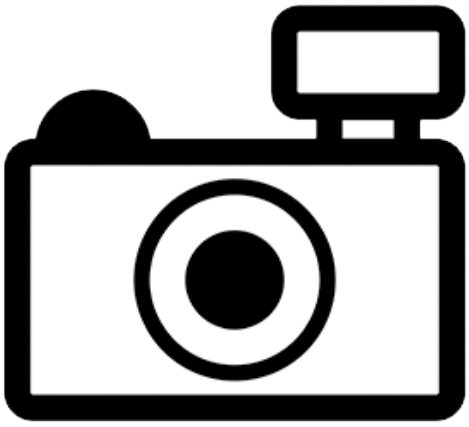
Smallmouth Electric Catfish (*Malapterurus microstoma*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2012
Revised, July 2018, August 2018
Web Version, 8/31/2018



1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"Africa: present throughout the Congo River basin [Central African Republic, Democratic Republic of the Congo, Republic of the Congo] [Norris 2002; Seegers 2008], but absent from the lowland, central portion of the basin [Norris 2002]."

"[In the Central Africa Republic:] Known from the rivers Koto and Bougwa-Ouaka [Norris 2002]."

"[In Republic of the Congo:] Known from the river Sembe (Sangha system) [Norris 2002] and from the Léfini [Ibala Zamba 2010]."

"[In the Democratic Republic of the Congo:] Known from the lower and middle Congo, Stanley-Pool, the rivers Uele, Ubangi, Kasai, Lualaba, Loboma, Lindi, Bima, Boonde and Dungu, the Lake Upemba area, and lakes Yandja and Kalemba [Norris 2002] [in the Democratic Republic of

the Congo]. Also reported from the Aruwimi, Itimbiri [Decru 2015], Lomami and Wagenia Falls [Moelants 2015]."

Status in the United States

No records of *Malapterurus microstoma* in the United States were found. No information on trade in *M. microstoma* in the United States was found.

The Florida Fish and Wildlife Conservation Commission has listed the electric catfish *M. microstoma* as a prohibited species. Prohibited nonnative species (FFWCC 2018), "are considered to be dangerous to the ecology and/or the health and welfare of the people of Florida. These species are not allowed to be personally possessed or used for commercial activities."

Means of Introductions in the United States

No records of *Malapterurus microstoma* in the United States were found.

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Eschmeyer et al. (2018), *Malapterurus microstoma* Poll & Gosse 1969 is the valid name for this species; it is also the original name.

From ITIS (2018):

"Kingdom Animalia
Subkingom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Siluriformes
Family Malapteruridae
Genus *Malapterurus*
Species *Malapterurus microstoma* Poll & Gosse 1969"

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Max length : 55.5 cm SL male/unsexed; [Norris 2002]; 54.0 cm SL (female)"

Environment
From Froese and Pauly (2018):

"Freshwater; benthopelagic. […]; 23°C - 28°C [assumed to be recommended aquarium temperature] [Baensch and Riehl 1991]"

Climate/Range
From Froese and Pauly (2018):

"Tropical; […]"

Distribution Outside the United States
Native
From Froese and Pauly (2018):

"Africa: present throughout the Congo River basin [Central African Republic, Democratic Republic of the Congo, Republic of the Congo] [Norris 2002; Seegers 2008], but absent from the lowland, central portion of the basin [Norris 2002]."

"[In the Central Africa Republic:] Known from the rivers Koto and Bougwa-Ouaka [Norris 2002]."

"[In Republic of the Congo:] Known from the river Sembe (Sangha system) [Norris 2002] and from the Léfini [Ibala Zamba 2010]."

"[In the Democratic Republic of the Congo:] Known from the lower and middle Congo, Stanley-Pool, the rivers Uele, Ubangi, Kasai, Lualaba, Loboma, Lindi, Bima, Boonde and Dungu, the Lake Upemba area, and lakes Yandja and Kalemba [Norris 2002] [in the Democratic Republic of the Congo]. Also reported from the Aruwimi, Itimbiri [Decru 2015], Lomami and Wagenia Falls [Moelants 2015]."

Introduced
No records of *Malapterurus microstoma* introductions were found.

Means of Introduction Outside the United States
No records of *Malapterurus microstoma* introductions were found.

Short Description
From Froese and Pauly (2018):

"Anal spines: 0; Anal soft rays: 10 - 13; Vertebrae: 40 - 42. Diagnosis: tooth patches narrow; horizontally based pectoral fins, placed low on the body; snout sharply narrowed rostrally; 40-42 vertebrae; 7-29 gill-rakers; 11-12 anal-fin rays; caudal saddle and bar pattern very faintly

expressed; 7-8 branched caudal-fin rays; body finely spotted; lateral line complete [Norris 2002]."

"Coloration: bicolored, occasionally sharply so; dorsum tan or light brown, venter pale and largely unpigmented, except for slight stippling on the underside of the head and around anal and pelvic fin bases, and scattered small spots; flank and dorsum well marked with generally small spots, 1-1.5 times an eye diameter large or smaller, with sometimes larger blotches posteriad; pectoral fin unspotted, rays may be dusky in adults; pelvic fin generally opaque, unspotted; adipose with pale distal margin, otherwise marked as dorsum; anal fin matches body ground color, lightly spotted in adults, with a pale distal margin in juveniles and adults; distal 2/3 of caudal fin dusky in juveniles and young, bounded by a clear distal margin and pale basal crescent; caudal fin in adults matches dorsum and flank ground color, except for a clear distal margin, and is well marked with fine spots in large adults (larger than 40cm SL); caudal saddle and bar pattern weakly developed, even in young; saddle slightly darker than ground color and extends to about mid-depth; pale interspace slightly lighter than ground color; caudal bar somewhat darker than saddle and present mostly on the caudal peduncle (not the caudal fin) [Norris 2002]."

From Sauga (1987):

"The adipose fin of *M. microstoma* is rounded and longer than that of the other two species [*M. electricus* and *M. minjiriya*]. In the paratypes of *M. microstoma* the adipose fin is heavily spotted […]"

Biology

From Moelants (2010):

"*Malapterurus microstoma* is a benthopelagic species that can produce an electric current that is used both for prey capture and defence. It occupies horizontal holes or burrows (up to 3 m in length) in the banks of rivers (1-3 m in depth). The holes may be occupied by a pair of sexually mature animals, suggesting that they are the site of reproduction. Mouth brooding has never been observed. Individuals of different species never cohabit the same burrow. (Poll and Gosse 1969, Norris 2002). Gut content from several specimens (150-220 mm SL) consisted of large amounts of plant detritus mixed with animal remains, mostly soft-bodied invertebrates. One specimen had ingested what appear to be large number of fish eggs along with sand. This suggests that this species is a generalist bottom forager, rather than a strict piscivore. (Norris 2002)."

Human Uses

From Moelants (2010):

"This species is harvested for the aquarium trade."

Diseases

No records of OIE-reportable diseases were found for *Malapterurus microstoma*.

Poelen et al. (2014) lists *Electrotaenia malopteruri* and *Contracaeum sp.* as parasites of *Malapterurus microstoma*.

Threat to Humans

From Froese and Pauly (2018):

"Other"

No further information was found on what type of threat to humans 'other' refers to but it may be related to the electrical charges it uses for predation and defense. Some species in this genus are able to produce electric discharges in the range of hundreds of volts (Alves-Gomes 2001), which have the potential to inflict harm.

3 Impacts of Introductions

No records of *Malapterurus microstoma* introductions were found. Therefore there is no information on impacts of introductions.

The Florida Fish and Wildlife Conservation Commission has listed the electric catfish *M. microstoma* as a prohibited species.

Members of the genus *Malapterurus* use electric discharges to stun prey and for defense (Alves-Gomes 2001). It is unknown how that would impact native fish.

4 Global Distribution

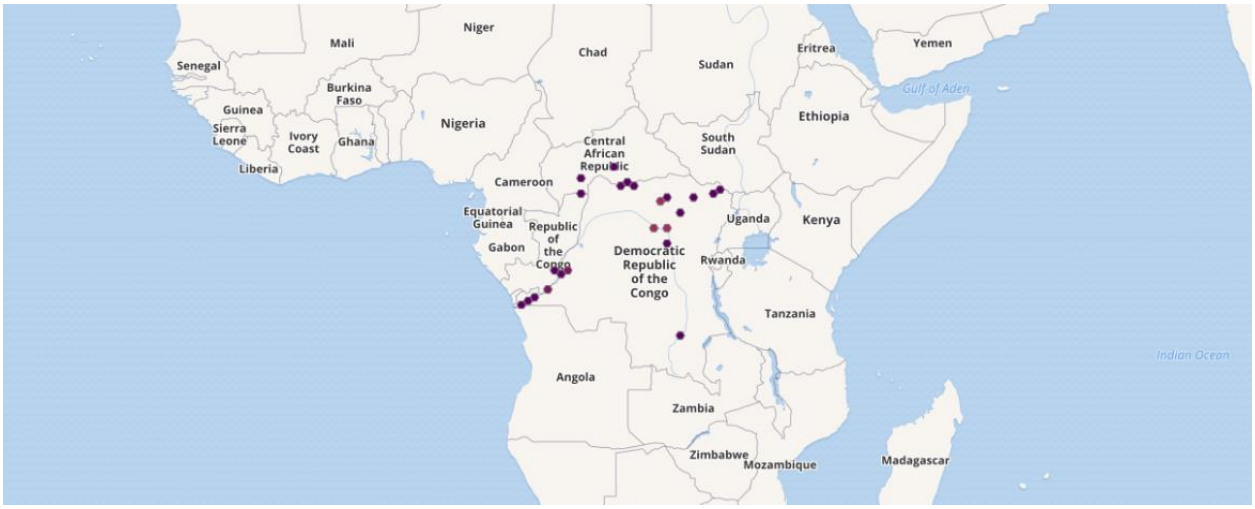


Figure 1. Known global distribution of *Malapterurus microstoma*. Locations are in Republic of the Congo, Democratic Republic of the Congo, and Central African Republic. Map from GBIF Secretariat (2018).

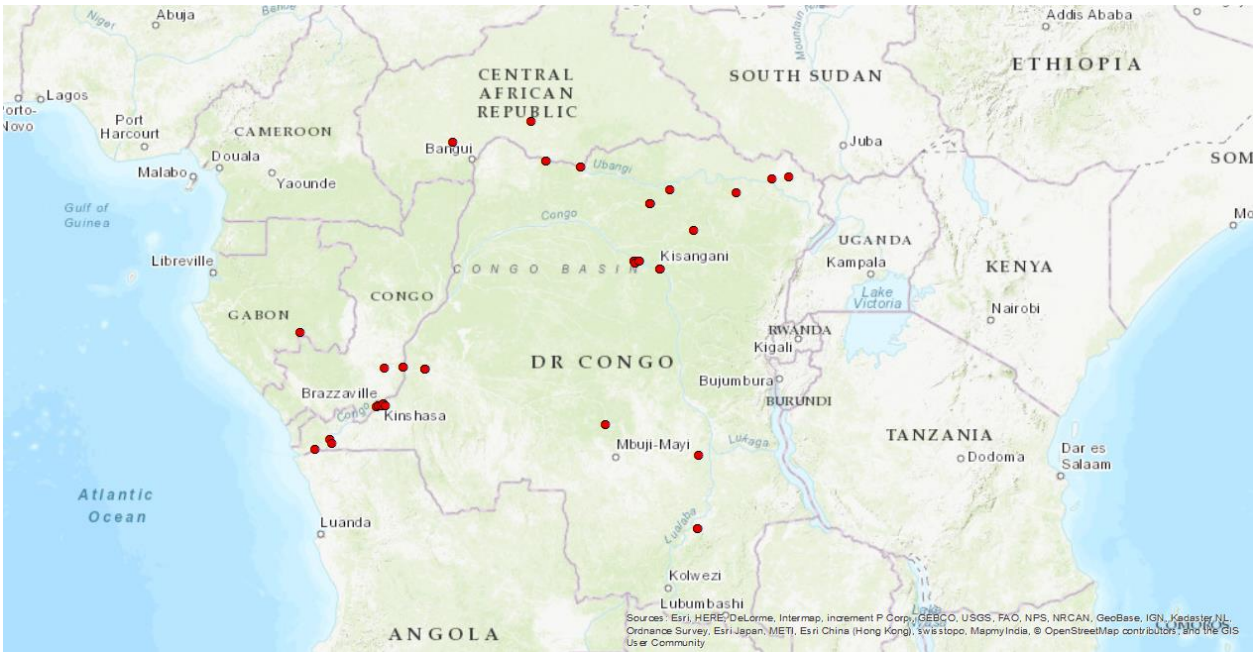


Figure 2. Additional known global distribution of *Malapterurus microstoma*. Locations are in Republic of the Congo, Democratic Republic of the Congo, and Central African Republic. Map created with data from Froese and Pauly (2018), basemap from ArcGIS® by Esri (www.esri.com).

5 Distribution Within the United States

No records of *Malapterurus microstoma* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Malapterurus microstoma* was low for most of the contiguous United States. Areas of the Gulf Coast and northern peninsular Florida had a medium match, and southern peninsular Florida had a high match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.004, low. The range for a low climate score is from 0.0 to 0.005, inclusive. Florida had a high individual Climate 6 score.

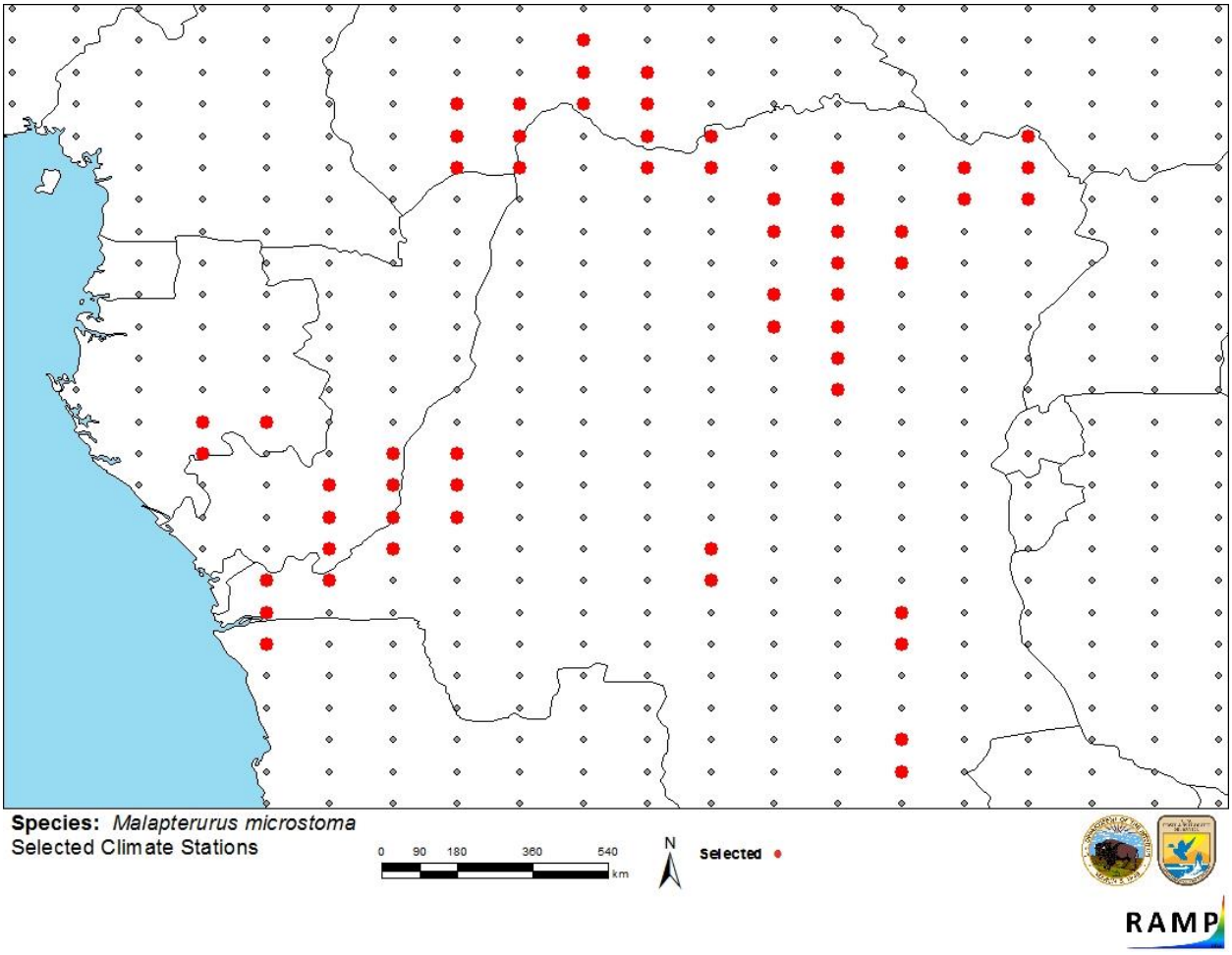


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; Angola, Gabon, Republic of the Congo, Democratic Republic of the Congo, Central African Republic) and non-source locations (gray) for *Malapterurus microstoma* climate matching. Source locations from Froese and Pauly (2018) and GBIF Secretariat (2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

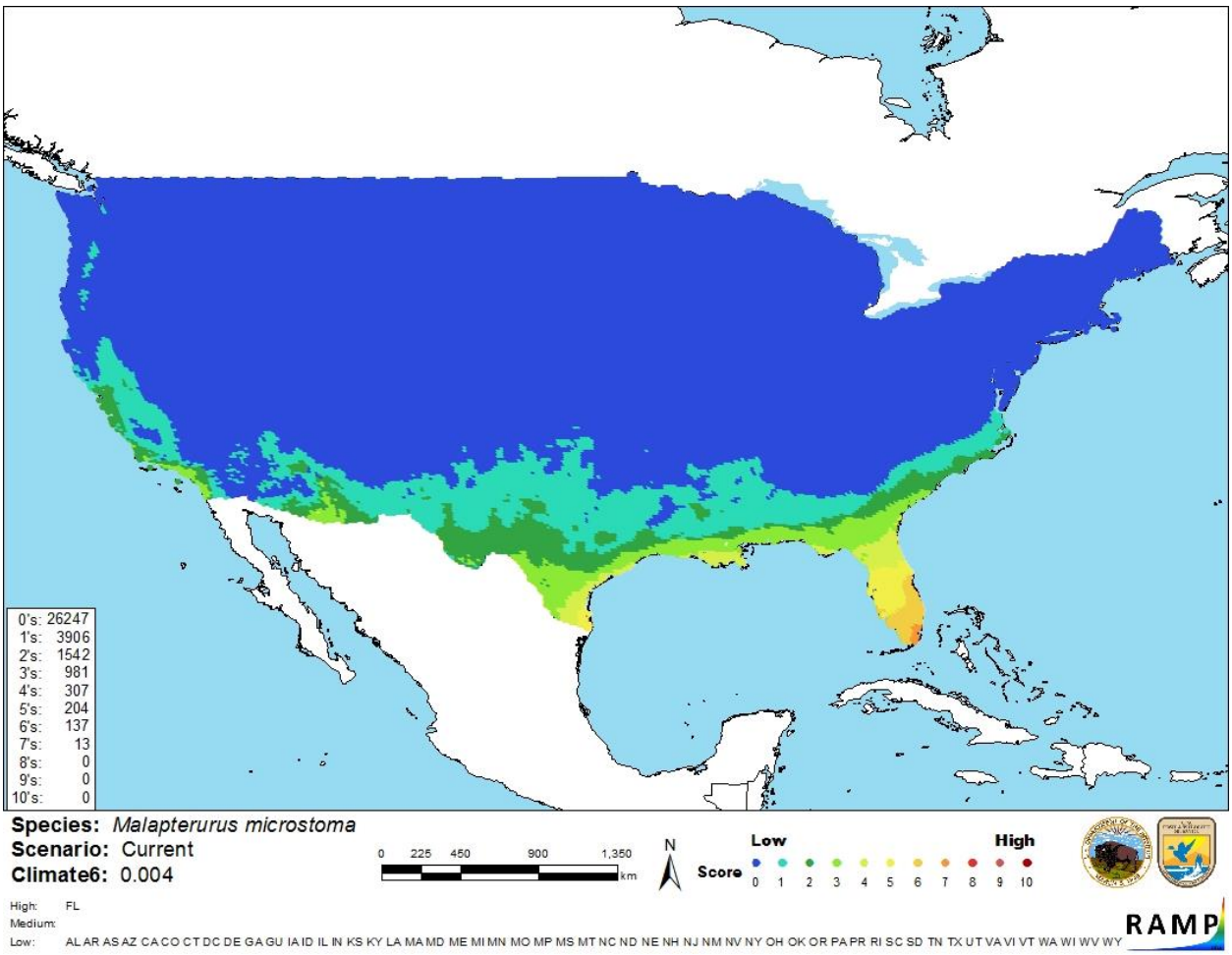


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Malapterurus microstoma* in the contiguous United States based on source locations reported by Froese and Pauly (2018) and GBIF Secretariat (2018). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Malapterurus microstoma* is low. There is some information regarding the biology of the species. There were no records of introductions found and therefore there is no information on any potential or realized impacts of introductions.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Smallmouth electric catfish (*Malapterurus microstoma*) is an electric catfish found in the Congo River Basin in central Africa. The history of invasiveness is uncertain. There were no records of introductions found. The Florida Fish and Wildlife Conservation Commission has listed the electric catfish *M. microstoma* as a prohibited species. *M. microstoma* is harvested for the aquarium trade but no specific information on volume or duration of this species is trade was found. There is no indication that this species is in trade in the United States. It poses a risk to humans, which may be related to its ability to create electrical discharges. Some species in this genus are able to produce electric discharges in the range of hundreds of volts to stun prey and for defense. The climate match for *M. microstoma* with the contiguous United States is low. However, *M. microstoma* had areas of medium match along the Gulf Coast and northern peninsula Florida and high matches in southern peninsular Florida. The certainty of assessment is low because of lack of information on potential invasiveness. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): Low**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information:** No additional information.
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

Alves-Gomes, J. A. 2001. The evolution of electroreception and bioelectrogenesis in teleost fish: a phylogenetic perspective. Journal of Fish Biology 58:1489–1511

Eschmeyer, W. N., R. Fricke, and R. van der Laan, editors. 2018. Catalog of fishes: genera, species, references. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (July 2018).

FFWCC (Florida Fish and Wildlife Conservation Commission). 2018. Prohibited species list. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida. Available: http://myfwc.com/wildlifehabitats/nonnatives/regulations/prohibited/. (July 2018).

Froese, R., and D. Pauly, editors. 2018. *Malapterurus microstoma* Poll and Gosse, 1969. FishBase. Available: http://www.fishbase.org/summary/Malapterurus-microstoma.html. (July 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Malapterurus microstoma* Poll and Gosse, 1969. Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/2342042. (July 2018).

ITIS (Integrated Taxonomic Information System). 2018. *Malapterurus microstoma* Poll and Gosse, 1969. Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=164144. (July 2018).

Moelants, T. 2010. *Malapterurus microstoma*. The IUCN Red List of Threatened Species 2010: e.T181680A7703373. Available: http://www.iucnredlist.org/details/full/181680/0. (July 2018).

Poelen, J. H., J. D. Simons, and C. J. Mungall. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. Ecological Informatics 24:148–159.

Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk assessment mapping program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

Sauga, V. O. 1987. On a new species of electric catfish from Kainji, Nigeria, with some observations on its biology. Journal of Fish Biology 30:75–89.

10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

Baensch, H. A., and R. Riehl. 1991. Aquarien atlas. Bd. 3. Melle: Mergus, Verlag für Natur-und Heimtierkunde, Germany.

Decru, E. 2015. The ichthyofauna in the Central Congo basin: diversity and distribution in the north-eastern tributaries. Katholieke Universiteit Leuven, Leuven, Belgium.

Ibala Zamba, A. 2010. Faune des poissons des rivières Luki et Léfini (bassin du Congo): diversité et écologie. Katholieke Universiteit Leuven, Leuven, Belgium.

Moelants, T. 2015. Diversity and ecology of the ichthyofauna of the Middle and Upper Congo basin: a case-study in the region of the Wagenia falls (Democratic Republic of the Congo). Katholieke Universiteit Leuven, Leuven, Belgium.

Norris, S. M. 2002. A revision of the African electric catfishes, family Malapteruridae (Teleostei, Siluriformes), with erection of a new genus and descriptions of fourteen new species, and an annotated bibliography. Annales du Musée Royal de l'Afrique Centrale: Sciences Zoologiques 289:1–155.

Poll and Gosse. 1969. [Source material did not give full citation for this reference.]

Seegers, L. 2008. The catfishes of Africa: a handbook for identification and maintenance. Aqualog Verlag A. C. S. GmbH, Germany.