Magadi Tilapia (*Alcolapia alcalica*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, web version – 03/30/2018

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1 Native Range and Status in the United States

Native Range
From Froese and Pauly (2015):

"Africa: Tanzania and Kenya (Lake Natron […]"

From Bayona (2006):

"Lake Natron drainage and Shombole swamps (Seegers andTichy 1999). Also in Lake Magardi."

"Although the known extent of occurrence is less than 100 km² and area of occupancy less than 10 km² (suggesting a CR status), the species is restricted to three locations (more than the CR threshold, but within the EN threshold). There is continuing decline in range area and habitat quality."

From Ford et al. (2015):

"Currently, *Alcolapia* includes four described species (shown in Fig. 1 [in source material]), three of which are found within Lake Natron: *Alcolapia alcalica* (Hilgendorf 1905), *Alcolapia latilabris* (Seegers & Tichy 1999) and *Alcolapia ndalalani* (Seegers & Tichy 1999), occurring sympatrically at springs bordering the southern lagoon. *Alcolapia alcalica* is the only species with a lakewide distribution, also occurring in monospecific populations along the western and northern shores of Lake Natron (Fig. 1 [in source material])."

Status in the United States

No records of *Alcolapia alcalica* in the United States were found.

Means of Introductions in the United States

No records of *Alcolapia alcalica* in the United States were found.

Remarks

Although *Alcolapia alcalica* is the accepted spelling of the name, many records have used the misspelling of *A. alcalicus*. Information searches were performed using both spellings along with synonyms *Oreochromis alcalicus* and *Tilapia alcalica*, to ensure completeness of information.

From Bayona (2006):

"IUCN Red List Category Endangered B1ab(i,ii,iii)+2ab(i,ii,iii)ver3.1"

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Froese and Pauly (2015):

"Kingdom Animalia
  Phylum Chordata
    Class Actinopterygii
      Order Perciformes
        Family Cichlidae
          Genus *Alcolapia*
            Species *Alcolapia alcalica* (Hilgendorf, 1905)"

From Bayona (2006):

"Previously also reported as *Tilapia alcalica* and *Oreochromis* (*Alcolapia*) *alcalicus alcalicus*. Specific rank according to Seegers and Tichy (1999)."

From Eschmeyer et al. (2017):

"***alcalica, Tilapia*** Hilgendorf [F. M.] 1905:407 [Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere (Jena) v. 22 (no. 4) […]] Ndadalani at the Nguruman Salt Lake [now Lake Natron], Tanzania. Lectotype: ZMB 16337 (40.5 mm). Paralectotypes: BMNH 1905.7.25.29-31 (now 4), ZMB 31905 [ex ZMB 16377] (4). Lectotype selected by Seegers & Tichy 1999:103 […]. •Synonym of *Oreochromis alcalicus* (Hilgendorf 1905), but a valid subspecies -- (Trewavas & Teugels 1991:307 […]). •Valid as *Oreochromis alcalicus* (Hilgendorf 1905) -- (Seegers & Tichy 1999:101 […]). •Valid as *Alcolapia alcalica* (Hilgendorf 1905) -- (Seegers et al. 2003:42 […] as *alcalicus*, Seegers 2008:154 […]). **Current status:** Valid as *Alcolapia alcalica* (Hilgendorf 1905). Cichlidae: Pseudocrenilabrinae."

Size, Weight, and Age Range

From Froese and Pauly (2015):

"Max length: 11.6 cm TL male/unsexed; [Seegers and Tichy 1999]"

Environment

From Froese and Pauly (2015):

"Freshwater; benthopelagic."

"Occur at a [water] temperature range of 30-32°C [Trewavas 1983]."

From Bayona (2006):

"Inhabits waters rich in sodium and chlorides and temperature ranges between 16–40°C (Reite et al. 1974)."

Climate/Range

From Froese and Pauly (2015):

"Tropical; 2°S - 3°S"

Distribution Outside the United States

Native

From Froese and Pauly (2015):

"Africa: Tanzania and Kenya (Lake Natron […]"

From Bayona (2006):

"Lake Natron drainage and Shombole swamps (Seegers andTichy 1999). Also in Lake Magardi."

"Although the known extent of occurrence is less than 100 km^2 and area of occupancy less than 10 km^2 (suggesting a CR status), the species is restricted to three locations (more than the CR threshold, but within the EN threshold). There is continuing decline in range area and habitat quality."

Introduced

From Froese and Pauly (2015):

"[…] introduced in Lake Nakuru)."

Means of Introduction Outside the United States

Froese and Pauly (2015) stated that *Alcolapia alcalica* was introduced to Lake Nakuru in Kenya, but did not provide a means of introduction. There were no corroborating records or references for this statement. No other records of introduction were found.

Short Description

From Froese and Pauly (2015):

"Dorsal spines (total): 9 - 14; Dorsal soft rays (total): 11-15; Anal spines: 3; Anal soft rays: 9 - 11; Vertebrae: 27 - 30. Mature females with an overall golden hue; males with the flanks a pale blue and the lateral parts of the lower lip swollen and brilliant. In full color the blue spots on the scales become iridescent. The genital papilla is conical, prominent and yellow in the mature male, less prominent, but swollen in the mature female. Scale rows on cheeks 3-4. Preorbital bone with only 4 pores and no scales. [Eccles 1992]"

"Scales on lateral line 27-30"

From Ford et al. (2015):

"Additionally, there are colour and trophic morphs found within certain Lake Natron *A. alcalica* populations (Seegers & Tichy 1999; Tichy & Seegers 1999; Seegers et al. 2001)."

"[…] terminal/retrognathous snout (*A. alcalica*), […]"

From Ford et al. (2016):

"[…] a recently reported "upturned mouth" morph of *A. alcalica* (Ford et al. 2015), […]"

Biology

From Froese and Pauly (2015):

"Feed actively in the early morning; mainly on algae as well as copepods and dipterous larvae [Trewavas 1983]. Females mouthbrood the eggs [Trewavas 1983]."

"Early in the morning before taking possession of their pits, the males feed on slimy algal growths-noisily. Sexual activity is greater after noon than before. Young male may build a small pit around that of a larger male and mate there with a small female [Trewavas 1983]. Males prepare and guard nests, while females migrate from one nest to another. Males guard the nest against juveniles of their own species and other species which feed on the fertilized eggs which fall from the mouth of the female mouth brooder [Coe 1966]."

"Being strictly herbivores, the species survives on algae, mainly of the family Cyanophycea. The juveniles are carnivores feeding on invertebrates, eggs and larvae. Maximum feeding activity occurs at night [Coe 1966]. Very little is known about the growth of this fish."

From Bayona (2006):

"Found in springs and spring-fed streams, rarely observed in the open water of some lagoons of the lake (Seegers and Tichy 1999)."

"Omnivorous. They take algae from stones as well as live food. The basic natural diet is blue-green algae. Sometimes insects are gulped from the water surface. Bacteria are also taken from the water surface (Seegers and Tichy 1999). The juveniles are carnivores feeding on invertebrates, eggs and larvae. There seems to be no distinct breeding period, although there may be a breeding maximum in December/January, which coincides with the hottest period of the year. Male builds nests (pits), which are not aggregated nor grouped in large numbers (Seegers and Tichy 1999)."

From Ford et al. (2015):

"In mixed Lake Natron species tanks, male *A. alcalica* reportedly courted female heterospecifics without any successful spawning (Seegers et al. 2001), […]"

From Ford et al. (2016):

"A substantial proportion (43%) of *A. alcalica* diet was accounted for by plant material (cellulose), with a smaller proportion (30%) of algae and cyanobacteria, […]"

"Stomach contents of *A. alcalica* showed a high proportion of cellulose (Fig. 2D [in source material]), but the absence of vascular plants from the soda lakes suggest this species is feeding on allochthonous plant matter. These sources may be wind-blown or washed into the springs, and may also be accessible during flooding in the wet season (e.g., Jackson et al. 2012), although availability of such resources is likely to vary seasonally"

Human Uses

No records of human uses of *Alcolapia alcalica* were found.

Diseases

Information on pathogens and parasites known to be carried by *Alcolapia alcalica* was not found.

Threat to Humans

From Froese and Pauly (2015):

"Harmless"

3 Impacts of Introductions

Froese and Pauly (2015) stated that *Alcolapia alcalica* was introduced to Lake Nakuru in Kenya, there were no corroborating records or references. No other records of introduction were found.

4 Global Distribution

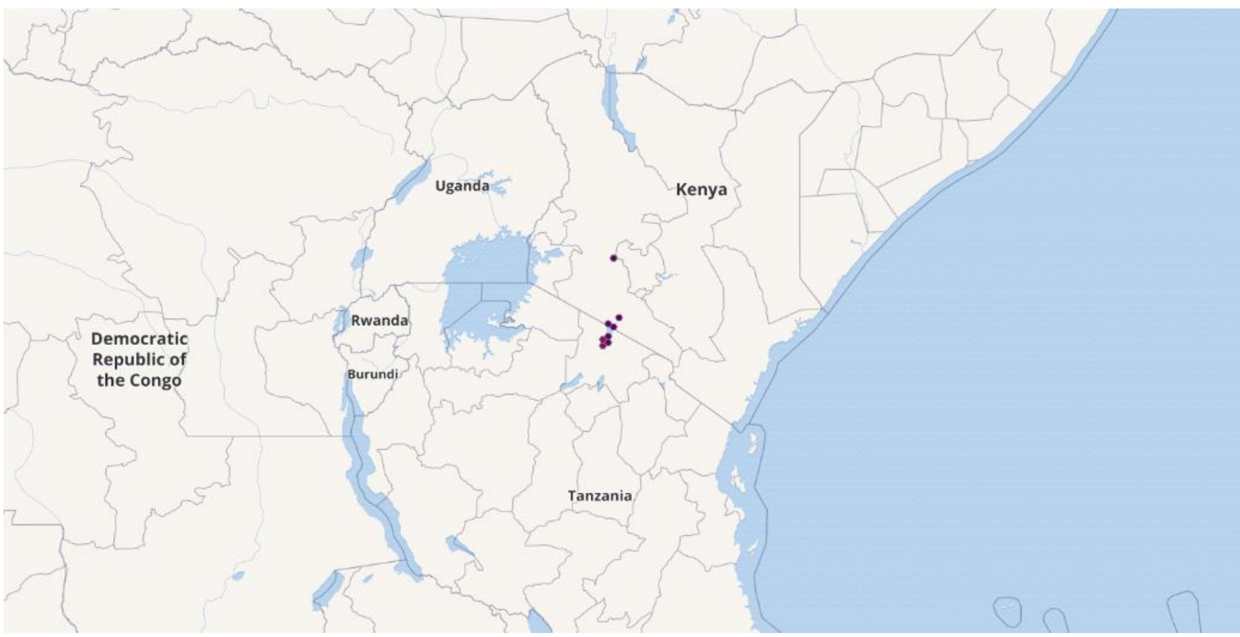

Figure 1. Known global distribution of *Alcolapia alcalica*. Locations are in Kenya and Tanzania. Map from GBIF Secretariat (2017).

5 Distribution Within the United States

No records of *Alcolapia alcalica* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Alcolapia alcalica* had small areas of medium match in southern Texas, in the southwest, and along the west coast. The climate match was low everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.000, low, and no states had an individually high climate match.

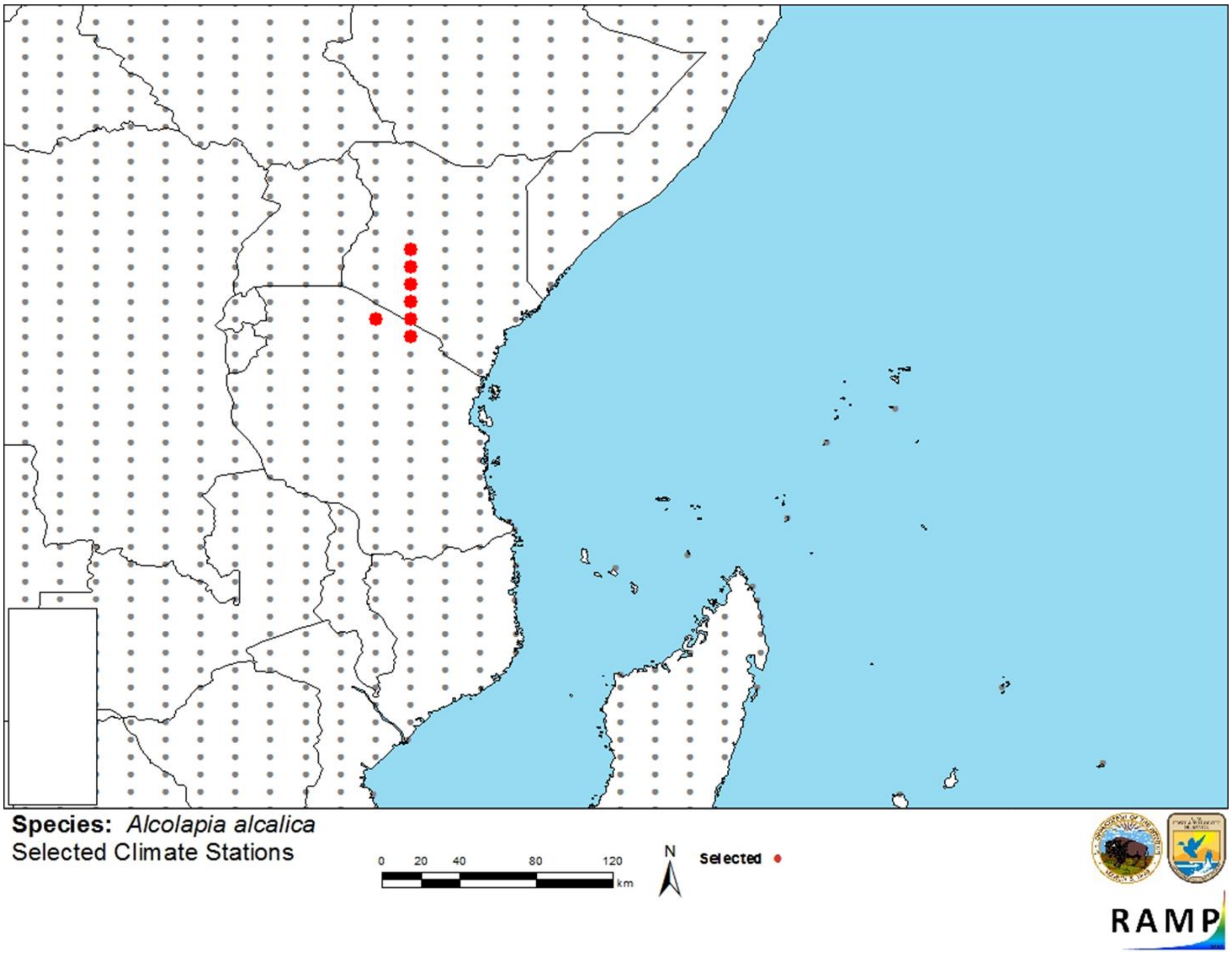

Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations in Kenya and Tanzania selected as source locations (red) and non-source locations (gray) for *Alcolapia alcalica* climate matching. Source locations from GBIF Secretariat (2017).

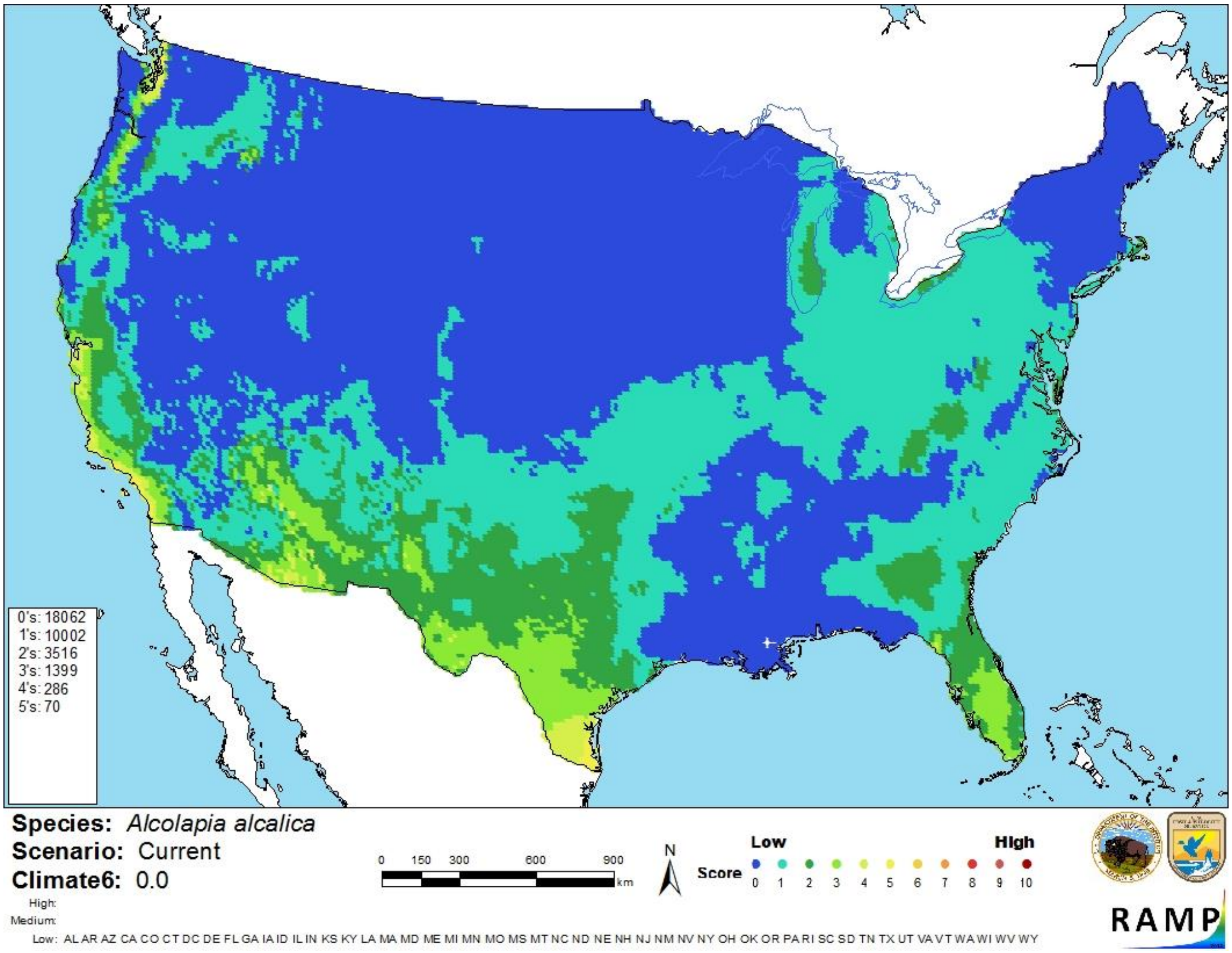

Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Alcolapia alcalica* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). 0 = Lowest match, 10 = Highest match.

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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

The certainty of assessment is medium. There was adequate quality information available for *Alcolapia alcalica*. A single record of introduction was found.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness is uncertain. A single record of introduction was found but no details were provided and the validity of that record is in question. The climate match was low. Climate 6 was 0.000. There were very small areas of medium climate match in southern Texas, in the southwest, and along the west coast. *Alcolapia* spp. as a whole are specialized to alkalinity levels that would kill most other fish. It is uncertain how that physiology would affect their ability to successfully establish a population in the United States. The certainty of assessment is medium. 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): Medium**
- **Remarks/Important additional information** *Alcolapia* spp. as a whole are specialized to alkalinity levels that would kill most other fish. It is uncertain how that physiology would affect their ability to successfully establish a population in the United States.
- **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.

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10 References Quoted But Not Accessed

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