

# Rock Flagtail (*Kuhlia rupestris*)

## Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2011  
Revised, March 2019  
Web Version, 1/16/2020



Photo: Yuichi Kano. Licensed under CC by Attribution. Available:  
<http://fishesofaustralia.net.au/home/species/4456>. (March 2019).

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2019):

“Africa to Asia and Oceania: East Africa to Samoa, north to the Ryukyu Islands, south to Queensland, Australia and New Caledonia [Comoros, Kenya, Madagascar, Mauritius, Mayotte, Reunion, Somalia, South Africa, Tanzania, Andaman Island, India, Indonesia, Japan, Philippines, Ryukyu Island, Tawian [*sic*], Timor-Leste, American Samoa, Austrailia [*sic*], Fiji, Guam, Micronesia, New Caledonia, North Marianas, Palau, Papua New Guinea, Samoa, Solomon Island, Vanuata [*sic*], and Wallis Futuna].”

### Status in the United States

According to Nico (2019), *Kuhlia rupestris* was introduced to Hawaii in the 1950’s.

From Nico (2019):

“Status: Did not survive; extirpated.”

From Froese and Pauly (2019):

“The following year another batch of 170 individuals was introduced again of which 104 were released in a small stream at Bellows Field in Oahu. Species did not become established [Eldredge 1994].”

## Means of Introductions in the United States

From Nico (2019):

“Intentionally stocked, most likely as a sport fish. According to Brock (1960), a shipment of 43 specimens was brought to Hawaii from Guam in 1957 and held in laboratory tanks; a second shipment, containing 170 fish, was received in 1958. Specimens from the second shipment were subsequently stocked.”

## Remarks

*Kuhlia rupestris* can live in both marine and freshwater environments; this assessment and the climate match are only valid for freshwater locations.

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Kuhlia rupestris* (Lacepède 1802).”

From ITIS (2019):

“Kingdom Animalia  
Subkingdom Bilateria  
Infrakingdom Deuterostomia  
Phylum Chordata  
Subphylum Vertebrata  
Infraphylum Gnathostomata  
Superclass Actinopterygii  
Class Teleostei  
Superorder Acanthopterygii  
Order Perciformes  
Suborder Percoidei  
Family Kuhliidae  
Genus *Kuhlia*  
Species *Kuhlia rupestris* (Lacepède, 1802)”

## Size, Weight, and Age Range

From Froese and Pauly (2019):

“Maturity:  $L_m$  2, range 26 - 27 cm

Max length : 45.0 cm TL male/unsexed; [Smith 1986]; common length : 25.0 cm SL male/unsexed; [Allen 1991]; max. published weight: 2.7 kg [Smith 1986]”

## Environment

From Froese and Pauly (2019):

“Marine; freshwater; brackish; reef-associated; catadromous [Riede 2004]; depth range 0 - 5 m [Fricke et al. 2011]. [...] 20°C - 26°C [Baensch and Riehl 1985; assumed to be recommended aquarium temperature]”

## Climate/Range

From Froese and Pauly (2019):

“Tropical;”

## Distribution Outside the United States

Native

From Froese and Pauly (2019):

“Africa to Asia and Oceania: East Africa to Samoa, north to the Ryukyu Islands, south to Queensland, Australia and New Caledonia [Comoros, Kenya, Madagascar, Mauritius, Mayotte, Mozambique, Reunion, Somalia, South Africa, Tanzania, Andaman Island, India, Indonesia, Japan, Ogasawara Island, Philippines, Ryukyu Island, Tawian, Timor-Leste, American Samoa, Australia, Fiji, Guam, Micronesia, New Caledonia, North Marianas, Palau, Papua New Guinea, Samoa, Solomon Island, Vanuata, and Wallis Futuna].”

Introduced

No introductions of *Kuhlia rupestris* outside of the United States have been reported.

## Means of Introduction Outside the United States

No records of introduction have been reported outside of the United States.

## Short Description

From Froese and Pauly (2019):

“Dorsal spines (total): 10; Dorsal soft rays (total): 10-12; Anal spines: 3; Anal soft rays: 9 - 11. Diagnosis: Preorbital serrae 10-15 (obsolete in large specimens); body depth 2.6-3.0 in SL; mouth large for genus, maxilla reaching to below posterior half of eye; caudal fin emarginate, lobes somewhat rounded, caudal concavity 5.3-8.7 in head length [Randall and Randall 2001].

Reduced number of lateral line scales; 17-18(19) gillrakers on lower part of first brachial arch; body with spots [Louette 2004]. Coloration: Silvery, the scales dorsally on body with black edges, those on side with a black bar or spot; juveniles with a broad black zone, edged above and below in white, in soft portion of dorsal fin, and each lobe of caudal fin with a large, white-edged black spot; black areas in these fins enlarge with growth until in adults most of these fins black (caudal with upper and lower edges and corners whitish) [Randall and Randall 2001].”

## Biology

From Froese and Pauly (2019):

“Primarily a freshwater inhabitant but may penetrate adjacent marine habitats [Randall and Randall 2001]. Adults occur in estuaries and the middle reaches of rivers; usually in relatively fast-flowing, clear streams [Allen 1991; Louette 2004]. Usually in rainforests, as well as in rocky pools below waterfalls [Allen et al. 2002]. Adults are omnivorous, feeding on small fishes, insects, crustaceans and fruits (figs) that drop into the water. Specific breeding habits are unknown, but adults move downstream into estuaries or to the sea to spawn [Allen et al. 2002]. Neither anterolateral groove nor venom gland is present [Smith and Wheeler 2006].”

“Presumably non-guarders (RF).”

## Human Uses

From Froese and Pauly (2019):

“Fisheries: commercial; gamefish: yes”

“Good food fish [Smith 1986].”

From Nico (2019):

“This species is a popular angling fish in Australia (Allen 1991).”

## Diseases

No information on diseases was found. **No OIE-reportable diseases (OIE 2020) were found to be associated with *Kuhlia rupestris*.**

## Threat to Humans

From Froese and Pauly (2019):

“Harmless”

### 3 Impacts of Introductions

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From Nico (2019):

“The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made.”

### 4 Global Distribution

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**Figure 1.** Known global distribution of *Kuhlia rupestris*. Locations in Comoros, Kenya, Madagascar, Mauritius, Mayotte, Reunion, Somalia, South Africa, Tanzania, Andaman Island, India, Indonesia, Japan, Philippines, Ryukyu Island, Taiwan, Timor-Leste, American Samoa, Australia, Fiji, Guam, Micronesia, New Caledonia, North Marianas, Palau, Papua New Guinea, Samoa, Solomon Island, Vanuatu, and Wallis Futuna. Map from GBIF Secretariat (2019). Because the climate matching analysis (section 6) is not valid for marine waters, no marine occurrences were used in the climate matching analysis.

### 5 Distribution Within the United States

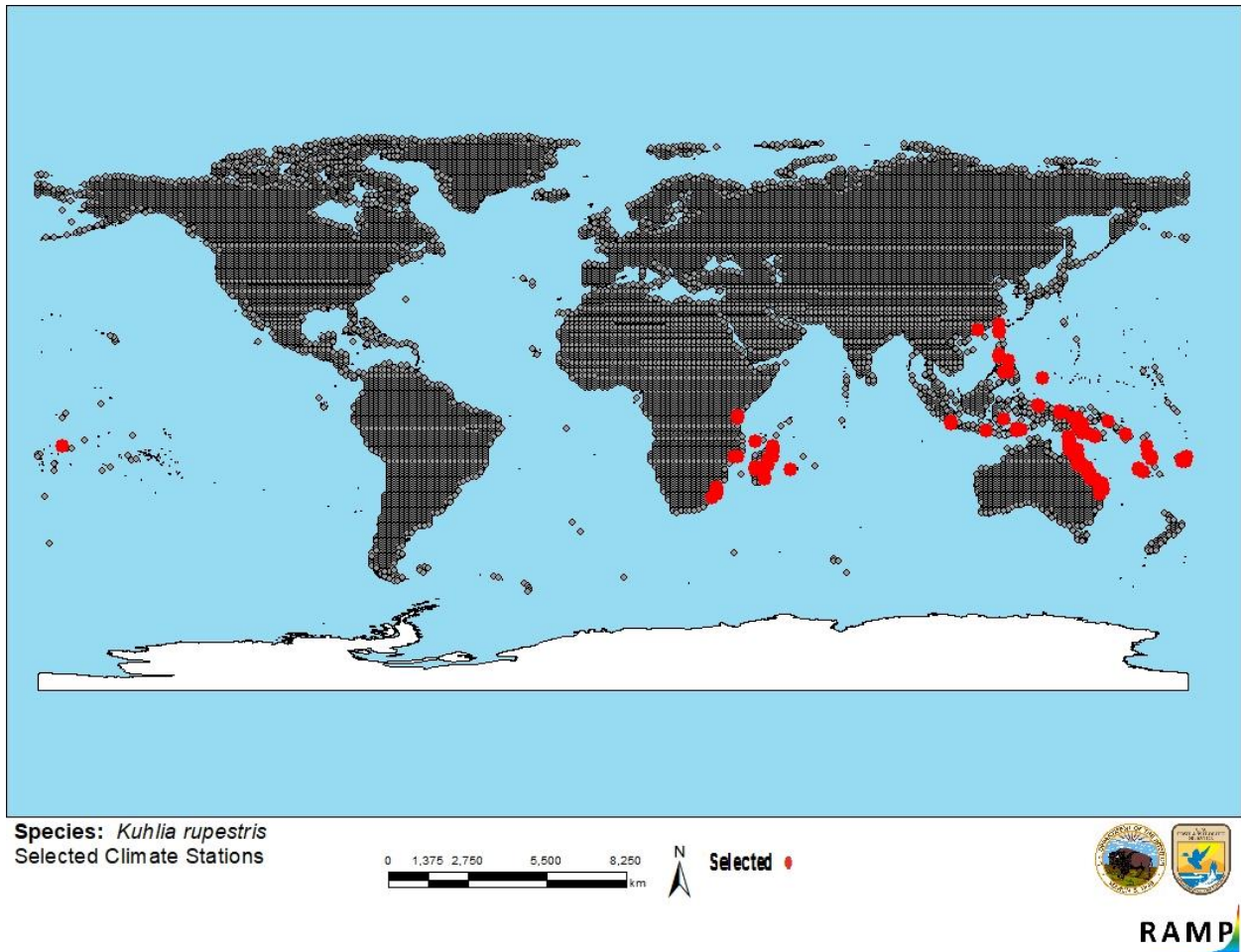
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No established populations of *Kuhlia rupestris* have been reported in the United States.

## 6 Climate Matching

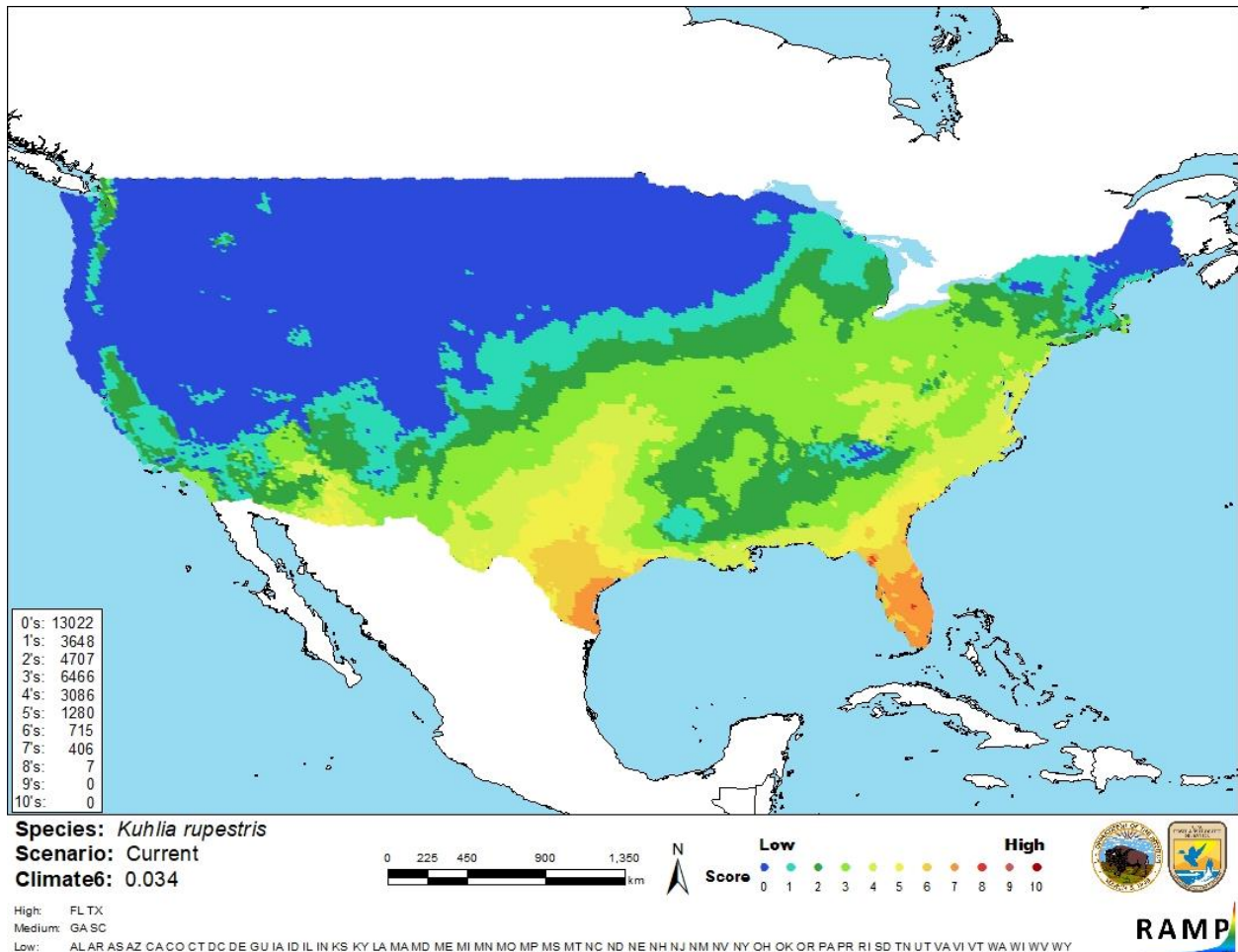
### Summary of Climate Matching Analysis

The climate match for the contiguous United States is generally very low in the northern and western states. Areas of medium and high match were found in the south. Southern Texas and peninsular Florida had the areas of highest match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.034, medium (scores greater than 0.005, but less than 0.103, are classified as medium). All States received low individual Climate 6 scores with the exception of Florida and Texas which received high climate scores, as well as Georgia and South Carolina which received medium climate scores.



**Figure 2.** RAMP (Sanders et al. 2018) source map showing weather stations in Southern Africa, Southeast Asia, and the South Pacific selected as source locations (red) and non-source locations (gray) for *Kuhlia rupestris* climate matching. Source locations from GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.





**Figure 3.** Map of RAMP (Sanders et al. 2018) climate matches for *Kuhlia rupestris* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). Counts of climate match scores are tabulated on the left. 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
$\geq 0.103$	High

## 7 Certainty of Assessment

Certainty of assessment is low for *Kuhlia rupestris*. There is information available on this species such as biology, environment, and range but there is no information about any introductions that have created established populations.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

Rock Flagtail (*Kuhlia rupestris*) is a fish native to coastal areas of southeastern Africa and countries and islands of the Indo-pacific. This species can occupy both freshwater and marine environments but is a primarily freshwater species. *K. rupestris* is a popular sport fish and is often caught for eating. The history of invasiveness is uncertain. No introductions have been reported outside of their native range other than an intentional introduction in Hawaii for sport fishing. This introduction failed to result in an established population. No impacts of introduction have been reported. The climate match for the contiguous United States is medium. Florida and Texas both received high climate scores, while Georgia and South Carolina received medium climate scores. All other States received low scores. The certainty of assessment is low. The overall risk assessment of *Kuhlia rupestris* is uncertain.

### Assessment Elements

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

Fricke, R., Eschmeyer, W. N., and R. van der Laan, editors. 2019. Eschmeyer's catalog of fishes: genera, species, references. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (March 2019).

Froese, R., and D. Pauly, editors. 2019. *Kuhlia rupestris* (Lacepède, 1802). FishBase. Available: <http://www.fishbase.org/summary/Kuhlia-rupestris.html>. (March 2019).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Kuhlia rupestris* (Lacepède, 1802). Global Biodiversity Information Facility, Copenhagen. Available: <https://www.gbif.org/species/5208684>. (March 2019).

ITIS (Integrated Taxonomic Information System). 2019. *Kuhlia rupestris* (Lacepède 1802). Integrated Taxonomic Information System. Reston, Virginia. Available: [https://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=168086#null](https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=168086#null). (March 2019).



Nico, L. 2019. *Kuhlia rupestris* (Lacepède, 1802). U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=751>. (March 2019).

OIE (World Organisation for Animal Health). 2020. OIE-listed diseases, infections and infestations in force in 2020. Available: <http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2020/>. (January 2020).

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

## 10 References Quoted But Not Accessed

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**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.**

Allen, G. R., S. H. Midgley, and M. Allen. 2002. Field guide to the freshwater fishes of Australia. Western Australian Museum, Perth, Western Australia.

Allen, G. R. 1991. Field guide to the freshwater fishes of New Guinea. Christensen Research Institute, Madang, Papua New Guinea.

Baensch, H. A., and R. Riehl. 1985. Aquarien atlas, band 2. Mergus, Verlag für Natur-und Heimtierkunde GmbH, Melle, Germany.

Brock, V. E. 1960. The introduction of aquatic animals into Hawaiian waters. *International Revue der Gesamten Hydrobiologie* 45:463–480.

Eldredge, L. G. 1994. Perspectives in aquatic exotic species management in the Pacific islands, volume I. Introduction of commercially significant aquatic organisms to the Pacific islands. South Pacific Commission, Noumea, New Caledonia.

Fricke, R., M. Kulbicki, and L. Wantiez. 2011. Checklist of the fishes of New Caledonia, and their distribution in the Southwest Pacific Ocean (Pisces). *Stuttgarter Beiträge zur Naturkunde A, Neue Serie* 4:341–463.

Louette, M. 2004. Poissons d'eau douce. Pages 231–241 in M. Louette, D. Meirte, and R. Jocqué, editors. *La faune terrestre de l'archipel des Comores*. *Studies in Afrotropical Zoology* 293:456.

Randall, J. E., and H. A. Randall. 2001. Review of the fishes of the genus *Kuhlia* (Perciformes: Kuhliidae) of the Central Pacific. *Pacific Science* 55(3):227–256.

Riede, K. 2004. Global register of migratory species - from global to regional scales. Federal Agency for Nature Conservation, Final Report, R&D-Projekt 808 05 081, Bonn.

Smith, W. L., and W. C. Wheeler. 2006. Venom evolution widespread in fishes: a phylogenetic road map for the bioprospecting of piscine venoms. *Journal of Heredity* 97(3):206–217.

Smith, M. M. 1986. Kuhlidae. Pages 508–509 *in* M. M. Smith and P. C. Heemstra, editors. *Smiths' sea fishes*. Springer-Verlag, Berlin.