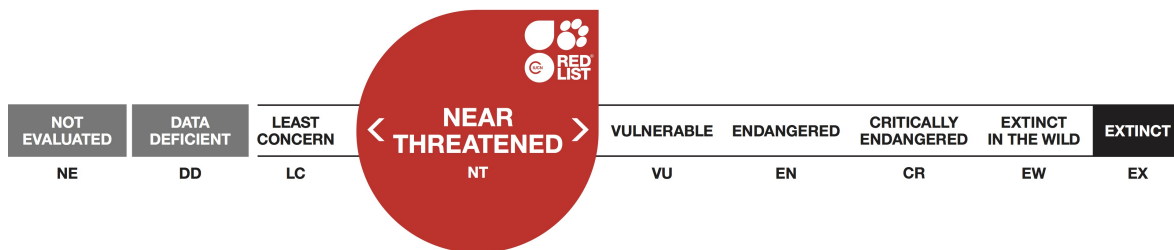


Aonyx capensis, African Clawless Otter

Assessment by: Jacques, H., Reed-Smith, J. & Somers, M.J.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Mustelidae

Taxon Name: *Aonyx capensis* (Schinz, 1821)

Common Name(s):

- English: African Clawless Otter, Cape Clawless Otter
- French: Loutre à joues blanches
- Spanish: Nutria Africana, Nutria de Cuello Blanco

Taxonomic Notes:

Wozencraft (2005) regarded this species as conspecific with the congeneric Congo Clawless Otter *A. congicus*. The two are here retained as distinct species (see van Zyll de Jong 1972, Wozencraft 1993, Somers and Nel 2013).

Assessment Information

Red List Category & Criteria: Near Threatened [ver 3.1](#)

Year Published: 2015

Date Assessed: June 14, 2014

Justification:

Although this species has a large distribution they are restricted to areas of permanent fresh water, offering good shoreline cover and an abundant prey base. Thus while the distribution range is large the spatial size of their occupied habitats is much smaller and unknown, particularly due to the widespread habitat destruction and pollution problems reported for much of the African continent. The impact of global climate change throughout Africa (Magadza 1994, Dixon *et al.* 2003, Hendrix and Glaser 2007) also has the potential of decreasing suitable habitat for otters and increasing human/otter conflict for increasingly scarce resources such as water, land, and fish. Both this decrease in suitable habitat and increase in human/otter conflict are currently occurring and will certainly increase over the next three generations (13 years).

This reassessment is based on a perceived (in regions where studies have been conducted) (Ray *et al.* 2005, Somers and Nel 2013) and assumed (in regions where no studies have been done) population decline over the last 18 years and beyond. In much of their range, populations of African Clawless Otters are faced with habitat loss or degradation, polluted waters, and/or degraded water ecosystems due to the introduction of invasive alien species such as Water Hyacinth (*Eichhornia crassipes*) and marginal agricultural practices. This habitat disturbance is exacerbated by poor sanitation infrastructure and growing industrial waste pollution. Additionally regional human populations are poor and increasingly placing pressure on all resources including water, vegetation, the otter prey base, as well as reducing suitable resting and denning sites vital to survival of the species.

For all of these reasons and the lack of effective conservation measures currently in place, the African Clawless Otter population is projected to decline by at least 20% in the next three generations (13 years based on Pacifici *et al.* 2013). The species is therefore uplisted from Least Concern to Near Threatened as it almost qualifies as threatened under criterion A2cde+3cde.

Previously Published Red List Assessments

2008 – Least Concern (LC)

2004 – Least Concern (LC)

2000 – Lower Risk/least concern (LR/lc)

2000 – Lower Risk/least concern (LR/lc)

2000 – Lower Risk/least concern (LR/lc)

1996 – Lower Risk/least concern (LR/lc)

Geographic Range

Range Description:

The African Clawless Otter is the most widely distributed otter species in Africa, with a range stretching from Senegal and Mali throughout most of West Africa to Sudan and Ethiopia, and then southwards throughout East Africa to the Western Cape of South Africa. They are absent from the Congo basin, where they are replaced by the Congo Clawless Otter (*Aonyx congicus*), the two species being sympatric in Uganda and Rwanda (Somers and Nel 2013).

Country Occurrence:

Native: Angola (Angola); Benin; Botswana; Burkina Faso; Cameroon; Chad; Congo, The Democratic Republic of the; Côte d'Ivoire; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Malawi; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Sudan; Swaziland; Tanzania, United Republic of; Uganda; Zambia; Zimbabwe

Distribution Map

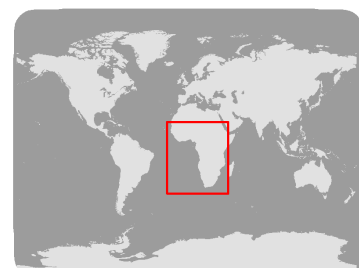


Aonyx capensis

Range

Extant (resident)

Compiled by:
IUCN (International Union for
Conservation of Nature)



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



Population

African Clawless Otters populations are thought to be decreasing throughout most of their range based on assessed threats and decreasing reports of signs or sightings; however, there is a lack of research-based population status information over the last 15 years outside of South Africa. Density estimates from various studies in southern Africa are summarized by Somers and Nel (2013).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

African Clawless Otters are predominantly aquatic and seldom found far from water. Freshwater is an essential habitat requirement, and they only occur in marine habitats where there is access to fresh water. In marine habitats, rocky shores are preferred (Van Niekerk *et al.* 1998). Elsewhere, they are found in diverse habitats, from impoundments, estuaries, and mangroves to desert conditions of the upper Doring River in the Western Cape (South Africa) and the Fish River in southern Namibia (Nel and Somers 2007, Somers and Nel 2013); they are also found in many seasonal or episodic rivers in the Karoo (South Africa), such as the Sak, Vis, Riet and Gamka Rivers, provided suitable-sized pools persist (Nel and Somers 2007, Somers and Nel 2013). They have been recorded up to 3,000 m in Ethiopia (Yalden *et al.* 1996). In Nigeria the African Clawless Otters is mainly restricted to brackish water streams (with mangrove vegetation along the banks) and, more occasionally, to transitional habitats between freshwater and brackish-water environments (Angelici *et al.* 2005). African Clawless Otters have been found in towns and cities, and can occupy rivers with high pollution and eutrophication levels (Somers and Nel 2013).

The home range of the African Clawless Otters range length varied from 4.9 to 54.1 km and core length from 0.2 to 9.8 km. Total area of water used varied between 4.9 and 1062.5 ha, and core areas from 1.1 to 138.9 ha. As predicted using the resource dispersion hypothesis, total home-range length was correlated with mean reed bed (high food density patch) nearest neighbour distance. The pattern of home-range use by females was suggestive of territoriality. Male African Clawless Otters had overlapping home ranges, both with other males and with females (Somers and Nel 2000).

The African Clawless Otters prefer hunting at depths of 0.5–1.5 m. This is despite having a higher hunting success, catching larger, more energy-rich prey (fish), and shortest time foraging per catch, at depths of 1.5–2.5 m. Some of the data presented support the optimal breathing hypothesis, which predicts that both surface and dive times should increase for dives of greater depths. However, diving efficiency does not decrease with increasing depth, and percentage time at the surface does not increase with increasing depth. These are contrary to the optimal breathing hypothesis (Somers and Nel 2000).

Systems: Terrestrial, Freshwater, Marine

Use and Trade (see Appendix for additional information)

This species is exploited for its meat and pelt (see under Threats).

Threats (see Appendix for additional information)

The main threat to the species is the declining state of freshwater ecosystems in Africa. For instance in South Africa the state of main river ecosystems is very poor: 84% of the ecosystems are threatened, with 54% Critically Endangered, 18% Endangered, and 12% Vulnerable (Nel *et al.* 2007). Otter habitat has been either drastically changed or lost, following bush clearing, deforestation, overgrazing, siltation, draining of wetlands or water extraction or denudation of riparian vegetation (Rowe-Rowe 1995, Nel and Somers 1998).

In parts of their range, African Clawless Otters getting killed for skins and other body parts (e.g., Cunningham and Zondi 1991, De Luca and Mpunga 2005), or because they are regarded as competitors for food, particularly in rural areas where fishing is an important source of income, or where they are believed to be responsible for poultry losses (Rowe-Rowe 1995), and damage to young maize plants (Reed-Smith pers. comm.). Fisheries managers of the Kairezi River Protected Area in Zimbabwe blamed trout declines on otter predation and competition with trout for food, even though scat analysis revealed that only 1% of otter faeces contained the remains of trout and their diets overlapped only 17% (Butler 1994, Butler and Marshall 1996). Occasionally, they are accidentally caught and drowned in gill nets and fish traps (Rowe-Rowe 1990).

Conservation Actions (see Appendix for additional information)

African Clawless Otters are present in a number of protected areas across their range. The populations of Cameroon and Nigeria are listed on CITES Appendix I (as *Aonyx capensis microdon*). All other populations are included in CITES Appendix II.

Credits

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Reviewer(s): Hussain, S.A. & Duplaix, N.

Contributor(s): Hoffmann, M.

Bibliography

- Angelici, F.M., Politano, E., Bogudue, A.J. and Luiselli, L. 2005. Distribution and habitat of otters (*Aonyx capensis* and *Lutra maculicollis*) in southern Nigeria. *Italian Journal of Zoology* 72(3): 223-227.
- Butler, J.R.A. 1994. Cape clawless otter conservation and a trout river in Zimbabwe: A case study. *Oryx* 28: 276-282.
- Butler, J.R.A. and Marshall, B.E. 1996. Resource use within the crab-eating guild of the upper Kairezi River, Zimbabwe. *Journal of Tropical Ecology* 12: 475-490.
- Cunningham, A.B. and Zondi, A.S. 1991. Use of animal parts for the commercial trade in traditional medicines. Institute of Natural Resources, University of Natal, Pietermaritzburg, South Africa.
- De Luca, D.W. and Mpunga, N.E. 2005. Small carnivores of the Udzungwa Mountains: presence, distribution and threats. *Small Carnivore Conservation* 32: 1-7.
- Dixon, R.K., Smith, J. and Guill, S. 2003. Life on the Edge: Vulnerability and Adaptation of African Ecosystems to Global Climate Change. *Mitigation and Adaptation Strategies for Global Change* 8: 93-113.
- Hendrix, C.S. and Glaser, S.M. 2007. Trends and triggers: climate, climate change, and civil conflict in Sub-Saharan Africa. *Political Geography* 26: 695-715.
- IUCN. 2015. The IUCN Red List of Threatened Species. Version 2015.2. Available at: www.iucnredlist.org. (Accessed: 23 June 2015).
- Magadza, C.H.D. 1994. Climate Change: some likely multiple impacts in Southern Africa. *Food Policy* 19(2): 165-191.
- Nel, J.A.J. and Somers, M.J. 2002. The status of otters in Africa: an assessment. In: Otter conservation - an example for a sustainable use of wetlands. Proceedings of the VIIth International Otter Symposium (eds R. Dulfer, J. Conroy, J.A.J. Nel and A.C. Gutleb). *IUCN Otter Specialist Group Bulletin* 19: 258-266.
- Nel, J.A.J. and Somers, M.J. 2007. Distribution and habitat choice of Cape clawless otters, *Aonyx capensis*, in South Africa. *South African Journal of Wildlife Research* 37: 61-70.
- Pacifici, M., Santini, L., Di Marco, M., Baisero, D., Francucci, L., Grottolo Marasini, G., Visconti, P. and Rondinini, C. 2013. Generation length for mammals. *Nature Conservation* 5: 87-94.
- Ray, J., Hunter, L. and Zigorous, J. 2005. Setting Conservation and Research Priorities For Larger African Carnivores. *Wildlife Conservation Society Working Paper* 24.
- Rowe-Rowe, D.T. 1990. Action plan for African otters. In: P. Foster-Turley, S. MacDonald and C. Mason (eds), *Otters: an Action Plan for their Conservation*, pp. 41-51. IUCN, Gland, Switzerland.
- Rowe-Rowe, D.T. 1995. Distribution and status of African otters. *Habitat* 11: 8-10.
- Rowe-Rowe, D.T. and Somers, M.J. 1998. Diet, foraging behaviour and coexistence of African otters and the water mongoose. In: N. Dunstone and M. Gorman (eds), *Behaviour and Ecology of Riparian Mammals. Symposia of the Zoological Society of London* 71, pp. 215-227. Cambridge University Press, Cambridge, UK.
- Somers, M.J. and Nel, J.A.J. 2004. Movement patterns and home range of Cape clawless otters (*Aonyx capensis*), affected by high food density patches. *Journal of Zoology* 262(1): 91-98.
- Somers, M.J. and Nel, J.A.J. 2013. *Aonyx capensis*. In: J. Kingdon and M. Hoffmann (eds), *Mammals of*

Africa. V: Carnivores, Pangolins, Equids and Rhinoceroses, Bloomsbury Publishing, London.

Van Niekerk, C.H., Somers, M.J. and Nel, J.A.J. 1998. Freshwater availability and distribution of Cape clawless otter spraints and resting places along the south-west coast of South Africa. *South African Journal of Wildlife Research* 28: 68-72.

Van Zyll de Jong, C.G. 1972. A systematic review of the Nearctic and Neotropical river otters (Genus *Lutra*, Mustelidae, Carnivora). *Life Sciences Contributions of the Royal Ontario Museum* 80: 1-104.

Wozencraft, W.C. 1993. Order Carnivora. In: D.E. Wilson and D.M. Reeder (eds), *Mammal Species of the World: A Taxonomic and Geographic Reference. Second Edition*, pp. 279-344. Smithsonian Institution Press, Washington, DC, USA.

Wozencraft, W.C. 2005. Order Carnivora. In: D.E. Wilson and D.M. Reeder (eds), *Mammal Species of the World: A Taxonomic and Geographic Reference. Third Edition*, pp. 532-628. Smithsonian Institution Press, Washington, DC, USA.

Yalden, D.W., Largen, M.J., Kock, D. and Hillman, J.C. 1996. Catalogue of the Mammals of Ethiopia and Eritrea. 7. Revised checklist, zoogeography and conservation. *Tropical Zoology* 9(1): 73-164.

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External Resources

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Appendix

Habitats

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

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.7. Forest - Subtropical/Tropical Mangrove Vegetation Above High Tide Level	Resident	Suitable	Yes
1. Forest -> 1.8. Forest - Subtropical/Tropical Swamp	Resident	Suitable	Yes
4. Grassland -> 4.6. Grassland - Subtropical/Tropical Seasonally Wet/Flooded	-	Marginal	-
5. Wetlands (inland) -> 5.1. Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.2. Wetlands (inland) - Seasonal/Intermittent/Irregular Rivers/Streams/Creeks	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.3. Wetlands (inland) - Shrub Dominated Wetlands	-	Marginal	-
5. Wetlands (inland) -> 5.4. Wetlands (inland) - Bogs, Marshes, Swamps, Fens, Peatlands	-	Marginal	-
5. Wetlands (inland) -> 5.5. Wetlands (inland) - Permanent Freshwater Lakes (over 8ha)	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.6. Wetlands (inland) - Seasonal/Intermittent Freshwater Lakes (over 8ha)	-	Marginal	-
5. Wetlands (inland) -> 5.7. Wetlands (inland) - Permanent Freshwater Marshes/Pools (under 8ha)	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.8. Wetlands (inland) - Seasonal/Intermittent Freshwater Marshes/Pools (under 8ha)	-	Marginal	-
5. Wetlands (inland) -> 5.13. Wetlands (inland) - Permanent Inland Deltas	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.14. Wetlands (inland) - Permanent Saline, Brackish or Alkaline Lakes	-	Marginal	-
5. Wetlands (inland) -> 5.15. Wetlands (inland) - Seasonal/Intermittent Saline, Brackish or Alkaline Lakes and Flats	-	Marginal	-
5. Wetlands (inland) -> 5.16. Wetlands (inland) - Permanent Saline, Brackish or Alkaline Marshes/Pools	-	Marginal	-
5. Wetlands (inland) -> 5.17. Wetlands (inland) - Seasonal/Intermittent Saline, Brackish or Alkaline Marshes/Pools	-	Marginal	-
9. Marine Neritic -> 9.10. Marine Neritic - Estuaries	Resident	Suitable	-
12. Marine Intertidal -> 12.5. Marine Intertidal - Salt Marshes (Emergent Grasses)	-	Marginal	-

Habitat	Season	Suitability	Major Importance?
13. Marine Coastal/Supratidal -> 13.4. Marine Coastal/Supratidal - Coastal Brackish/Saline Lagoons/Marine Lakes	Resident	Suitable	Yes
13. Marine Coastal/Supratidal -> 13.5. Marine Coastal/Supratidal - Coastal Freshwater Lakes	Resident	Suitable	Yes
15. Artificial/Aquatic & Marine -> 15.1. Artificial/Aquatic - Water Storage Areas (over 8ha)	-	Marginal	-
15. Artificial/Aquatic & Marine -> 15.2. Artificial/Aquatic - Ponds (below 8ha)	-	Suitable	No
15. Artificial/Aquatic & Marine -> 15.3. Artificial/Aquatic - Aquaculture Ponds	-	Suitable	No
15. Artificial/Aquatic & Marine -> 15.9. Artificial/Aquatic - Canals and Drainage Channels, Ditches	-	Marginal	-

Use and Trade

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

End Use	Local	National	International
Food - human	Yes	No	No
Medicine - human & veterinary	Yes	No	No
Wearing apparel, accessories	Yes	No	No

Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	-	-	-

	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	- - -
	Stresses:	2. Species Stresses -> 2.1. Species mortality
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	- - -
	Stresses:	2. Species Stresses -> 2.1. Species mortality
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale)	Ongoing	- - -
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.8. Other
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale)	Ongoing	- - -
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.8. Other
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.1. Abstraction of surface water (domestic use)	Ongoing	- - -
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.2. Abstraction of surface water (commercial use)	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation
8. Invasive & other problematic species & genes -> 8.1. Invasive non-native/alien species -> 8.1.2. Named species (<i>Eichhornia crassipes</i>)	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.2. Soil erosion, sedimentation	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation
11. Climate change & severe weather -> 11.2. Droughts	Ongoing	- - -
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation

Conservation Actions in Place

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

Conservation Actions in Place
In-Place Research, Monitoring and Planning
Action Recovery plan: No
Systematic monitoring scheme: No
In-Place Land/Water Protection and Management
Occur in at least one PA: Yes
Area based regional management plan: No
Invasive species control or prevention: Not Applicable
In-Place Species Management
Harvest management plan: No
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: Unknown
In-Place Education
Subject to recent education and awareness programmes: Unknown
Included in international legislation: Yes
Subject to any international management/trade controls: Yes

Conservation Actions Needed

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

Conservation Actions Needed
2. Land/water management -> 2.1. Site/area management

Research Needed

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

Research Needed
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Lower elevation limit (m): 0

Distribution
Upper elevation limit (m): 3000
Lower depth limit (m): 10
Upper depth limit (m): 0
Population
Continuing decline of mature individuals: Yes
Population severely fragmented: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 4.4
Movement patterns: Not a Migrant

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