

# African Bonytongue (*Heterotis niloticus*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2011  
Revised, September 2018  
Web Version, 4/1/2019



Photo: B. Tibbatts. Licensed under CC BY 3.0. Available:  
<https://www.fishbase.de/photos/ThumbnailsSummary.php?Genus=Heterotis&Species=niloticus>.  
(September 2018).

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2018):

“Africa: native in all the basins of the Sahelo-Sudanese region, the Senegal, Gambia, Corubal, Volta, Ouémé, Niger, Bénoue, Chad and Nile basins and Lake Turkana [countries of Benin, Burkina Faso, Cameroon, Chad, Ethiopia, Gambia, Ghana, Guinea-Bissau, Ivory Coast, Kenya, Mali, Niger, Nigeria, Senegal, Sudan; Daget and Durand 1981; Daget 198; Paughy 1990].”

From Akinyi et al. (2010):

“Native:

Benin; Burkina Faso; Cameroon; Chad; Côte d'Ivoire; Egypt; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Mali; Niger; Nigeria; Senegal; South Sudan; Sudan”

## Status in the United States

This species has not been reported as introduced or established in the United States. This species may be in trade in the U.S.

From Pet Zone Tropical Fish (2018):

“African Arowana (*Heterotis niloticus*)”

“Your Price: \$69.00”

“Sorry but this item is currently unavailable. Please check back at a later stage.”

From FFWCC (2018):

“Prohibited nonnative species 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.”

The Florida Fish and Wildlife Conservation Commission (FFWCC) lists the fish *Heterotis niloticus* as a prohibited species.

## Means of Introductions in the United States

This species has not been reported as introduced or established in the United States.

## Remarks

Fricke et al. (2019) list the following scientific names as synonyms of *H. niloticus*: *Heterotis adansonii*, *Heterotis ehrenbergii*, *Sudis adansonii*, and *Sudis niloticus*. Information for this report was sought using each of these names as search terms in addition to the accepted scientific name.

From CABI (2018):

“International Common Names

English: African arowana; bony tongue; heterotis”

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

“Kingdom Animalia

Subkingdom Bilateria

Infrakingdom Deuterostomia

Phylum Chordata

Subphylum Vertebrata  
Infraphylum Gnathostomata  
Superclass Actinopterygii  
Class Teleostei  
Superorder Osteoglossomorpha  
Order Osteoglossiformes  
Suborder Osteoglossoidei  
Family Osteoglossidae  
Subfamily Heterotidinae  
Genus *Heterotis*  
Species *Heterotis niloticus* (Cuvier, 1829)”

From Fricke et al. (2018):

“Current status: Valid as *Heterotis niloticus* (Cuvier 1829). Arapaimidae.”

## **Size, Weight, and Age Range**

From Froese and Pauly (2018):

“Maturity: Lm ?, range 40 - 40 cm

Max length : 100.0 cm SL male/unsexed; [Olaosebikan and Raji 1998]; max. published weight: 10.2 kg [Paugy 1990]”

## **Environment**

From Froese and Pauly (2018):

“Freshwater; pelagic; depth range 1 - ? m [Reed et al. 1967]. [...] 25°C - 30°C [Baensch and Riehl 1985; assumed to be recommended aquarium temperature range];”

## **Climate/Range**

From Froese and Pauly (2018):

“Tropical; [...] 16°N - 3°N, 17°W - 37°E”

## **Distribution Outside the United States**

Native

From Froese and Pauly (2018):

“Africa: native in all the basins of the Sahelo-Sudanese region, the Senegal, Gambia, Corubal, Volta, Ouémé, Niger, Bénoue, Chad and Nile basins and Lake Turkana [countries of Benin, Burkina Faso, Cameroon, Chad, Ethiopia, Gambia, Ghana, Guinea-Bissau, Ivory Coast, Kenya, Mali, Niger, Nigeria, Senegal, Sudan; Daget and Durand 1981; Daget 198; Paugy 1990].”

From Akinyi et al. (2010):

“Native:

Benin; Burkina Faso; Cameroon; Chad; Côte d'Ivoire; Egypt; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Mali; Niger; Nigeria; Senegal; South Sudan; Sudan”

## Introduced

From Froese and Pauly (2018):

“Successful introductions in the storage reservoirs of Côte d'Ivoire, the Cross, Sanaga, Nyong and Ogowe rivers and the lower and middle Congo basin, including Ubangui and Kasai [Paugy 1990]; rapidly enlarged its distribution in the Lualaba (upper Congo basin) after extraordinary inundations in 1979 [Ankei 1989]. Also introduced in Madagascar [Stiassny and Raminosa 1994].”

Froese and Pauly (2019) report that *H. niloticus* introduction resulted in population establishment in Togo, Republic of the Congo, Democratic Republic of the Congo, Gabon, Central African Republic, and Madagascar.

Froese and Pauly (2019) report *H. niloticus* was introduced to the Philippines in 1989 but it is unknown whether the species is established in the wild.

## Means of Introduction Outside the United States

From CABI (2018):

“*H. niloticus* is native in many African countries but has also been introduced in many rivers, natural and artificial lakes and through aquaculture (Micha, 1973).”

“No accidental introduction has been recorded. However, the high interconnection of African rivers and lakes systems leading to a complex hydrological regime could allow natural spread of *H. niloticus* (Adite, 2007).”

Froese and Pauly (2019) report the reason for *H. niloticus* introduction to the Philippines as “ornamental.”

## Short Description

From CABI (2018):

“Body rather elongate, its depth from 3.5 to 5 times in standard length. Head rather short, length 3.5 to 5 times in standard length. Elongated dorsal and anal fins are posteriorly positioned and end close to the small, rounded caudal fin (Bailey, 1994; Dankwa et al., 1999). Dorsal fin with 32-37, anal with 34-39, rays. Scale formula: 2.5/34-40/6. It lacks ‘feelers’ or mandibular barbels. Dermal bones of skull deeply sculptured. Gill rakers thin and serrate, numbering 33 (young) to 98 on the ceratobranchial (lower limb) and 21 (young) to 76 on the epibranchial (upper limb).

These numbers increase with the size of the fish. Number of vertebrae: 66-69 (average usually 67).”

“Colour is uniformly greyish or bronze; lips yellowish and eye more or less golden. According to some authors (Daget, 1954; Blache et al., 1964; Moreau, 1982), this coloration may turn into blackish when the fish reach sexual maturity. In the young, posterior parts of anal and dorsal fins sometimes marked with dark longitudinal bands, and scales with a dark oval spot at margins of overlapping zones (Paugy, 1990).”

## **Biology**

From CABI (2018):

“*H. niloticus* is a pelagic species, found in freshwater rivers, streams, floodplains, lakes and swamps (Froese and Pauly, 2012). It occurs in shallow water where it feeds on invertebrates, copepods and chironomids. Juveniles are found in swampy places among aquatic vegetation; adults live in the open water of rivers and lakes, where they can be found in the pelagic zone as well as the littoral zone (Moreau, 1982). The species can survive in deoxygenated waters (Moreau, 1982; Adite et al., 2006).”

“Bonytongues (*H. niloticus*) select sites and construct their nests in shallow marginal areas within the aquatic vegetation at the floodplain. Nests average 116 cm in diameter (range 77–165 cm) and occur at an average water depth of 60 cm (range 40–86 cm). Height of submerged and emergent vegetation surrounding nests ranges from 30 to 135 cm (mean = 89 cm), and the diameter of nest entrances range from 20 to 47 cm (mean = 33 cm). Between 1 and 7 days posthatch, larvae have large yolk sacs and are incapable of significant movement, and thus are particularly vulnerable. When nests containing newly hatched larvae are disturbed, both parents take larvae into their mouths for transportation to another location (Adite et al., 2006). The number of larvae per nest ranges from 3953 to 6125 (mean = 5028). Tending of nests and broods occurs from the time of hatching until juveniles disperse from the nest. Recruitment age is estimated as 6 months (Moreau, 1982), the age at which *Heterotis* initiates migration from reproductive sites to open water or to floodplains.”

“*H. niloticus* in the River Kaduna flood plain in Nigeria is considered to be predominantly planktivorous (Bake and Sadiku, 2005). However, the diet reported by Adité et al. (2005) along with the relative gut length trend (relative gut length was inversely related to body size of *Heterotis*) support that *H. niloticus* is an omnivore rather than a detritivore, a planktivore or a specialist invertebrate feeder. The different food habits of *Heterotis* in different habitats suggest a degree of trophic plasticity of this species.”

“In the Lake Hlan – River Sô system of Benin, smaller *H. niloticus* tended to consume insect larvae and microcrustacea and larger fish tended to consume hard seeds and adults. The thick-walled gizzard of *H. niloticus*, which generally contained sand, aids digestion of seed coats. Detailed information on diet composition is given by Adité et al. (2005).”

## Human Uses

From CABI (2018):

“*H. niloticus* is of high commercial value for fisheries. Fishing of *H. niloticus* takes place in all African countries where the species occurs.”

From Akinyi et al. (2010):

“The hardiness of this fish, together with its great growth rate make it a candidate for aquaculture in Africa and it has been transported to a number of countries for this purpose.”

From Froese and Pauly (2018):

“Fisheries: commercial; aquaculture: commercial; aquarium: commercial”

This species may be in trade in the United States.

From Pet Zone Tropical Fish (2018):

“African Arowana (*Heterotis niloticus*)”

“Your Price: \$69.00”

“Sorry but this item is currently unavailable. Please check back at a later stage.”

## Diseases

**No OIE-reportable diseases (OIE 2019) have been documented in this species.**

From Froese and Pauly (2018):

“Sporozoa-infection (*Myxobolus* sp.), Parasitic infestations (protozoa, worms, etc.)  
Tenuisentis Infection, Parasitic infestations (protozoa, worms, etc.)”

Poelen et al. (2014) list the following as parasites of *Heterotis niloticus*: *Tenuisentis niloticus*, *Sandonella sandoni*, *Heterotesia* sp., *Brevimulticaecum heterotis*, *Dujardinascaris malapteruri*, *Sterrhurus musculus*, and *Nephrocephalus* sp. (Strona et al. 2013, Smithsonian Institution no date).

## Threat to Humans

From Froese and Pauly (2018):

“Potential pest [Anonymous 2001]”

### 3 Impacts of Introductions

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From CABI (2018):

“*H. niloticus* inhabits fresh water habitat in associations with many other species. Negative impacts on habitats and biodiversity have not been recorded because of its omnivorous feeding habit and its trophic plasticity (Adité et al, 2005). Froese and Pauly (2012) report that several countries experience adverse ecological impacts after introduction, but these ecological impacts were not specified. Froese and Pauly (2012) also mention *H. niloticus* as a potential pest.”

“More research is required to evaluate the impact of *H. niloticus* introductions on other species and on river and lake habitats.”

The Florida Fish and Wildlife Conservation Commission (FFWCC 2018) has listed *H. niloticus* as a prohibited species.

### 4 Global Distribution

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**Figure 1.** Known global distribution of *Heterotis niloticus*. Map from GBIF Secretariat (2018). A point in Florida was excluded from the extent of this map and from climate matching because it represents a preserved specimen.

## **5 Distribution Within the United States**

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This species has not been reported as introduced or established in the United States.

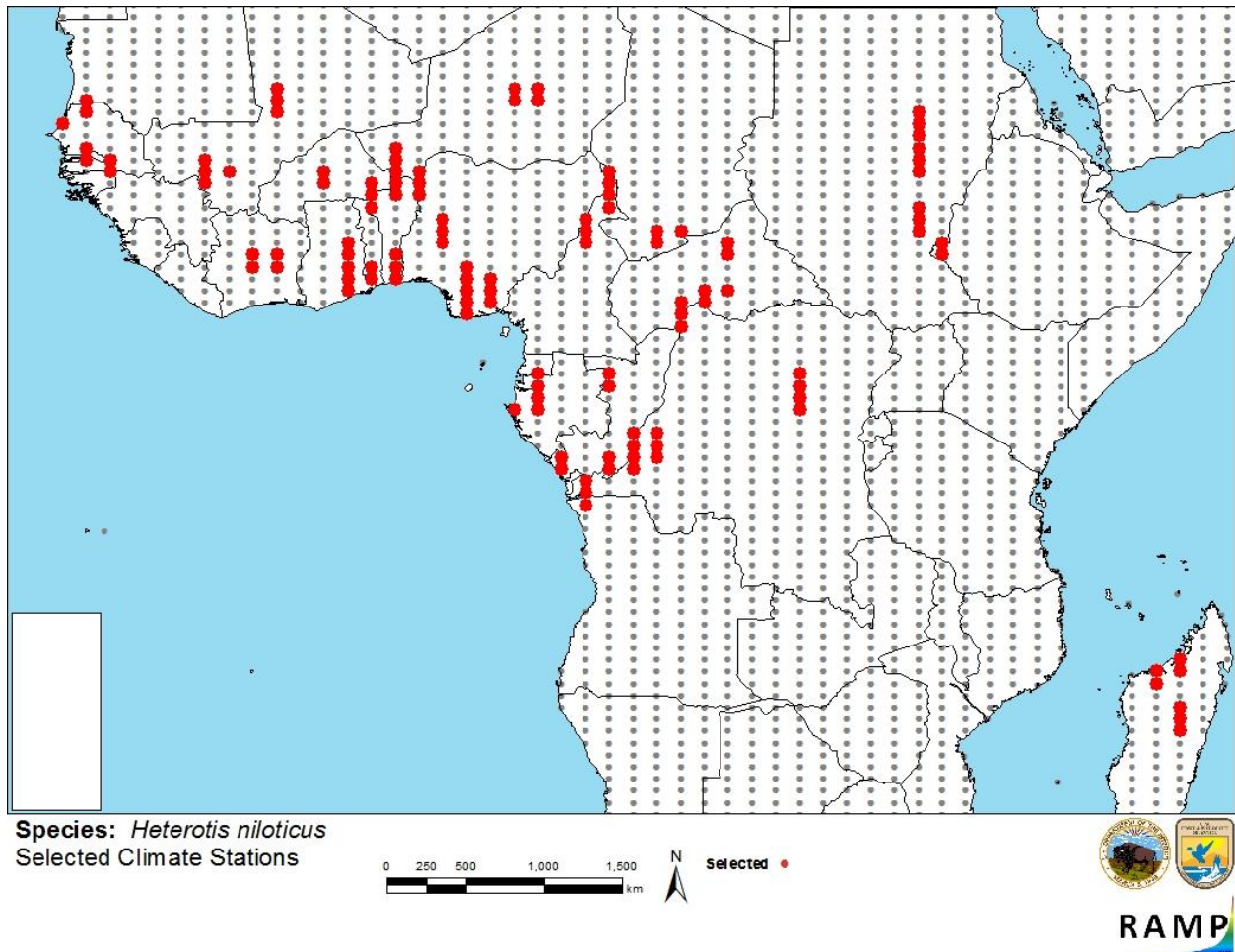
## **6 Climate Matching**

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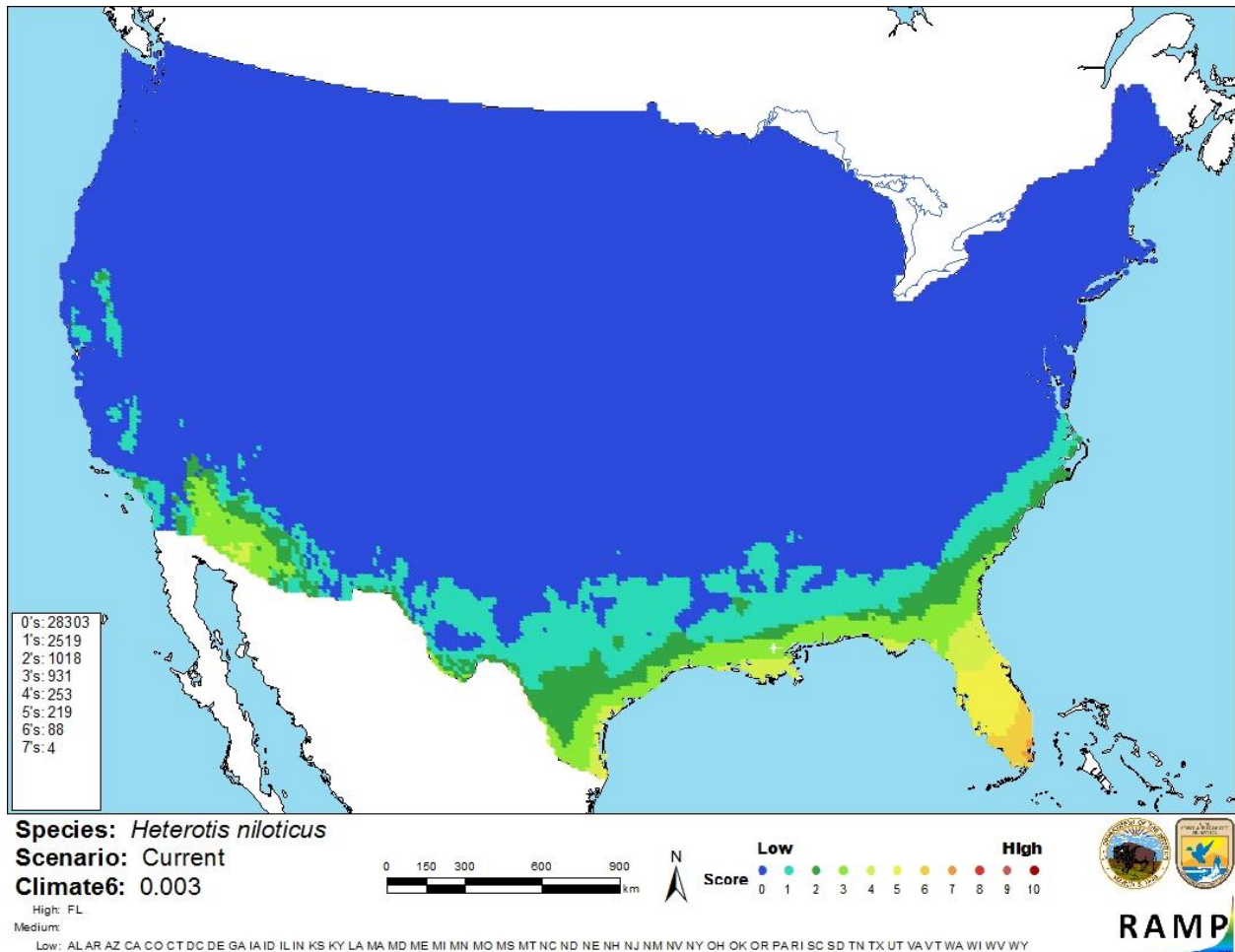
### **Summary of Climate Matching Analysis**

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.003, which indicates a low climate match. A Climate 6 score of 0.005 or below indicates a low climate match. The climate score was high in Florida and low in every other state in the contiguous United States. Most of the contiguous United States had a very low climate match, but areas of the far southern United States had a medium to medium-low climate match, including peninsular Florida, scattered areas along the Gulf Coast, and southern Arizona.





**Figure 2.** RAMP (Sanders et al. 2014) source map showing weather stations in Africa selected as source locations (red; Senegal, Gambia, Mali, Ivory Coast, Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria, Chad, Cameroon, Gabon, Central African Republic, Democratic Republic of the Congo, Republic of the Congo, Sudan, Ethiopia, and Madagascar) and non-source locations (gray) for *Heterotis niloticus* climate matching. Source locations from GBIF Secretariat (2018).



**Figure 3.** Map of RAMP (Sanders et al. 2014) climate matches for *Heterotis niloticus* in the contiguous United States based on source locations reported by 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
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

There is adequate information available on the biology, ecology, and distribution of *Heterotis niloticus*. Multiple introductions of this species outside of its native range have been well-documented, and the pathways of these introductions are clear. It has been stated that adverse ecological impacts of these introductions have occurred, but no supporting information to this claim is available. Further information is needed to assess the invasive potential of this species

and determine the risk it poses to the contiguous United States. Certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Heterotis niloticus*, the African Bonytongue, is a large freshwater fish native to the Sahelo-Sudanese region in Northwest Africa. It has been widely introduced in the Congo Basin and Madagascar because of its value in aquaculture, and it is established in the wild in these areas. *H. niloticus* also is used for commercial fisheries and in commercial aquaria. In the United States, this species is (or has been) in trade under the name “African Arowana,” but it has not been reported as introduced in the United States. The Florida Fish and Wildlife Conservation Commission (FFWCC) lists *H. niloticus* as a prohibited species. General adverse impacts of *H. niloticus* introduction has been noted, and some regard it as a potential pest. However, there are no scientific studies documenting negative impacts of this species’ introduction. Therefore, history of invasiveness is classified as “none documented.” *H. niloticus* has a low climate match with the contiguous United States. Certainty of this assessment is low because there is a lack of research into impacts of introductions of *H. niloticus*. The overall risk assessment category is uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Low**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

## 9 References

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

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## 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.**

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