

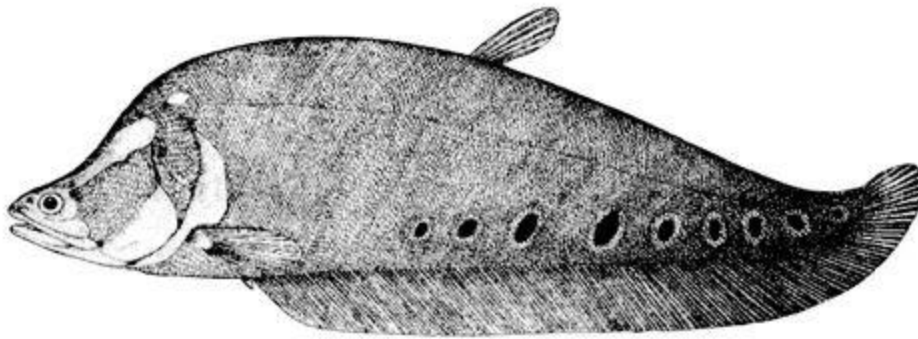
Clown Knifefish (*Chitala ornata*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011

Revised, March 2017

Web Version, 09/14/2017



FAO

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1 Native Range and Status in the United States

Native Range

From Nico et al. (2017):

“Tropical Asia. The Mekong and Chao Phraya basins of Indochina and Thailand (Roberts 1992). Laos (Baird et al. 1999).”

Status in the United States

From Nico et al. (2017):

“A single fish (56 cm TL, 1.6 kg) was taken in early 1994 by an angler from a small lake south of Winter Garden in Lake County, Florida (Hawkins 1994; W. Icenhour, personal communication). A population of clown knifefish inhabitants [*sic*] Palm Beach County, Florida where the species was first recorded in 1994 (W. Courtenay, personal communication). It ranges from Lake Mangonia, about 4 km North of the West Palm Beach Canal South through the El Rio Canal (E-4), Lakes Osborne and Ida to the Delray Canal (C-15), a distance of 36 km (Shafland et al. 2008). A single individual was also collected in Crescent Lake, St. Petersburg in Pinellas County, FL. A single fish was collected from Norman Reservoir on the Catawba River, North Carolina in 2002 (G. Bray, personal communication). A single fish was also found at January-Wabash Park in Ferguson, Missouri (R. Wilfong, personal communication). A single specimen was found dead by an angler at North Montpelier Pond, Vermont, in November 2013 (Dobbs 2013).”

“Status: Established in Florida. Fewer than 100 individuals were collected between 1994-2003 (P. Shafland, pers. comm.), though many additional specimens have been caught since by both the Florida Fish and Wildlife Conservation Commission and by anglers; its numbers appear to be steadily increasing (Shafland et al. 2008). Failed introduction in Missouri, and possibly failed in North Carolina: no further reports from the state, but Lake Norman contains several warm-water outfalls that could act as thermal refugia for this species (G. Bray, personal communication).”

Means of Introductions

From Nico et al. (2017):

“Probable aquarium release.”

Remarks

From Vidthayanon (2012):

“Synonym(s): *Notopterus chitala* (Hamilton 1822)
Notopterus ornatus Gray 1831”

From Nico et al. (2017):

“This species is often incorrectly identified as *Chitala chitala*.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2017):

“Kingdom Animalia
Subkingdom Bilateria

Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Osteoglossomorpha
Order Osteoglossiformes
Suborder Notopteroidei
Superfamily Notopteroidea
Family Notopteridae
Genus *Chitala*
Species *Chitala ornata* (Gray, 1831) – clown knifefish”

“Current Standing: valid”

Size, Weight, and Age Range

From Froese and Pauly (2016):

“Max length : 100.0 cm SL male/unsexed; [Baird et al. 1999]; max. published weight: 5.0 kg [IGFA 2001]”

Environment

From Froese and Pauly (2016):

“Freshwater; pelagic; potamodromous [Riede 2004]”

Climate/Range

From Froese and Pauly (2016):

“Tropical; 24°C - 28°C, preferred ?”

Distribution Outside the United States

Native

From Nico et al. (2017):

“Tropical Asia. The Mekong and Chao Phraya basins of Indochina and Thailand (Roberts 1992). Laos (Baird et al. 1999).”

Introduced

From Vidthayanon (2012):

“Myanmar; Philippines”

From Froese and Pauly (2016):

“Malaysia”

“Singapore”

From Silva and Kurukulasuriya (2010):

“*Chitala ornata* was first reported in “*Diyawanna oya*” in 1994 and it is widespread in streams and reservoirs in the wet zone of Sri Lanka (e.g. “*Diyawannawa oya*”, “*Panape ela*” in Mellana (Horana), “*Wevita wewa*” in Bandaragama, “*Weres ganga*” in Moratuwa, Godangoda and Mathugama (Amarasinghe et al., 2006).”

Means of Introduction Outside the United States

From Vidthayanon (2012):

“It has been introduced to Myanmar and the Philippines for aquaculture.”

From Abarra et al. (2017):

“Ornamental fish trade has contributed to the introduction of knife fish to the Philippines (Guerrero, 2014). Knife fish [...] easily became a popular ornamental fish (Punongbayan, 2012). [...] It is believed that the fish found its way into Laguna de Bay in two ways: accidental escape from aquariums and ornamental fish farms primarily due to flooding, or deliberate release of hobbyists into waterways when the fish got too big for aquariums and they wanted to get rid of them (Despuez, 2012).”

Short Description

From Froese and Pauly (2016):

“Distinguished from other members of the family by the presence of a row of large ocellated spots above the base of the anal fin [Kottelat 1998]. Differs from *C. chitala* in lacking silver or gold transverse streaks on dorsum and from *C. blanci* and *C. lopis* in lacking a basal pectoral spot [Roberts 1992].”

Biology

From Froese and Pauly (2016):

“Inhabits flowing waters of large and medium-sized rivers [Rainboth 1996]. Within the Mekong mainstream, it occurs in pools [Sokheng et al. 1999]. Found in the basin-wide mainstream of the

lower Mekong [Pantulu 1986]. A predator on surface-feeding fishes, crustaceans and insects, with a crepuscular or nocturnal activity pattern. Moves into inundated forest during the high water period from June to October. Individuals from the Great Lake are shipped to markets in Thailand [Rainboth 1996].”

From Nico et al. (2017):

“Clown knifefish is generally found around submerged structure (e.g., rocks, wood, aquatic vegetation) in lakes or deeper pools of rivers. Submerged structure is used as a daytime refuge as well as a spawning substrate. Reproduction occurs from March to July, with eggs deposited on submerged wood and guarding of eggs and fry performed by one of the parents.”

From Vidthayanon (2012):

“It is well-adaptive [*sic*] to impounded waters.”

Human Uses

From Vidthayanon (2012):

“It is a [*sic*] popularly consumed, fished at large and small scales, and found in aquaculture. Juveniles are popular in the aquarium trade and large fish are popular for public aquaria. In Thailand, it is often used in food products.”

Diseases

No information available.

Threat to Humans

From Froese and Pauly (2016):

“Harmless”

3 Impacts of Introductions

From Guerrero et al. (2014):

“The “clown featherback” (*C. ornata*), a native of Thailand, is locally known [in the Philippines] as “arowana.” It was introduced in the country with permit from the BFAR. First observed in Laguna de Bay in 2011 (Palma pers. comm.), it is believed to have escaped into the lake after a flooding event caused by Typhoon Ondoy in 2009. An economic impact assessment conducted by Palma (pers. comm.) showed that the species is “highly predaceous” on the cultured fishes (milkfish and Nile tilapia) and native fishes in the lake. In a fish catch survey, it comprised 40% of the total catch (3,151 kg/day) of the fisherfolk.”

From Silva and Kurukulasuriya (2010):

“The clown knife fish (*C. ornata*) is also a large, notorious predator whose increase in populations has decreased the abundance of several small surface-dwelling fish species in Sri Lanka. The morphology of clown knife fish and its occupation of a perfect niche in the water have triggered the destruction of habitats and disappearance of native biota (Weliange, 2009). The recent investigations done by Shirantha and Amarasinghe (2009) have indicated an ontogenetic dietary shift of *C. ornata* having potential adverse impacts on aquatic fauna, including native fish populations. The abundance of native fish species such as *Aplocheilichthys dayi*, *A. parvus*, *Horadandia athukorali*, *P. vittatus*, *P. bimaculatus*, *R. daniconius* and *Amblypharyngodon melettinus* have decreased since the introduction of *C. ornata* in 1994 (Gunawardena, 2002).”

From Abarra et al. (2017):

“Aquaculture production in Laguna de Bay contributed 2.33% (48,767 metric tons) to the 2,093,371 metric tons total aquaculture production of the Philippines in 2006 (BFAR Region 1V-A 2007). Moreover, aquaculture production of the bay comprised 1.11% of the 4,409,526 metric tons total fisheries production of the country (Israel, 2007). Unfortunately, the aquaculture industry of Laguna de Bay is currently facing knife fish infestation and has become the center of population control efforts. [...] Having an aggressive and carnivorous nature, knife fish preys on smaller fish species, especially cultured milkfish (*Chanos chanos*), bighead carp (*Aristichthys nobilis*), and tilapia (*Oreochromis niloticus*) in fish pens and cages (Mayuga, 2013). Knife fish fry is very small and can penetrate fish pens and cages. Once inside, the fish grows and consume cultured stocks inside the pens and cages (Despuez, 2012). Currently, knife fish is a regular catch among fishermen instead of cultured and indigenous species (Mayuga, 2013). Moreover, knife fish has a very low market demand and a market value of US\$ 0.10–0.30 per kg only. Its low market demand is due to the consumer perception that the fish is exotic and not part of the regular fish staple (Despuez, 2012). The extremely high supply and low demand for knife fish translates huge investment loss on the livelihood of those dependent on the fishing industry.”

From Nico et al. (2017):

“Impact of Introduction [in the U.S.]: Unknown.”

4 Global Distribution

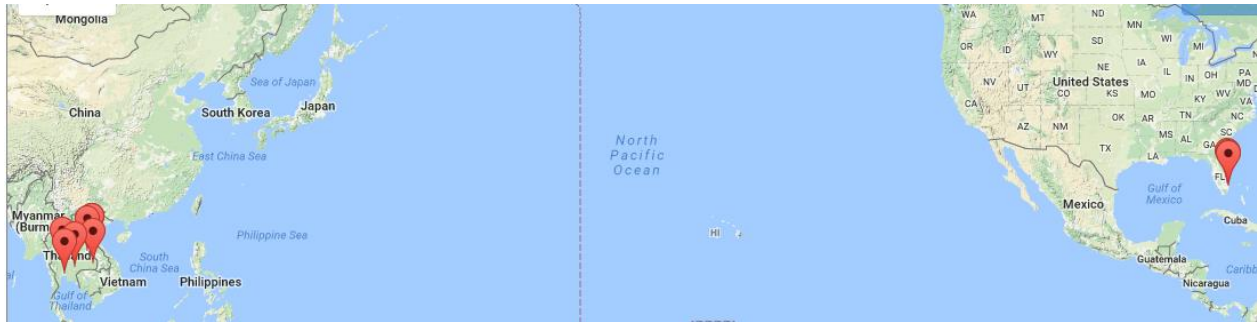


Figure 1. Known global established locations of *Chitala ornata*. Map from VertNet (2016).

5 Distribution Within the United States

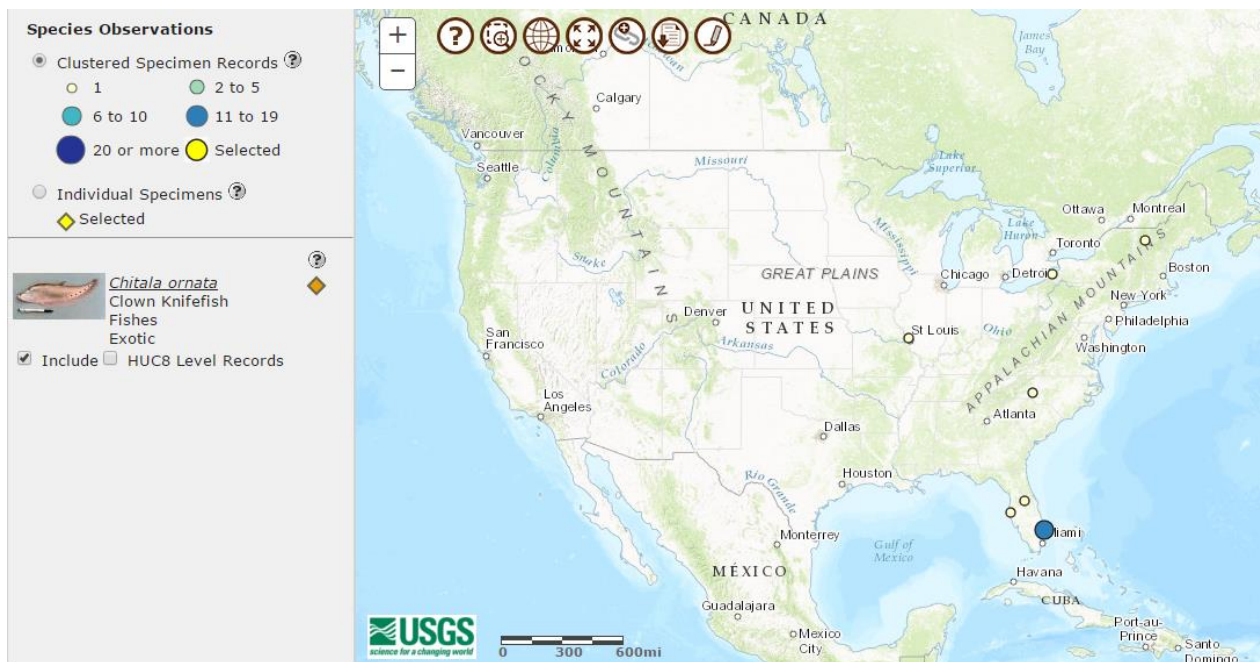


Figure 2. Known distribution of *Chitala ornata* in the United States. Map from Nico et al. (2017). Point locations outside of Florida do not represent established populations.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high throughout the state of Florida and medium along the Gulf Coast and Southeast Atlantic Coast. The remainder of the contiguous U.S. showed a low climate match. Climate 6 proportion indicated that the contiguous U.S. has a medium climate match overall. The range of proportions indicating a medium climate match is 0.005-0.103; the Climate 6 proportion for *C. ornata* was 0.033.

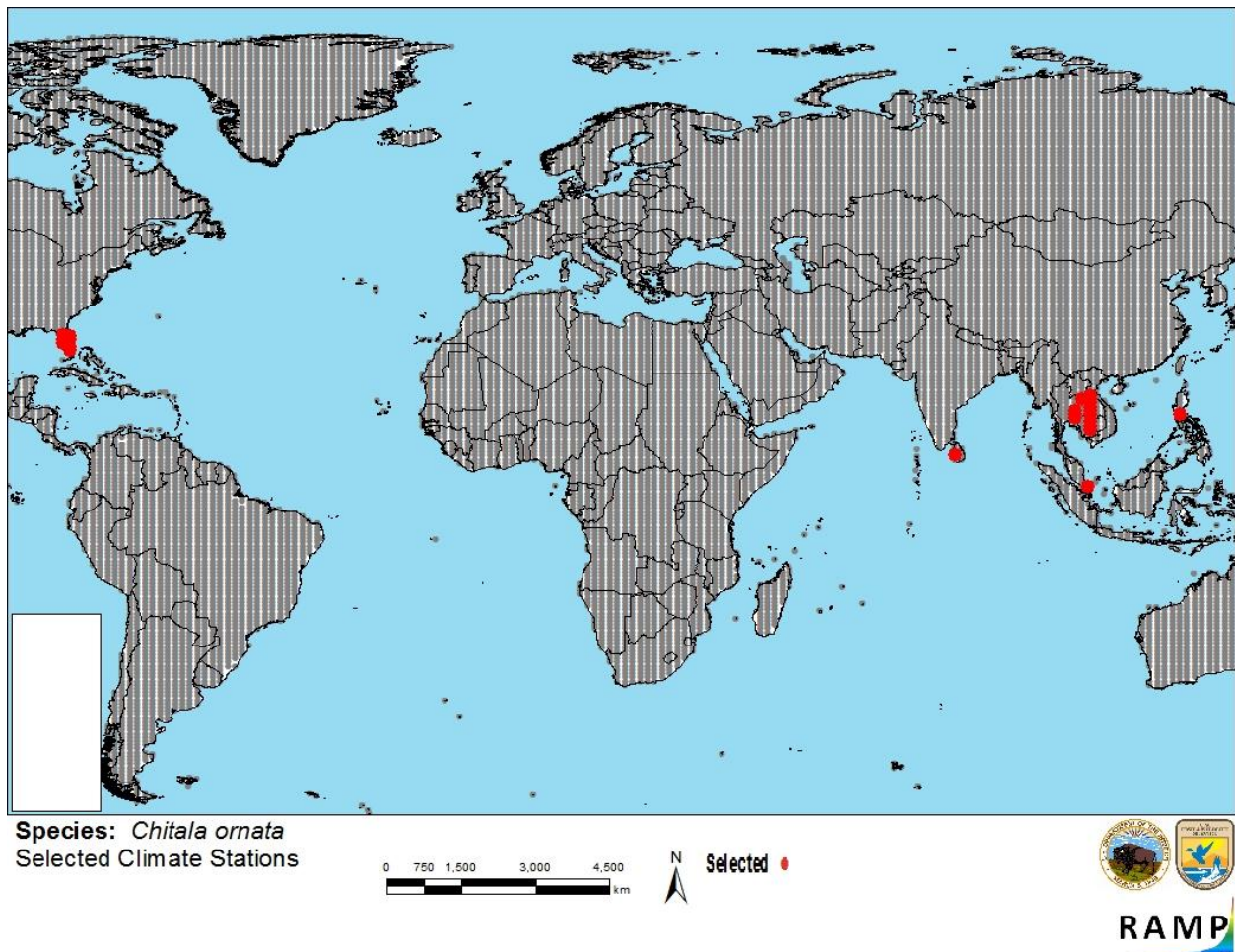


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *C. ornata* climate matching. Source locations from GBIF (2016), with the additions of Singapore (Froese and Pauly 2016), Diyawanna Oya in Sri Lanka (Silva and Kurukulasuriya 2010), and Laguna de Bay in the Philippines (Guerrero et al. 2014; Abarra et al. 2017).

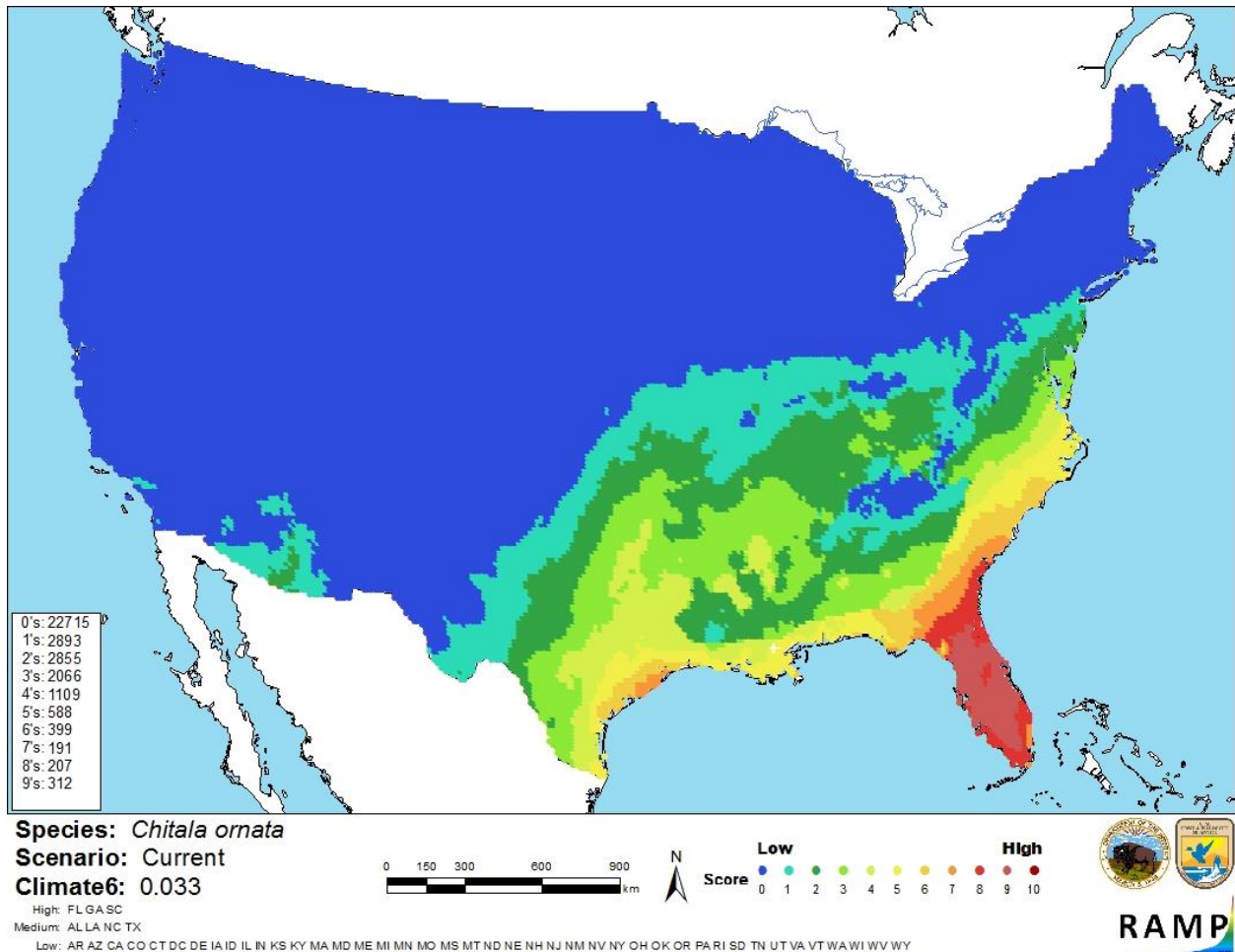


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *C. ornata* in the contiguous United States based on source locations reported by GBIF (2016), Froese and Pauly (2016), Silva and Kurukulasuriya (2010), Guerrero et al. (2014), and Abarra et al. (2017). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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

Ample information is available on the biology, ecology, and distribution of *C. ornata*. Some information is available on impacts of *C. ornata* introduction, but that information is limited in geographic scope relative to the introduced range of the species. Certainty of this assessment is medium.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The piscivorous and invertivorous *Chitala ornata* is native to Southeast Asia. The species has become established in the United States in the state of Florida, probably through aquarium release. The impacts of its establishment in Florida are largely unknown, but introductions in Sri Lanka and the Philippines have negatively affected native fish populations and aquaculture production. Due to the history of invasiveness and medium climate match overall, risk posed to the contiguous U.S. is high. However, the climate matching analysis suggests that much of the contiguous U.S. is a low climate match, making the risk to those low-match locations less definite.

Assessment Elements

- **History of Invasiveness: High**
- **Climate Match: Medium**
- **Certainty of Assessment: Medium**
- **Overall Risk Assessment Category: High**

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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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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