

Polyodon spathula, Paddlefish

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Acipenseriformes	Polyodontidae

Scientific Name: *Polyodon spathula* (Walbaum, 1792)

Infra-specific Taxa Assessed:

- *Polyodon spathula* Mississippi-Ohio-Missouri River subpopulation
- *Polyodon spathula* Mobile Basin subpopulation
- *Polyodon spathula* Pearl and Pascagoula Rivers subpopulation
- *Polyodon spathula* Texas Gulf subpopulation

Common Name(s):

- English: Paddlefish, Duckbill Cat, Spadefish, Spoonbill Cat
- French: Poisson Spatule

Taxonomic Source(s):

Fricke, R., Eschmeyer, W.N. and Van der Laan, R. (eds). 2022. Eschmeyer's Catalog of Fishes: genera, species, references. Updated 02 May 2022. California Academy of Sciences. Available at: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>.

Assessment Information

Red List Category & Criteria: Vulnerable A2cd [ver 3.1](#)

Year Published: 2022

Date Assessed: September 14, 2019

Justification:

Population size (measured as number of mature individuals) for the Paddlefish (*Polyodon spathula*) exceeds 10,000. Its area of occupancy (AOO) is very large and substantial subpopulation mixing may occur due to large scale movements of adult Paddlefish. The species is assessed as Vulnerable (VU) due to the past reduction in population size and the persistence of the threats that caused this reduction.

Tagging results of the five-year MICRA Paddlefish project and harvest reports from states with sport and commercial fisheries indicate that range-wide Paddlefish populations can currently sustain harvests.

The species was assessed as Vulnerable in 2004 and continues to be Vulnerable due to past reduction in population size; this is a refinement of the Red List assessment based on reduction over the past three generations (40–67 years for this species). Although Paddlefish are widespread and several subpopulations could be considered relatively abundant, the Vulnerable classification is recommended to recognise that, range-wide, Paddlefish still may face potential population decline due to expected increased legal and illegal harvest for caviar production and competition with increasing populations of exotic Asian Carp species for food and habitat.

Previously Published Red List Assessments

2019 – Vulnerable (VU)

<https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T17938A174780447.en>

2004 – Vulnerable (VU)

<https://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T17938A7638243.en>

1996 – Vulnerable (VU)

1994 – Vulnerable (V)

1990 – Vulnerable (V)

1988 – Indeterminate (I)

1986 – Indeterminate (I)

Geographic Range

Range Description:

This species occurs in the Mississippi River basin from southwestern New York to central Montana and south to Louisiana; Gulf Slope drainages from Mobile Basin, Alabama (primarily below the Fall Line; Mettee *et al.* 1996), to Galveston Bay, Texas (Page and Burr 1991). The historical range included occurrences in Canada in Lake Huron and Lake Helen and in 26–27 states in the United States (Parker 1988, Graham 1997).

It is extirpated in Canada: there have been no Canadian records since the early 1900s (Parker 1988). However, Canada never was a significant part of the distribution (highly peripheral). For a more detailed description of this species' range, see the NatureServe's Explorer database.

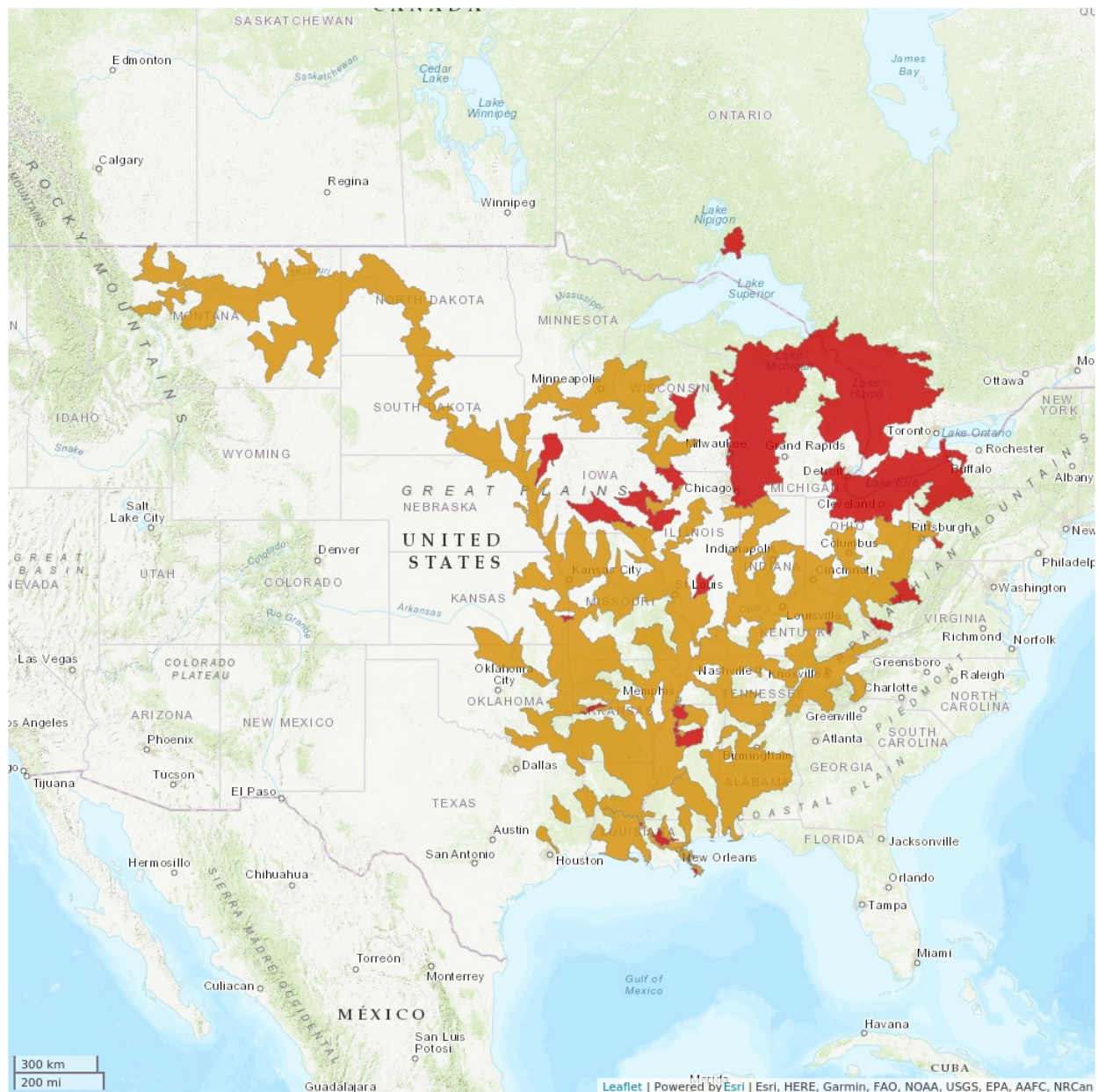
Country Occurrence:

Native, Extant (resident): United States (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Montana, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, Virginia, West Virginia, Wisconsin)

Native, Possibly Extinct: United States (North Carolina, Pennsylvania)

Native, Extinct: Canada (Ontario); United States (Michigan, New York)

Distribution Map

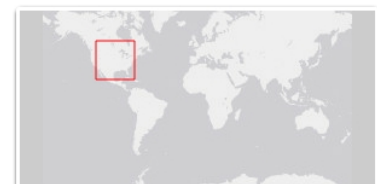


Legend

- EXTANT (RESIDENT)
- EXTINCT

Compiled by:

IUCN SSC Sturgeon Specialist Group 2021



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

In 1992, the U.S. Fish and Wildlife Service (USFWS) announced a 12-month Ruling in the Federal Register declaring that the listing of Paddlefish as Threatened was not warranted in response to a petition to list this species as threatened or endangered under the U.S. Endangered Species Act (ESA). The assessment found that historical and current scientific information, including fundamental information about population size and structure, growth rate, and fisheries harvest, was almost completely lacking. Interviews with fisheries biologists indicated that while Paddlefish were declining in some areas, in other areas they were expanding and occupying habitat from which they'd been formerly extirpated. While some state agencies listed the Paddlefish as a species of concern others licensed commercial and sport anglers.

The Mississippi Interstate Cooperative Resource Association (MICRA) was established in 1991 to address the full spectrum of fisheries management issues in the Mississippi River Basin. MICRA launched a basin-wide, multi-year, coded wire tagging Paddlefish study in the spring of 1995 to help address issues of Paddlefish population size and large-scale movements. Twenty-two Mississippi River Basin states actively participate in the Paddlefish project by: 1) hatchery-raising and tagging more than 1.3 million Paddlefish for release into Basin waters since 1988; 2) collecting and tagging 11,281 wild adult Paddlefish in 19,178 hours of sampling in Basin waters since 1995; and 3) collecting tag return and creel information in those states which allow sport and/or commercial harvests.

Number of mature individuals in this range-wide population number considerably more than 10,000. The area of occupancy is very large. Substantial subpopulation mixing may occur due to large-scale movements of adult Paddlefish.

Ten states classified Paddlefish as stable (Arkansas, Indiana, Kansas, Kentucky, Missouri, Mississippi, Nebraska, Ohio, South Dakota, Wisconsin); three as stable/increasing (Illinois, Minnesota, North Dakota); two as increasing (Oklahoma, West Virginia); and one (Iowa) as stable/unknown. One state listed them as declining (Tennessee) and one as stable/declining (Montana). However, in two states (Pennsylvania, New York) Paddlefish were extirpated but are now increasing due to stocking efforts. Texas and Virginia listed the status as unknown (Bettoli *et al.* 2009).

Paddlefish status may be linked to stocking, which occurs in 10 states (Grady and Elkington 2009). From 1988 to 2009, over 1.5 million Paddlefish have been stocked in the Mississippi, Missouri, and Ohio River basins (Pracheil *et al.* 2012).

Current Population Trend: Unknown

Habitat and Ecology (see Appendix for additional information)

This species inhabits slow-flowing water of large and medium-sized rivers, river-margin lakes, channels, oxbows, backwaters, impoundments with access to spawning areas. Paddlefish native habitats included larger, free flowing rivers where they often use backwater and oxbows for feeding and nursery habitats, and can migrate hundreds of km to access spawning grounds. Although specific spawning sites are often unknown, paddlefish prefer gravel substrates over flowing water. Paddlefish have thrived in impounded systems where suitable spawning habitat is presented, which is often below dams in tailwater sections. In addition, many reservoir Paddlefish populations are supplemented by stocking. In the Mississippi River drainage, Paddlefish reach sexual maturity by age 4–9 for males, and age 6–13 for females. However, Paddlefish in Montana mature as late as age 14. Male Paddlefish may be able to spawn every year, but females may spawn every 2–5 years, thus making them susceptible to declines due to harvest or sexually mature individuals or disruptions in their suitable spawning triggers, or

habitat modifications.

Across its global distribution, Paddlefish has generation lengths within the range 13.3–22.4 years; three generations for the species is somewhere between 40 and 67 years..

Systems: Freshwater (=Inland waters)

Use and Trade

Paddlefish are classified as a sport fish in seven states and as a commercial fish in 14 states as of 2006 (Bettoli *et al.* 2009). There is a small scale commercial fishery for meat and caviar and some recreational fishery in part of the range..

Threats (see Appendix for additional information)

The primary threat to Paddlefish populations in the Mississippi River basin is river modification that has reduced backwater and oxbow habitat that is used as feedings and nursery areas, and also has blocked Paddlefish from suitable spawning grounds, or altered flows in rivers that trigger Paddlefish spawning movements (Gerken and Paukert 2009). Although Paddlefish have thrived in the reservoir environments created by some dams, Paddlefish still need flowing rivers upstream of dams for spawning. In reservoir systems where spawning habitat is limited or non-existent, Paddlefish are often supplemented through stocking.

Other factors that threaten Paddlefish are overharvest. Most large sport fisheries have sustainable harvest because of intensive management (Hansen and Paukert 2009). Commercial harvest is primarily in the southeast US (Arkansas, Kentucky, and Tennessee) and there is still concern about illegal harvest when the demand for caviar increases. Paddlefish are susceptible to overharvesting because they congregate in spring just before and during their spawning runs and are easily captured by sampling gears such as gill nets. Recovery of overfished populations may take decades because Paddlefish reach maturity at older ages and may not spawn every year.

Waterway contamination and pollution is often linked as a threat to Paddlefish because sedimentation generally increases turbidity in rivers and reduces survival of embryos and fill in gravel deposits used for spawning. Near urbanized areas in the Ohio River, contaminants (PCBs and chlordane) have been found in Paddlefish roe and flesh and has led to consumption advisories. Increased PCBs may also be reducing Paddlefish health (Gunderson *et al.* 2000).

Invasive aquatic species pose a relatively new and yet to be fully understood threat to Paddlefish. Asian carp have been established throughout much of the Lower Missouri and Mississippi river basins and their tributaries and have been reported in the Mobile basin and in Gulf Coast rivers of Texas and Louisiana. Schrank *et al.* (2003) found reduced growth of juvenile Paddlefish when Bighead Carp were present, suggesting that invasive species may have direct effects through competitive interactions. Other factors such as disease and parasites are less understood as they relate to Paddlefish, but research on their effects of other species suggests this might be a threat to Paddlefish (Pegg *et al.* 2009). Invasive species may alter the food webs in rivers and reservoirs and thus decouple paddlefish from their primary prey (zooplankton). Both Asian Carp and Zebra Mussels shifted the size structure or species of zooplankton, and Zebra Mussel establishment has been linked to reduction of up to 70% of zooplankton in Lake Erie (MacIsaac *et al.* 1995).

Conservation Actions (see Appendix for additional information)

Control of sport and commercial harvest through state and federal regulations have substantially diminished the negative impacts of harvest on Paddlefish populations. In addition, stocking to supplement populations where recruitment is limited occurs in areas where there are sport fisheries for Paddlefish. However, reintroduction programs in New York and Pennsylvania are also used to re-establish Paddlefish populations (Budnik *et al.* 2014). Other conservation measures that are currently being considered involve increasing fish passage in the large rivers. In particular, providing passage at Intake Dam on the Lower Yellowstone River, Montana, and Prairie de Sac Dam on the Wisconsin River is being considered.

In states with sport fisheries, Paddlefish are managed by seasons and bag limits to ensure sustained harvests (MICRA 1993). Fourteen states currently have Paddlefish sport fisheries. Six of these are supplemented by stocking programs (Graham 1997). The management authority for this species is the individual state fish and game agency responsible for waters within their jurisdiction. This species still supports commercial fisheries in Illinois, Indiana, Kentucky, and Tennessee where authorities believe the harvest is well managed and sustainable. However, there are individual subpopulations that have been overexploited. This species is listed on CITES Appendix II.

Credits

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External Resources

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Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
5. Wetlands (inland) -> 5.1. Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)	-	Suitable	-
15. Artificial/Aquatic & Marine -> 15.3. Artificial/Aquatic - Aquaculture Ponds	-	Marginal	-

Use and Trade

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

End Use	Local	National	International
1. Food - human	Yes	Yes	No
15. Sport hunting/specimen collecting	Yes	Yes	No

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.4. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.4. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Negligible declines	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

2. Agriculture & aquaculture -> 2.4. Marine & freshwater aquaculture -> 2.4.3. Scale Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
3. Energy production & mining -> 3.1. Oil & gas drilling	Ongoing	Minority (50%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
3. Energy production & mining -> 3.2. Mining & quarrying	Ongoing	Minority (50%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
4. Transportation & service corridors -> 4.3. Shipping lanes	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.6. Motivation Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.9. Small dams	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.3. Indirect species effects		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.10. Large dams	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.3. Indirect species effects		
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.11. Dams (size unknown)	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.1. Unspecified species	Ongoing	-	-	Low impact: 3

	Stresses:	2. Species Stresses -> 2.3. Indirect species effects		
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.1. Sewage	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.3. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.1. Oil spills	Past, unlikely to return	Minority (50%)	Negligible declines	Past impact
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.2. Seepage from mining	Past, likely to return	Minority (50%)	Negligible declines	Past impact
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.3. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.2. Soil erosion, sedimentation	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.4. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.4. Garbage & solid waste	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
9. Pollution -> 9.6. Excess energy -> 9.6.2. Thermal pollution	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Future	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.2. Droughts	Future	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.3. Temperature extremes	Future	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.4. Storms & flooding	Future	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: No
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: Unknown
Percentage of population protected by PAs: 0
Area based regional management plan: No
Occurs in at least one protected area: No
In-place species management
Harvest management plan: Yes
Successfully reintroduced or introduced benignly: Yes
Subject to ex-situ conservation: Yes
In-place education
Subject to recent education and awareness programmes: Unknown
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action Needed
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.2. Invasive/problematic species control
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
3. Species management -> 3.1. Species management -> 3.1.2. Trade management
3. Species management -> 3.2. Species recovery
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation
3. Species management -> 3.4. Ex-situ conservation -> 3.4.2. Genome resource bank
4. Education & awareness -> 4.1. Formal education
4. Education & awareness -> 4.2. Training

Conservation Action Needed
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level
6. Livelihood, economic & other incentives -> 6.2. Substitution

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.4. Harvest, use & livelihoods
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.3. Harvest & Trade Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends
3. Monitoring -> 3.3. Trade trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 20000
Continuing decline in area of occupancy (AOO): No
Extreme fluctuations in area of occupancy (AOO): No
Continuing decline in number of locations: Unknown
Lower elevation limit (m): 0
Upper elevation limit (m): 60
Lower depth limit (m): 20
Upper depth limit (m): 0
Population
Extreme fluctuations: No

Population
Population severely fragmented: Yes
Habitats and Ecology
Generation Length (years): 11.4-29.2,13.3-22.4

The IUCN Red List Partnership



The IUCN Red List of Threatened Species™ is produced and managed by the [IUCN Global Species Programme](#), the [IUCN Species Survival Commission \(SSC\)](#) and [The IUCN Red List Partnership](#).

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