephants was observed in the Kawaxab drainage within Palmwag concession. This group included:

- 8 females of breeding age
- 11 juveniles and calves
- 0 males of breeding age

A separate group of 24 was observed near Spaarwater, after they came out of the Palmwag Concession and went into the hills east of the highway to eat fresh greens that resulted from the early rains. This group (which we call the Achab group) included:

- 11 females of breeding age
- 1 female subadult
- 5 juveniles
- 4 calves
- 1 male subadult
- 2 males of breeding age

This yields a current minimum of 43 elephants in the Uniab drainage based on direct observations in 2017. However, a group of 7 elephants that usually frequent the Barab drainage were not observed in 2017, and if added to the previous number, a total of ~50 is obtained. According to local guides in the Palmwag concession, and our observations, there are only 3 bulls of breeding age in this subpopulation.

Acknowledgements

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Appendix A:

Figure A1: Map of the approximate home range of Hoarusib-Hoanib (green) and Uniab (blue) elephant subpopulations. Migration routes between the Hoarusib and Hoanib are indicated by the connecting lines. Mean annual rainfall is portrayed by isoclines. These are the same subpopulations as studied by Viljoen (1987, 1988), with occasional, temporary movements outside these home ranges, as described by Lindeque and Lindeque (1991).

