Centrochelys sulcata, African Spurred Tortoise


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Scientific Name: *Centrochelys sulcata* (Miller, 1779)

Synonym(s):
- *Geochelone sulcata* (Miller, 1779)
- *Testudo calcarata* Schneider, 1784
- *Testudo radiata* ssp. *senegalensis* Gray, 1831
- *Testudo sulcata* Miller, 1779

Common Name(s):
- English: African Spurred Tortoise, Grooved Tortoise, Sahel Tortoise
- French: Tortue sillonnée
- Spanish; Castilian: Tortuga Africana, Tortuga Con Púas

Taxonomic Source(s):

Taxonomic Notes:
Previously assigned to the genus *Geochelone*, following Loveridge and Williams (1957), the species has more recently been placed in *Centrochelys* Gray 1872, following Bour (1980), as subsequently recognized by Devaux (2000), TTTWG (2017), and Petrozzi *et al.* (2020b), but not by Fritz and Havas (2007). There is very little morphological (Lambert 1993) or genetic (mtDNA) variation in this species; however, there is some divergence between eastern and western subpopulations of *C. sulcata* based on the presence of two haplotypes (Livoreil and Van Der Kuyl 2005), but subspecies are not recognized.

Assessment Information

Red List Category & Criteria: Endangered A4bcd ver 3.1

Year Published: 2021

Date Assessed: August 29, 2020

Justification:
*Centrochelys sulcata*, the African Spurred Tortoise, is declining rapidly due to: 1) extensive habitat loss due to agricultural expansion, livestock overgrazing, and set fires in its habitats, 2) exploitation for eggs and meat for consumption as well as for the international pet trade and traditional medicinal use, and 3) the gradual effects of climate change and desertification in its sub-Saharan habitat. The species was...
previously assessed as Vulnerable (VU A1cd; version 2.3) for the Red List in 1996. Observed extensive habitat destruction and degradation and estimated decreases based on surveys of already-low-density populations across its fragmented range over the last several years with comparisons to its status during the previous two generations (ca 60 yrs), and further predicted habitat loss and population declines over the next one generation (30 yrs), suggest that the species has and will sustain at least a 50–75% decline over these three generations (90 yrs), and as such is hereby assessed as Endangered (EN) under criterion A4bcd.

**Previously Published Red List Assessments**

1996 – Vulnerable (VU)

https://dx.doi.org/10.2305/IUCN.UK.1996.RLTS.T163423A5605057.en

**Geographic Range**

**Range Description:**
The African Spurred Tortoise, *Centrochelys sulcata*, occurs through the majority of the Sahel and the Sudanese climatic zones, in areas of annual precipitation between 150 and 700 mm, and ranging from Mauritania and Senegal to Sudan, Ethiopia, Eritrea, and the southwestern tip of the Arabian Peninsula, although within this region its distribution is highly fragmented (Broadley 1989, Iverson 1992, Gasperetti *et al.* 1993, Devaux 2000, Trape *et al.* 2012, TFWG 2017, Petrozzi *et al.* 2020b). In West Africa the major distribution centres are found in the south of Mauritania, in the Ferlo region of Senegal, central Mali, southeastern Burkina Faso, W National Park and the Termit Massif in Niger, and from Chad to the northern Central African Republic (Trape *et al.* 2012, Petrozzi *et al.* 2020b). Numerous records from areas north and south of the presumed indigenous range are considered traded and/or introduced animals (Devaux 2000, TFWG 2017, Petrozzi *et al.* 2020b), and recent records from Saudi Arabia and Yemen may possibly represent historical introductions. The species may occur in most southern Algeria, but has not been recorded there.

**Country Occurrence:**

**Native, Extant (resident):** Burkina Faso; Central African Republic; Chad; Eritrea; Ethiopia; Mali; Mauritania; Niger; Nigeria; Senegal; Sudan

**Native, Possibly Extant (resident):** Benin; Cameroon

**Native, Possibly Extinct:** Togo

**Native, Presence Uncertain:** Algeria

**Extant & Origin Uncertain:** Saudi Arabia; Yemen

**Possibly Extinct & Origin Uncertain:** Djibouti

**Presence Uncertain & Origin Uncertain:** Somalia
Distribution Map

Legend

- **EXTANT (RESIDENT)**

Compiled by:

Chelonian Research Foundation 2020

https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T163423A1006958.en
Population

According to Villiers (1958), *Centrochelys sulcata* was very widely distributed in the 1950s from southern Mauritania to Ethiopia and Eritrea, and was believed to number at least about 100,000 tortoises. However, according to hypothetical estimates by Devaux *et al.* in CITES (2000), the total population of this species in the late 1990s was assumed to be between 18,000 and 20,000 specimens (i.e., an estimated population reduction at that time of about 80% over 40 years). However, their suggested numbers were clear underestimates based on incomplete or absent surveys in many parts of the range, and we consider their estimates to be unreliable and not accurately reflective of the actual population size at the time. We have documented much larger numbers than their estimates for Mali (Petrozzi *et al.*, unpubl. data), Burkina Faso (Hema, Petrozzi, Luiselli *et al.*, unpubl. data) and northern Nigeria (Eniang, Petrozzi, Luiselli *et al.*, unpubl. data), and in Senegal, more than 400 animals remain in the wild (Diagne, unpubl. data). However, recent studies of population densities in the native range of *C. sulcata*, estimated through the DISTANCE methodology, have shown that the species has among the lowest mean densities of all tortoises in the world (Burkina Faso: 0.0021 ind/ha, Niger: 0.167 ind/ha; Petrozzi *et al.* 2018).

**Current Population Trend:** Decreasing

Habitat and Ecology (see Appendix for additional information)

*Centrochelys sulcata*, the African Spurred Tortoise, is one of the largest terrestrial chelonians in the world, the largest extant continental tortoise, and the largest tortoise in Africa (Trape *et al.* 2012, Petrozzi *et al.* 2020b). Males are larger than females, and may exceed 100 kg in body mass, with a straight carapace length (SCL) of up to 86.0 cm in males and 57.8 cm in females, and a curved carapace length reaching 101.0 cm in males and 67.0 cm in females. The sex ratio is nearly equal and sexual maturity is reached at 10–12 yrs for females and 13–15 years for males in the wild, at a size of 40–50 cm SCL, but from 5–6 yrs in captivity (Petrozzi *et al.* 2020b). The species is especially linked to habitat with periodic or intermittent streams and rivers, locally called kori in the Sahelian regions. In addition, African Spurred Tortoises can be found on slopes and hills, in particular on stabilized dunes, and sporadically in flat areas with semi-deciduous shrublands and high grasses. The species is mostly herbivorous, but can feed on carrion on occasion and on garbage in the surroundings of human settlements. Males are highly territorial, with larger males winning sexual combats. The population density is among the lowest that has been observed so far in terrestrial chelonians (Petrozzi *et al.* 2018). The species makes extensive use of deep and long burrows (up to 15 m long), occasionally used by more than one individual, and above-ground activity is mainly concentrated in the early morning hours and during the wet season (August). Reproduction is also seasonal, with matings occurring primarily in September to April. Nesting occurs from September to May, during which 2–3 clutches of 14–40 eggs (average clutch size ca 18; average egg ca 52 x 44 mm, 55 g) are laid (Petrozzi *et al.* 2020b). Annual fecundity is about 45 eggs (average clutch size of ca 18 eggs x average clutches annually of ca 2.5). Generation time is estimated as at least 30 yrs, based on average age at maturity of about 12 yrs for females and longevity of up to 50–80 yrs (Petrozzi *et al.* 2020b).

**Systems:** Terrestrial

Use and Trade

There is some harvest of eggs and wild animals for subsistence consumption, local use as domestic pets,
and fairly extensive export of animals for the international pet trade (Petrozzi et al. 2020b). This species breeds very readily in captivity (Trape et al. 2012; Petrozzi et al. 2020b), and there is wide-scale production of captive-produced hatchlings in Togo and the USA and some in Europe.

**Threats (see Appendix for additional information)**

Habitat modification and the ongoing desertification of the Sahel region, are the main threats affecting the natural populations of *Centrochelys sulcata*. The international pet trade is also an important threat, as well as local consumption in a few Sahelian communities (Petrozzi et al. 2020b). In many areas where the species is present the density is very low, with the future survival of populations seriously at risk (Petrozzi et al. 2018). The presence of high density livestock and bushfires restricts the presence of *C. sulcata* (Petrozzi et al. 2016b), and the presence of cattle is negatively correlated with the presence of *C. sulcata* (Petrozzi et al. 2020a). Current habitat fragmentation and lower tortoise densities can be attributed to human pressure in combination with drought. Overgrazing (by zebu cattle, goats, donkeys, and camels) and climate-change-induced desertification contribute to habitat loss and competition for food plants for this species (Lambert 1993, 1999; CITES 2000; Petrozzi et al. 2020b).

Traditionally, consumption of *C. sulcata* may have been minimal at the local community level, as the inhabitants of the Sahel region are primarily Muslims who have a religious prohibition against the consumption of turtle flesh (Broadley 1989, Klemens and Thorbjarnarson 1995); but some local consumption does occur, as *C. sulcata* meat is considered a delicacy by some Sahelian human populations (Warshall 1989; Lambert 1993; Petrozzi et al. 2017, 2018, 2019). In addition, political instability, civil wars, and local famine may force human communities to consume individuals of this species and accelerate its decline, for instance, in Sudan (Siddig 2014). The species is often kept in captivity since it is a symbol of longevity and an object of veneration for its good-luck; this is a tradition among the Dogons in Mali, among the Senegalese, and in Burkina Faso (Ardjima et al. 2010).

Trade data from CITES for *C. sulcata* exported from African nations analyzed by Petrozzi et al. (2016b) showed that during 20 years from 1990 to 2010, an average of 2000–2790 animals were traded annually (somewhat higher numbers of captive *C. sulcata* were exported from the USA during the same time frame; Leuteritz, unpubl. data). Of the African traded animals, a total of over 9,100 were taken from the wild (an average of over 430 individuals annually). However, many specimens were reported to come from countries where the species did not occur (e.g., Togo) or had been extirpated (e.g., Cameroon) (Chirio and LeBreton 2007). In some cases, specimens traded from countries where the species was not present probably came from the bordering countries (e.g., specimens traded from Togo originate in Burkina Faso, Niger, and Mali (Petrozzi et al. 2016a). Petrozzi et al. (2016b) observed a decrease in the annual export of wild individuals for the pet trade after the introduction of export quotas by country and by year, but trade data must be considered with caution. A recent assessment indicates that breeding farms in Togo are efficiently breeding this species for export (Segniagbeto et al., unpubl. data), using breeding stock from Mali and Niger. Overall, from 1990 through 2019, over 393,000 live *C. sulcata* have been reported as traded by CITES, with about 28% (ca 109,000) being exported from in-range or adjacent African countries (https://trade.cites.org/).

Overall, according to a recent evaluation, habitat fragmentation and loss has accounted for about 60% of the species’ estimated percentage involvement of threats (Stanford et al. 2020), with climate change accounting for about 25%, exploitation for local egg and meat consumption for ca 10%, and exploitation for trade (pets, food, medicine) for about 5% (Diagne, McGovern, and Luiselli, unpubl. data.).
Conservation Actions (see Appendix for additional information)

*Centrochelys sulcata* was assessed as Vulnerable for the IUCN Red List in 1996 and provisionally reassessed for the Red List as Endangered by the IUCN Tortoise and Freshwater Turtle Specialist Group in 2013 (TTWG 2017, Rhodin *et al*. 2018). It has been listed in Appendix II of CITES since 1977 as part of the family listing of Testudinidae; as of 2000 a zero annual export quota has been established for specimens removed from the wild and traded for primarily commercial purposes (UNEP-WCMC 2013). In 2001 the USDA enacted a prohibition on the importation of African land tortoises including *C. sulcata* into the United States because of Heartwater disease, an acute infectious disease affecting ruminants carried by ticks (using tortoises as hosts) (Smith and Redding 2001). For the European Union, Regulation (CE) n° 1968/99 of the Commission dated 10 September 1999 suspends introduction into the Community of specimens of several species of wild fauna and flora; *Geochelone [Centrochelys] sulcata* was one of the species concerned, for all wild, all specimens, and all countries of origin (CITES 2000).

The species has been reintroduced in north and western Ferlo, Senegal (Garrigues and Cadi 2011; Diagne, unpubl. data), and there are captive colonies in several countries, both in Africa and elsewhere (e.g., Diagne 1996). The species is present in several protected areas: W Regional Park (Benin, Burkina Faso, Niger), Arly National Park, including Singou Reserve and Réserve Partielle de Pama, and Reserve Sylvo-Pastorale et Partielle de Faune de Sahel (Burkina Faso), Bénoué National Park and possibly Faro National Park (Cameroon, but now possibly extirpated), Koumbala Reserve and Bamingui Bangoran National Park (Central African Republic), Teseny Reserve (Eritrea), Kafta Sheraro National Park and Awash National Park (probably introduced) (Ethiopia), Reserve Partielle de la Faune d’Ansongo-Ménaka and Park National de la Boucle du Baoule (Mali), and Diawling National Park (Mauritania).

Given that *C. sulcata* is easily bred in captivity (Petrozzi *et al*. 2020b), reintroductions of captive-bred individuals into the wild may be easily feasible, given that the species is also often kept in captivity by local communities across the Sahel, and that, in several cases, the captive individuals were either collected in the local surrounding regions or were the descendants of free-ranging individuals previously caught locally (Ardjima *et al*. 2020). From studies on the preferred habitat of this species, it would be possible to select suitable reintroduction sites within preferred habitats for the species. The reintroduction of *C. sulcata* in certain habitats may also encourage the proliferation of various savanna plants which depend on tortoises for their seed dispersal. Overall, the main challenge is to find suitable secure habitat (national parks or wildlife sanctuaries, public or private) to perform reintroduction activities of *C. sulcata* within its indigenous Sahelian habitat and range.

Credits


**Reviewer(s):** van Dijk, P.P. & Stanford, C.B.

**Authority/Authorities:** IUCN SSC Tortoise and Freshwater Turtle Specialist Group

https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T163423A1006958.en 6
Bibliography


Citation


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External Resources
Appendix

Habitats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Season</th>
<th>Suitability</th>
<th>Major Importance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Shrubland -&gt; 3.5. Shrubland - Subtropical/Tropical Dry</td>
<td>Resident</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Grassland -&gt; 4.5. Grassland - Subtropical/Tropical Dry</td>
<td>Resident</td>
<td>Suitable</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Use and Trade
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>End Use</th>
<th>Local</th>
<th>National</th>
<th>International</th>
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</thead>
<tbody>
<tr>
<td>Food - human</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pets/display animals, horticulture</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Establishing ex-situ production *</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Threats
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Threat</th>
<th>Timing</th>
<th>Scope</th>
<th>Severity</th>
<th>Impact Score</th>
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</thead>
<tbody>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion 1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion 1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
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<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion 1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Agriculture &amp; aquaculture -&gt; 2.3. Livestock farming &amp; ranching -&gt; 2.3.1. Nomadic grazing</td>
<td>Ongoing</td>
<td>Minority (50%)</td>
<td>Slow, significant declines</td>
<td>Low impact: 5</td>
</tr>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Agriculture &amp; aquaculture -&gt; 2.3. Livestock farming &amp; ranching -&gt; 2.3.2. Small-holder grazing, ranching or farming</td>
<td>Ongoing</td>
<td>Minority (50%)</td>
<td>Slow, significant declines</td>
<td>Low impact: 5</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Stresses:</th>
<th>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Agriculture &amp; aquaculture -&gt; 2.3. Livestock farming &amp; ranching -&gt; 2.3.3. Agro-industry grazing, ranching or farming</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion</td>
</tr>
<tr>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
</tr>
<tr>
<td>5. Biological resource use -&gt; 5.1. Hunting &amp; trapping terrestrial animals -&gt; 5.1.1. Intentional use (species is the target)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Stresses:</td>
<td>2. Species Stresses -&gt; 2.1. Species mortality</td>
</tr>
<tr>
<td>7. Natural system modifications -&gt; 7.1. Fire &amp; fire suppression -&gt; 7.1.1. Increase in fire frequency/intensity</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.1. Ecosystem conversion</td>
</tr>
<tr>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
<td></td>
</tr>
<tr>
<td>2. Species Stresses -&gt; 2.1. Species mortality</td>
<td></td>
</tr>
<tr>
<td>2. Species Stresses -&gt; 2.2. Species disturbance</td>
<td></td>
</tr>
<tr>
<td>11. Climate change &amp; severe weather -&gt; 11.1. Habitat shifting &amp; alteration</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Stresses:</td>
<td>1. Ecosystem stresses -&gt; 1.2. Ecosystem degradation</td>
</tr>
<tr>
<td>2. Species Stresses -&gt; 2.2. Species disturbance</td>
<td></td>
</tr>
</tbody>
</table>

**Conservation Actions in Place**
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
<thead>
<tr>
<th>Conservation Action in Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-place land/water protection</td>
</tr>
<tr>
<td>Conservation sites identified: Yes, over part of range</td>
</tr>
<tr>
<td>Occurs in at least one protected area: Yes</td>
</tr>
<tr>
<td>In-place species management</td>
</tr>
<tr>
<td>Successfully reintroduced or introduced benignly: Yes</td>
</tr>
<tr>
<td>Subject to ex-situ conservation: Yes</td>
</tr>
<tr>
<td>In-place education</td>
</tr>
<tr>
<td>Included in international legislation: Yes</td>
</tr>
<tr>
<td>Subject to any international management / trade controls: Yes</td>
</tr>
</tbody>
</table>

**Conservation Actions Needed**
(http://www.iucnredlist.org/technical-documents/classification-schemes)

<table>
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<tr>
<th>Conservation Action Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Land/water protection -&gt; 1.2. Resource &amp; habitat protection</td>
</tr>
<tr>
<td>2. Land/water management -&gt; 2.1. Site/area management</td>
</tr>
</tbody>
</table>

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Conservation Action Needed

2. Land/water management -> 2.3. Habitat & natural process restoration

3. Species management -> 3.2. Species recovery

3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction


Research Needed
(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed

1. Research -> 1.1. Taxonomy

1. Research -> 1.2. Population size, distribution & trends

1. Research -> 1.3. Life history & ecology

1. Research -> 1.4. Harvest, use & livelihoods

1. Research -> 1.5. Threats

1. Research -> 1.6. Actions


2. Conservation Planning -> 2.2. Area-based Management Plan

2. Conservation Planning -> 2.3. Harvest & Trade Management Plan


3. Monitoring -> 3.2. Harvest level trends

3. Monitoring -> 3.3. Trade trends

3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

**Distribution**

- Continuing decline in area of occupancy (AOO): Yes
- Estimated extent of occurrence (EOO) (km²): 6100000

**Population**

- Population severely fragmented: Yes

**Habitats and Ecology**

- Continuing decline in area, extent and/or quality of habitat: Yes
- Generation Length (years): 30
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