Tambaquí (*Colossoma macropomum*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2012
Revised, October 2016
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1 Native Range and Status in the United States

Native Range

From Nico and Neilson (2016):

"Native to the Amazon and Orinoco river basins of South America (Machado-Allison 1982; Araujo-Lima and Goulding 1997)."

Status in the United States

From Nico and Neilson (2016):

"Possibly established in Puerto Rico. Reported, but failed, in California, Florida, Hawaii, Massachusetts, Nebraska, and Texas."

"A single fish, tentatively identified as *C. nigripinnis*, was taken from the Sacramento River in California, near Elkhorn Ferry above Sacramento in Yolo County, on 10 October 1977 (Brittan and Grossman 1979). Two fish, originally misidentified as 'piranha', were taken by anglers from the San Joaquin River near Fresno. A single fish was collected from Mission Creek, Santa Barbara County, on 2 November 1999 (museum specimen)."

"A single fish was taken from Lake Maggiore in St. Petersburg, Pinellas County, Florida, on 12 January 1983 (museum specimen); one fish (identified as *Colossoma nigripinne*) was collected from Waverly Pond in Tallahassee, Leon County, on 13 October 1968 (Courtenay et al. 1974; Courtenay and Hensley 1979; museum specimen); one fish (270 mm TL) was collected from Diversion Canal C-24, near Fort Pierce, St. Lucie County, on 11 December 1988 (J.D. Williams, personal observation; specimen not retained); two fish were collected from Green Pond on the University of Florida campus in 2001 (Hill and Cichra 2005); a specimen was collected in the Pompano Beach area in Broward County (International Game Fishing Association 2000); two fish were observed in Blue Spring State Park, Volusia County, on 20 April 2004; an angler captured a single fish in Deer Point Lake, Bay County, on 2 August 2010 (Lindsey 2010). A single specimen was caught in a south Miami canal in 1982 (Museum specimen). Because this species is commonly kept as a pond fish in south Florida, it is likely that some specimens have escaped from captivity into natural waters."

"The first report in Hawaii was of a 3.2-kg adult fish taken in Wahiawa Reservoir, a 350-acre, privately owned irrigation reservoir on Oahu, in 1987; several other large adult pacus, possibly members of this same species, have been caught or seen in recent years, but no juveniles have been taken (Devick 1991, 1992). One fish was sighted in Nuuanu #3 Reservoir, Oahu (Devick 1991). Specimens have been collected in a pond on the University of Hawaii at Manoa campus and in Kailua Canal, Oahu (Mundy 2005)."

"Several specimens were collected in Fall River, Kansas in 1999 (museum specimens)."

"A single fish was taken with a hook and line from Triphammer Pond in Hingham, Plymouth County, Massachusetts, on 22 August 1993 (Cardoza et al. 1993; Hartel et al. 1996)."

"A single specimen was collected, and two more observed, from Old Fort Bayou near Ocean Springs, Mississippi, on 20 September 1995 (Ross 2001)."

"A single fish was taken by an angler from the Missouri River in Omaha, Nebraska, on 27 September 1999."

"Several fishes were taken from the Schenectady and Amsterdam region of the Mohawk River, New York, in the early 1990s (T. Preddice, pers. comm.)."

"There are several records of single fish taken from various sites in Texas including Forests Lake near Longview, Gregg County, on 30 July 1988; Eagle Point, a coastal area (with water salinity of about 10 PSU) near Houston, Harris County, in August 1988; and Branch Creek near Port Arthur, Jefferson County, on 25 May 1990 (Howells et al. 1991)."

"One fish was collected in Silver Lake, Washington in 1994 (museum specimen)"

Means of Introduction into the United States

From Nico and Neilson (2016):

"All introductions were probably aquarium releases."

Remarks

From Nico and Neilson (2016):

"Most U.S. records represent collections of single fish taken by anglers. The Massachusetts fish was originally reported to be a red-bellied pacu in a newspaper account and as a *Colossoma* sp. by Cardoza et al. (1993); the fish was later determined to be *C. macropomum* by W. Fink, based on a photograph of the specimen (Hartel, personal communication). Some specimens previously identified as *C. macropomum* and taken in Florida waters may very well represent hybrid forms produced by artificial means using *Colossoma* and *Piaractus* parents (L.G. Nico, personal observations)."

From ITIS (2016):

"Synonym(s): *Colossoma marcopomum* (Cuvier, 1818)
Colossoma nigripinnis (Cope, 1878)
Colossoma oculus (Cope, 1872)
Myletes nigripinnis Cope, 1878
Myletes oculus Cope, 1872
Piaractus nigripinnis (Cope, 1878)
Common Name(s): tambaquí
blackfin pacu [English]
cachama [English]"

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2016):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata

Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Characiformes
Family Characidae
Genus *Colossoma* Eigenmann and Kennedy, 1903
Species *Colossoma macropomum* (Cuvier, 1816)"

"Current Standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2016):

"Max length : 108 cm TL male/unsexed; [IGFA 2001]; common length : 70.0 cm TL male/unsexed; [Frimodt 1995]; max. published weight: 40.0 kg [Machacek 2007]"

Environment

From Froese and Pauly (2016):

"Freshwater; benthopelagic; pH range: 5.0 - 7.8; dH range: ? - 20; potamodromous [Riede 2004]; depth range 5 - ? m."

"[…] 22°C - 28°C [Riehl and Baensch 1991; assumed to represent recommended aquarium temperatures]"

Climate/Range

From Froese and Pauly (2016):

"Tropical […] 15°S - 35°S"

Distribution Outside the United States

Native

From Nico and Neilson (2016):

"Native to the Amazon and Orinoco river basins of South America (Machado-Allison 1982; Araujo-Lima and Goulding 1997)."

Introduced

Froese and Pauly (2016) report *C. macropomum* as introduced and established or probably established in Thailand (unknown year), Magdalena River (Colombia; unknown year), Philippines (1980-1989), Dominican Republic (1981), and Guyana (2002).

Froese and Pauly (2016) report *C. macropomum* as introduced with unknown establishment status in Jamaica (unknown year), Panama (1980), Cuba (1982), Honduras (1983), Taiwan (1986), Guatemala (1989), Hungary (1991), and China (1998).

Froese and Pauly (2016) report *C. macropomum* as introduced but not established in Bangladesh (unknown year), Costa Rica (1984), and Indonesia (1986).

From Froese and Pauly (2016):

"[…] pisciculture form largely distributed in South America."

Means of Introduction Outside the United States

From Froese and Pauly (2016):

"aquaculture"
"ornamental"

Short Description

From Goulding and Carvalho (1982):

"*Colossoma macropomum* is the second largest scaled fish (after *Arapaima gigas*, Osteoglossidae) in the Amazon Basin […] The fish possesses the unique combination of molariform-like teeth adapted for crushing hard nuts and numerous elongated gillrakers that are employed to capture zooplankton […]. Also noteworthy are its elongated opercula that support large fleshy flaps. The enlarged opercular appendages help increase water flow (with zooplankton) through the gills.

"Young to pre-adult *C. macropomum* are ovoidal to rhomboidal shaped fishes, but during ontogeny into adults gradually become more elongated."

"*Colossoma macropomum* displays distinct countershading, and is black dorsally and yellow to olive-green ventrally. The intensity of the hues is influenced by water transparency and color. In the blackwater, humic acid stained rivers, such as the Rio Negro, the fish is very dark, whereas in turbid water, such as the Rio Amazonas, it is much lighter in coloration and becomes almost a light golden-yellow ventrally."

Biology

From Goulding and Carvalho (1982):

"*Colossoma macropomum* is one of about thirty or more species of Amazonian characins that migrate in the rivers in large schools."

"When water level begins to rise rapidly, large schools of *C. macropomum* are encountered moving upstream in the whitewater rivers, and at this time gonads are fully developed […] The exact spawning habitat of *C. macropomum* is still unknown, though it appears to be along the grassy levees that are being inundated with rising water. […] Subsequent to spawning, *C. macropomum* schools break up and the fishes begin entering floodplain forests of the blackwater, clearwater and whitewater rivers where they feed. Depending on floodplain morphology and water level, the fishes remain in flooded forest from four to seven months. When water level drops and the flooded forests are drained, most of the adult biomass of *C. macropomum* flees to the river channels, while much lesser quantities move into floodplain lakes. Populations that feed in the blackwater and clearwater river systems during the annual inundations migrate down these tributaries at the beginning of the low water period and subsequently enter whitewater rivers where they seek out woody shore areas. Likewise, populations that retreat from the floodplains of whitewater rivers also ensconce themselves in woody shore areas. Adult *C. macropomum* remain in these woody shore habitats until the commencement of the new floods, at which time they migrate upstream and spawn. The cycle is renewed when the spawned fishes migrate into the flooded forests to feed."

"Our surveys of blackwater and clearwater tributaries revealed that immature *C. macropomum* are confined to the floodplains of whitewater rivers, though the exact number of years that the young reside in these nursery habitats before migrating is uncertain […] The smallest individuals that have been found with developed gonads were 56 cm (female, Rio Madeira) and 56 cm (female, Rio Solimões). It is still unclear whether young adults make their first migrations at the time of spawning or during the low water period."

"*Colossoma macropomum* adults are widely distributed in the Amazon Basin, though rare or absent in the upper reaches of the larger blackwater and clearwater rivers. Judging from the rightbank tributaries of the Rio Madeira and the Rio Negro system, the species is only abundant in the clearwater and blackwater rivers within a distance of about 150 km from the whitewater rivers: beyond this, it is rare or disappears."

"Of the 138 specimens (13-51 cm SL) examined from the high water period […] Fruits and seeds from trees or shrubs accounted for about 44 percent of the total bulk consumed by all of the specimens, followed by zooplankton with 30 percent and wild rice representing 22 percent. […] Of the 125 specimens examined from the low water period (September through February) […] Zooplankton accounted for 70 percent of the total bulk consumed, while not one of the other nine items eaten represented more than 10 percent."

Human Uses

From Froese and Pauly (2016):

"Fisheries: minor commercial; aquaculture: commercial; aquarium: public aquariums"

"Used in aquaculture because it can live in mineral poor waters and is very resistant to diseases. Marketed fresh and frozen [Frimodt 1995]."

From Nico and Neilson (2016):

"Pacus are popular as aquarium fish. They are esteemed as food fish in South America, with large fisheries based around seasonal spawning movements and aggregations (Goulding and Carvalho 1982). Most U.S. records represent collections of single fish taken by anglers."

Diseases

From Froese and Pauly (2016):

"*Rhabdochona* Infestation 4, Parasitic infestations (protozoa, worms, etc.)
Chabaudinema Infestation, Parasitic infestations (protozoa, worms, etc.)
Cucullanus Infestation 7, Parasitic infestations (protozoa, worms, etc.)"

From Pereira et al. (2012):

"Fungi of the *Branchiomyces* genus (*B. demigrans* and *B. sanguinis*) are the aetiological agents of branchiomycosis, an acute respiratory disease that has been described in several fish species worldwide (Khoo 2000). Overpopulation, increased temperature (above 20°C), increased concentrations of non-ionized ammonia and the presence of algae in the aquatic environment create favourable conditions for the outbreaks of this disease (Paperna & Smirnova 1997; Hawke & Khoo 2004). [...] In this study, we concluded that the fungus *Branchiomyces* sp. is strongly associated with a gill lesion condition whose histopathology is characterized by severe circulatory alterations produced by the fungus. […] our results provide the first report of a *Branchiomyces* sp. infection in C. *macropomum* from the Brazilian Amazon."

From Molnár and Békési (1993):

"*Myxobolus colossomatis* n. s (*Myxosporea*) is described from a pond-cultured Amazon River fish (*Colossoma macropomum*). The parasite cysts developed in the connective tissue of the fins, gills, heart, liver and serous membranes around the intestine."

Threat to Humans

From Froese and Pauly (2016):

"Traumatogenic"

3 Impacts of Introductions

From Nico and Neilson (2016):

"Impact of Introduction: Unknown."

4 Global Distribution

Figure 1. Known global distribution of *Colossoma macropomum.* Map from GBIF (2016). Locations in the United States, Argentina, and Europe (not shown) were excluded from climate matching because they do not represent established populations.

5 Distribution Within the United States

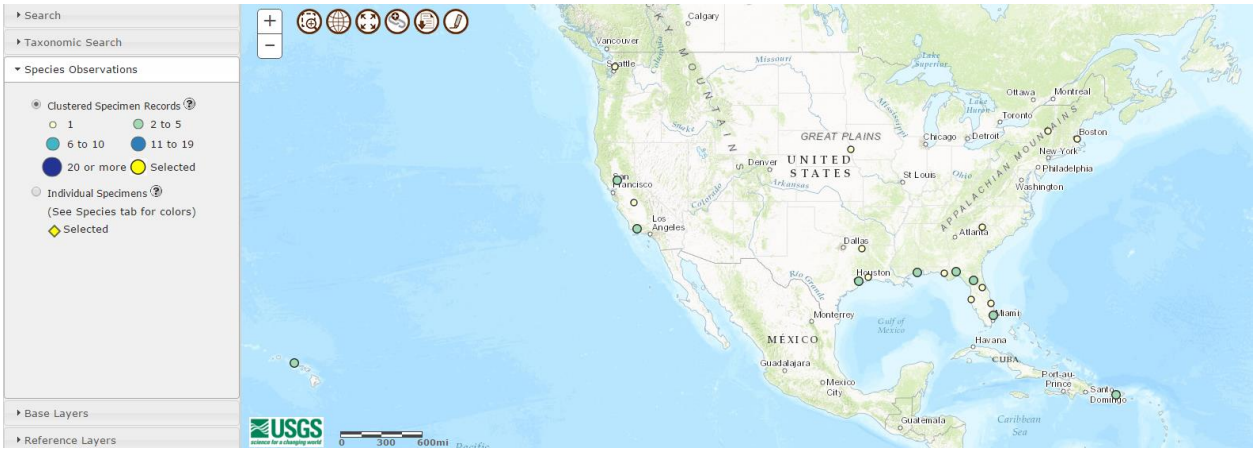

Figure 2. Known U.S. distribution of *Colossoma macropomum*. Map from Nico and Neilson (2016). No locations in the continental U.S. or Hawaii represent established populations (Nico and Neilson 2016).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was low for nearly the entire continental U.S. Climate match was medium right along the Gulf of Mexico coastline and in northern Florida; climate match was high in southern Florida. Climate6 score indicated that the continental U.S. had a medium climate match. The range of scores indicating a medium climate match is 0.005 – 0.103; Climate6 score of *Colossoma macropomum* was 0.009.

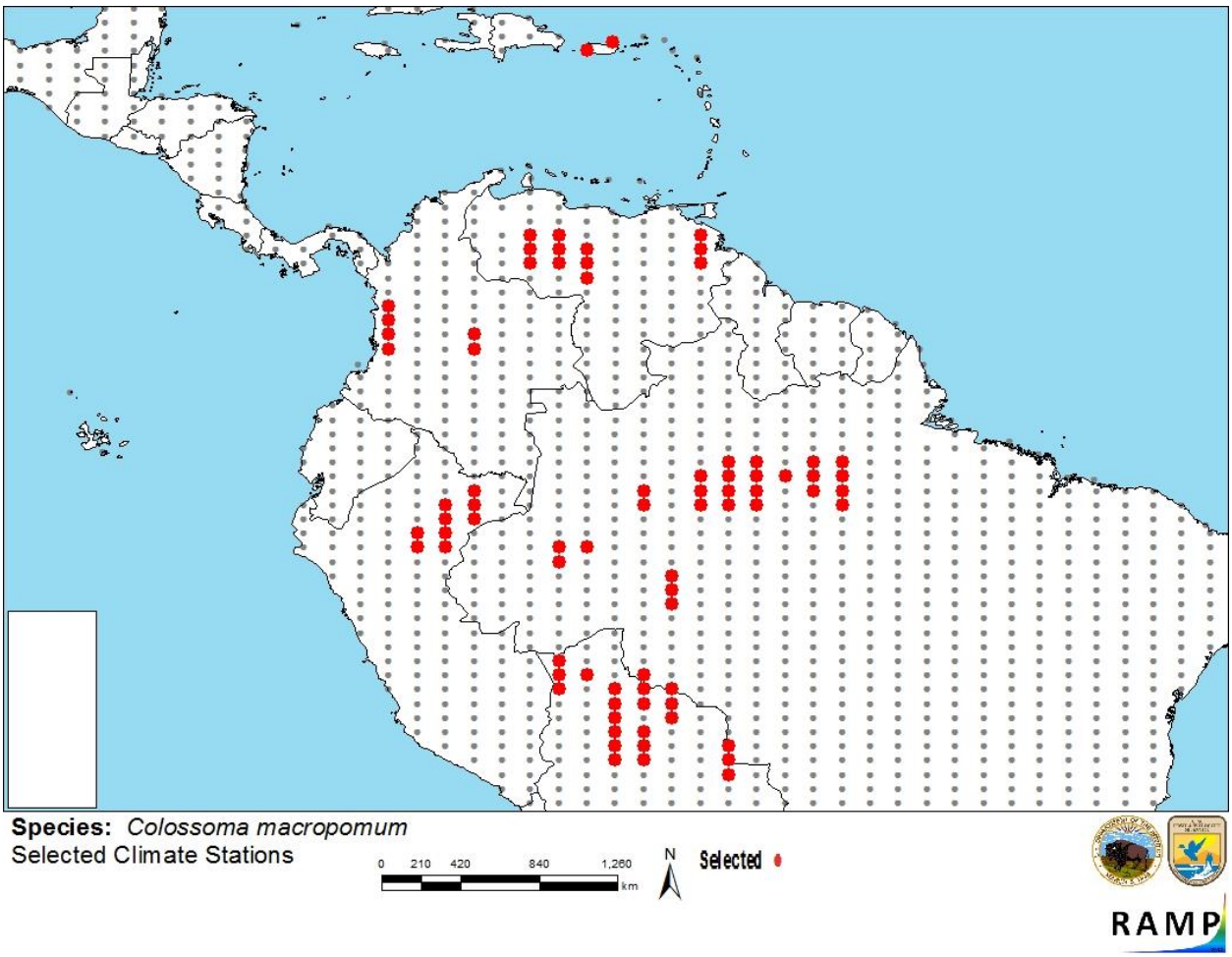

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations in northern South America and the Caribbean selected as source locations (red) and non-source locations (gray) for *Colossoma macropomum* climate matching. Source locations from GBIF (2016) and Nico and Neilson (2016).

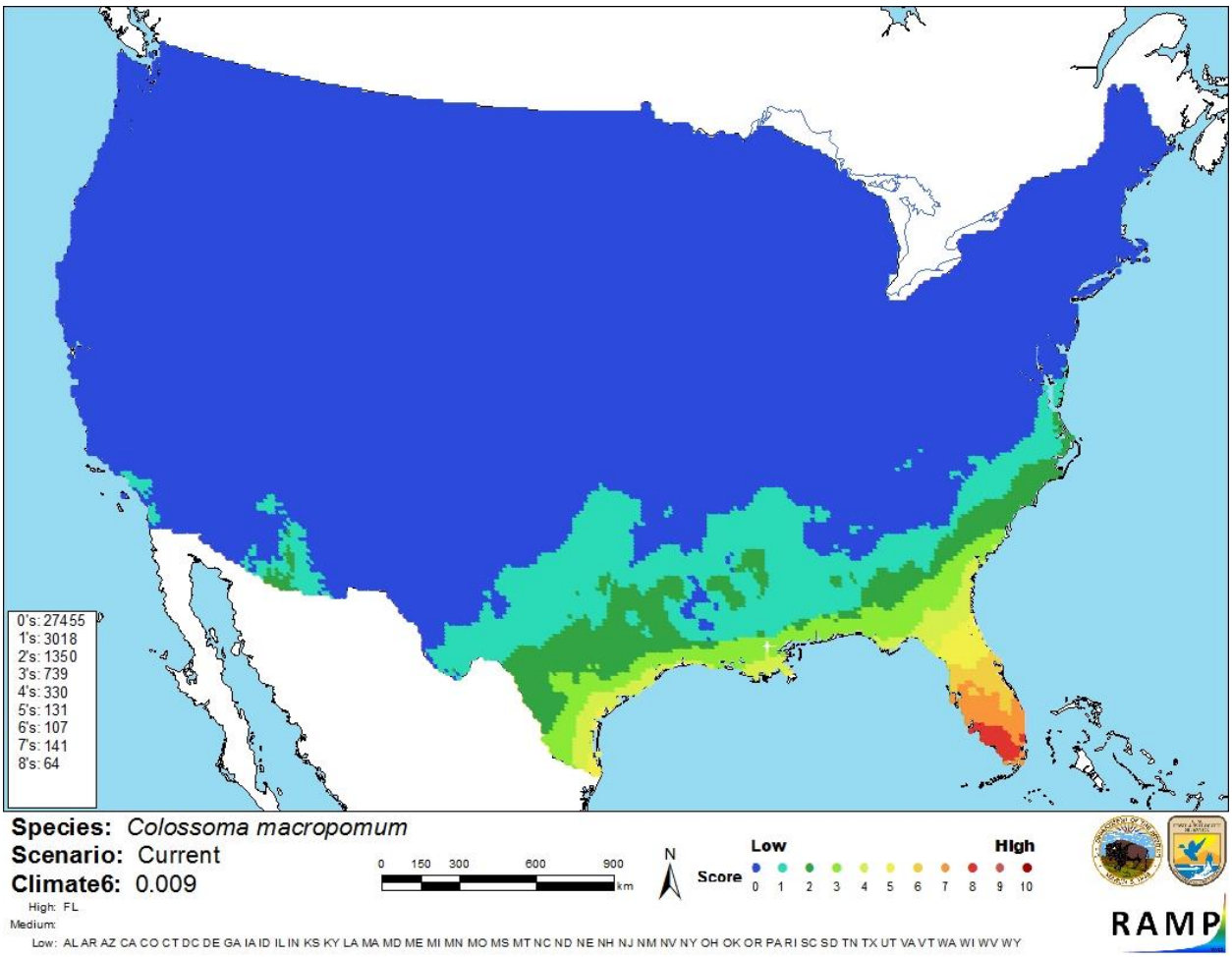

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Colossoma macropomum* in the contiguous United States based on source locations reported by GBIF (2016) and Nico and Neilson (2016). 0=Lowest match, 10=Highest match. Climate match scores are tabulated on the left.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

Information is readily available on the biology of *C. macropomum*. Information on the global distribution of established populations is sparse, and there have been no peer-reviewed studies of the potential impacts of *C. macropomum* where it has been introduced. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Continental United States

C. macropomum is native to the Amazon and Orinoco river basins in South America, but has been translocated to other locations in the Americas, Asia, and Europe for aquaculture and ornamental purposes. Although several individuals have been collected in the continental U.S., no established populations are known. No specific impacts of *C. macropomum* introduction have been reported; the species may cause injury to humans because of its large size. Climate match to the Continental U.S. is medium, with highest match in southern Florida. Overall risk posed by *C. macropomum* is unknown.

Assessment Elements

- **History of Invasiveness: None Documented**
- **Climate Match: Medium**
- **Certainty of Assessment: Low**
- **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

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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