

**Yellow-blotched Map Turtle
(*Graptemys flavimaculata*)**

**5-Year Review:
Summary and Evaluation**



Yellow-blotched map turtles; adult female on the left and adult male on the right. Photo: © Will Selman

**U.S. Fish and Wildlife Service
Southeast Region
Mississippi Ecological Services Field Office
Jackson, Mississippi**

March 2022

5-YEAR REVIEW

Yellow-blotched Map Turtle (*Graptemys flavimaculata*)

GENERAL INFORMATION

Current classification: Threatened

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Reviewers:

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Date of original listing: January 14, 1991 ([56 FR 1459](#))

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants ([50 CFR 424.11](#)). The U.S. Fish and Wildlife Service (Service) evaluated the biology, habitat, and threats of the yellow-blotched map turtle to inform this status review. We announced initiation of this review and a request for information in a published *Federal Register* notice on May 13, 2022 ([87 FR 29364](#)) with a 60-day comment period and received one public comment with information of applied Best Management Practices in the silviculture industry. The primary sources of information used in this analysis were the 1991 final rule listing this species as Threatened ([56 FR 1459](#)), 1993 Recovery Plan (Service 1993), 2018 5-year Status Review (Service 2018), peer-reviewed scientific publications, unpublished survey data and reports, and solicited information from knowledgeable individuals, including those associated with academia and State conservation programs. This review was completed by the Service, Mississippi Ecological Services Field Office (MSFO), Jackson, Mississippi. All literature and documents used for this review are on file at the MSFO. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on the yellow-blotched map turtle.

FR Notice citation announcing the species is under active review: May 13, 2022 ([87 FR 29364](#))

Species' Recovery Priority Number at start of 5-year review ([48 FR 43098](#)): 14. The yellow-blotched map turtle is a species with a low degree of threat and high recovery potential.

Review history:

April 25, 2018 – The 2018 5-year review for the yellow-blotched map turtle included much of the known information on the species from the time of listing until 2018. There was no change in listing status, although the species status was considered “unknown” because of difficulty in comparing surveys that used different techniques.

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service, the Society for the Study of Amphibians and Reptiles (SSAR; Crother 2017), and the Turtle Taxonomy Working Group (TTWG 2021).

Distinct Population Segment (DPS) ([61 FR 4722](#))

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This species was not listed as a DPS, and we have no new information that would indicate the species should be listed as a DPS under the Service's 1996 DPS Policy.

Recovery Criteria

Recovery Plan or Outline

Recovery Plan for the yellow-blotched map turtle (*Graptemys flavimaculata*), 15 March 1993.

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act ([84 FR 45020](#)).

“The criteria for delisting are:

- (1) Evidence of a stable or increasing population in the Leaf, Chickasawhay, and Pascagoula Rivers for a period of at least 15 years. A stable population is defined as one having the reproductive capability to sustain itself without immigration of individuals from other populations. Minimum density estimates from basking counts should average 44 *Graptemys flavimaculata* [yellow-blotched map turtles] per river kilometer in the Pascagoula River, and at least 22 per river kilometer in the Leaf and Chickasawhay Rivers over the 15-year period. These figures are based on estimates from basking counts conducted by Stewart (1989) in the lower Pascagoula River.
- (2) Protection of yellow-blotched map turtle habitat on the entire Pascagoula River and on the lower 129 kilometers (80 miles) of both the Leaf and the Chickasawhay Rivers. The areas to be protected begin, on the Leaf River, at the U.S. 84 bridge in Covington County, and on the Chickasawhay River, in the vicinity of Quitman, Clarke County. Protection is defined as having sufficient control over the watersheds that adverse environmental impacts are unlikely to occur.”

Criterion 1 does not reflect the best available scientific information on the biology of the species. Revision of the minimum basking density requirements under Criterion 1 are necessary to determine the appropriate recovery criterion that reflects total population densities. This revision needs to reduce the minimum basking density estimate of 22 individuals per river kilometer (rkm) for the Chickasawhay River and a portion of the upper Leaf River, while

maintaining the original criterion of 44 basking individuals/rkm for the Pascagoula River. The Leaf and Chickasawhay rivers are geologically and hydrologically different river systems (Mossa and Coley 2004; Ayers 2014), and the assumption that population densities of yellow-blotched map turtles are similar in these rivers is inaccurate.

The middle and lower Leaf River has habitats more representative of the mainstem Pascagoula River (i.e., large meander sections with associated sandbars, abundant emergent deadwood), where the highest densities of yellow-blotched map turtles are found (~543 turtles/rkm; 97 basking turtles/rkm; Brown et al. 2016). However, only the lower Chickasawhay River has similar habitat; the middle to upper Chickasawhay River fluctuates rapidly in water level due to an incised and restricted channel, leading to swifter river flows, higher canopy cover, and fewer sandbars (Selman and Qualls 2009). Several basking surveys conducted over the last several decades have repeatedly reported low yellow-blotched map turtle numbers in the middle to upper Chickasawhay River (0 to 6.4 basking turtles/rkm; Lindeman 1998; Selman and Qualls 2009; Brown et al. 2016), while the lower Chickasawhay River can have similar basking densities (~44 rkm upstream of Pascagoula River confluence; 24.9 basking turtles/rkm) to the middle Leaf River (~121 rkm upstream of Pascagoula River confluence; 23.7 basking turtles/rkm; Selman and Qualls 2009). These differences are likely influenced by changes in preferred habitat along the continuum of the Chickasawhay River and upper Leaf River, and Selman and Qualls (2009, p. 180) directly addressed this issue: “The other survey reaches within the upper Leaf and Chickasawhay rivers that did not meet recovery requirements [22 basking individuals/rkm] will likely never meet these requirements due to smaller river channels and patchiness of optimal habitat for this species.”

As noted above, a portion of Criterion 1 has not been met due to the need for more specific recovery standards that reflect geologic and hydrologic differences between river systems within the range of the species. The yellow-blotched map turtle Recovery Plan suggested that specific study populations be designated and monitored using a standard protocol for basking surveys across 18 monitoring stations. At least six yellow-blotched map turtle surveys have occurred since the species was listed. However, because of differences in techniques and localities of specific study sites, the data are difficult to compare. Brown et al. (2016) repeated mark-resight surveys conducted by Selman and Qualls (2009) at one site each on the Leaf River, Chickasawhay River, and Pascagoula River. Currently, these surveys are the only two directly comparable surveys conducted on the species. Additional mark-resight surveys need to be conducted at these three locations, along with an additional (at minimum) five sites throughout the Leaf, Chickasawhay, Pascagoula, and Escatawpa rivers. Additional surveys within the Escatawpa River could provide necessary information to determine appropriate basking density criterion for the genetically and morphologically different population that resides there. Currently, the species' status is uncertain, as no additional studies have been conducted since the previous 5-year review.

Criterion 2 has been partially met. Currently, at least one shoreline of the entire Pascagoula River and its associated bayous (155.5 river km [96.6 river mi]), 126 rkm (78.3 rmi) of Big Black, Black, and Red creeks, 11.8 rkm (7.3 rmi) of the Escatawpa River, 6.8 rkm (4.2 rmi) of the lower Leaf River, and 5.8 rkm (3.6 rmi) of the lower Chickasawhay River have some form of protection by Federal (e.g., National Wildlife Refuges, National Forests, Wild and Scenic Rivers), State (Wildlife Management Areas [WMAs], Coastal Reserves), and/or non-governmental conservation organization (The Nature Conservancy) ownership or designation.

Ward Bayou WMA has a management plan for the yellow-blotched map turtle, which originally prohibited recreational use of four of its six nesting sandbars; however, limited law enforcement and inconspicuous signage has resulted in heavy recreational use. This has led to direct (catching and killing of adult females) and indirect (disturbing nests or nesting females, increasing predator presence via discarded food) impacts to the yellow-blotched map turtle (T. Brooks pers. comm. 2022).

Less than 10 rkm (6 rmi) of the Leaf and Chickasawhay rivers, combined, have been protected. There are two city parks bordering approximately 1.5 rkm (0.93 rmi) of the Leaf River at Hattiesburg, providing some minor land protection, and one Nature Conservancy property (~5.8 rkm [3.6 rmi]) on the lower Chickasawhay River. Albeit not immediately adjacent to the Leaf River, DeSoto National Forest protects several minor tributaries of the Leaf and Pascagoula rivers, as well as two major tributaries: Black and Red creeks. Land conservation should be prioritized along the lower Escatawpa River (a tributary of the Pascagoula River) to protect the genetically and morphologically distinct population that resides there. The feasibility of protecting vast stretches of the Leaf and Chickasawhay rivers is low due to encroachment of cities (e.g., Hattiesburg and Leakesville) and the substantial funding that would be necessary for purchasing of expansive river front property. However, focusing land acquisition on areas of high priority (e.g., Escatawpa River, lower Chickasawhay River, and lower Leaf River) can provide necessary watershed-level protections for the yellow-blotched map turtle.

Biology and Habitat Summary

As referenced in the 2018 5-year review (Service 2018), population trends based on Selman and Qualls (2009) and Brown et al. (2016) indicate a population decline at the Chickasawhay River site, a slight decline at the Leaf River site, and a substantial population recovery at the Pascagoula River site to pre-Katrina abundances (Table 1). In addition to presenting limited new information, the previous 5-year review (Service 2018) is summarized below.

The yellow-blotched map turtle is endemic to the Pascagoula River drainage of southeast Mississippi, including the Leaf, Chickasawhay, and Escatawpa rivers and other large tributaries (Figure 1). This species currently inhabits approximately 1,104 rkm (686 rmi) of riverine habitat: 316 rkm (196 rmi) of the Pascagoula River subdrainage, 435 rkm (270 rmi) of the Leaf River subdrainage, 300 rkm (186 rmi) of the Chickasawhay River subdrainage, and 53 rkm (33 rmi) of the Escatawpa River subdrainage with a range extension of approximately 30 rkm (18.6 rmi) in 2019 (Pearson et al. 2020). Populations with basking densities >15 turtles/rkm (see Selman and Qualls 2009) are confined to a total of 330 rkm (205 rmi): 141 rkm (87.6 rmi) in the Pascagoula River, 127 rkm (79 rmi) in the Leaf River, and 62 rkm (38.5 rmi) in the lower Chickasawhay River. The status of the Escatawpa River population is currently unknown and based on the last basking survey conducted in the Escatawpa River in 2008, population abundance is still presumed to be very low (Selman and Qualls 2009).

Due to the frequent aerial basking behavior of this species, basking surveys are a reliable way to determine presence/absence and estimate population size using mark-resight surveys. There have been several surveys conducted for this species from 1989 to 2016, some of which produced estimates of population size, primarily for the lower Pascagoula River population of yellow-blotched map turtles (see Service 2018). Based on these surveys, population size increased from 1989 (210 turtles/rkm; Stewart 1989) to 2005 (602 turtles/rkm; Selman and Qualls 2009), until impacts from Hurricane Katrina caused substantial declines in population abundance (2007: 281

turtles/rkm). The lower Pascagoula River population has since apparently recovered to pre-Katrina abundances (543 turtles/rkm; Brown et al. 2016) with basking densities of 97 turtles/rkm greatly exceeding the minimum required for the Pascagoula River of 44 turtles/rkm.

The Leaf River population experienced a slight decline in population size between the two mark-resight surveys: 96.3 turtles/rkm (2005 to 2008; Selman and Qualls 2009) to 60 turtles/rkm (2016; Brown et al. 2016). Lindeman (2018) reported basking densities throughout the Leaf River averaged 15 basking turtles/rkm, less than the minimum required of 22 basking turtles/rkm for recovery. Using correction factors to adjust for proportion of turtles basking at a single time (15% to 30%; Selman and Qualls 2011), Lindeman's average basking density equates to an estimated population density of approximately 50 to 100.2 turtles/rkm, overlapping estimates provided by both Selman and Qualls (2009) and Brown et al. (2016) for the Hattiesburg Leaf River population.

Additionally, based on mark-resight surveys, there has been a decline in total population densities at the lower Chickasawhay River population from 93 turtles/rkm (21.2 basking turtles/rkm; Selman and Qualls 2008) to 26 turtles/rkm (6.3 basking turtles/rkm; Brown et al. 2016). Lindeman (2018) reported the highest basking density of yellow-blotched map turtles on the Chickasawhay River occurred in the lower river reaches (3.34 basking turtles/rkm), which is approximately equivalent to a total population density of 14 to 22 turtles/rkm, similar to that estimated by Brown et al. (2016). The lower Chickasawhay River is characterized by numerous, large sandbars similar to the Leaf and Pascagoula rivers, providing higher quality habitat that yellow-blotched map turtles prefer. However, it is currently unknown why populations have seemingly declined at the Chickasawhay River site and if these declines are due to increasing threats. Further mark-resight surveys are necessary to better assess the population status and trends of the yellow-blotched map turtle, and standardization of methodologies and sampling locations should be prioritized for comparability between previous and future research.

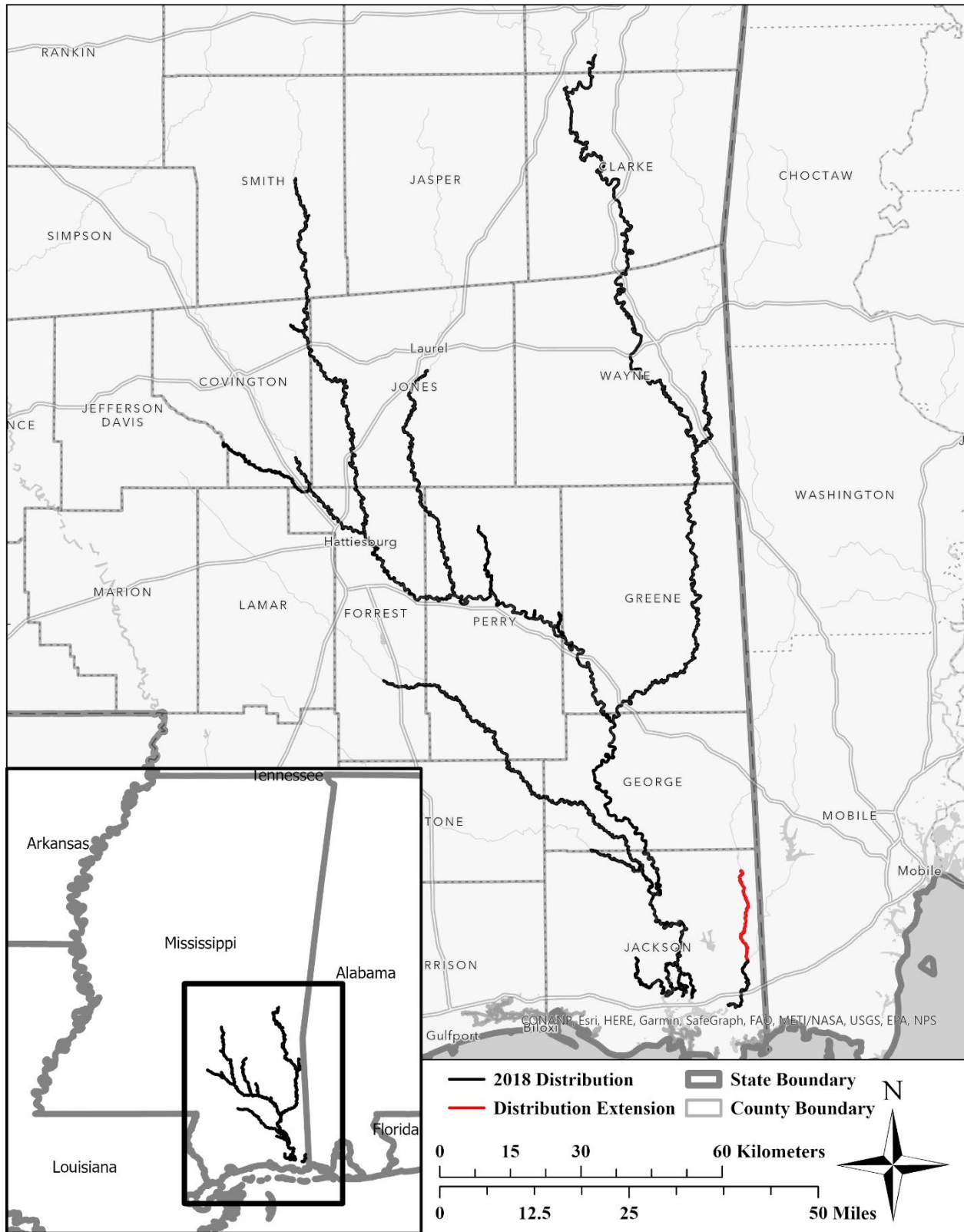


Figure 1. Distribution of the yellow-blotched map turtle in the Pascagoula River drainage, with a 30 rkm (18.6 rmi) upstream distribution extension in the disjunct Escatawpa River population (red).

Table 1. Population density estimates and observed basking densities of yellow-blotched map turtles (*G. flavimaculata*) at three representative sites in the Pascagoula River drainage. Population density (turtles per river kilometer) was calculated based on mark-resight survey estimates using Program NOREMARK (White 1996). Basking densities are within parentheses and were calculated based on number of yellow-blotched map turtles observed basking divided by river kilometers surveyed. Dashes represent no available data for certain years.

| Site | 2005 | 2006 | 2007 | 2008 | 2016 | Source of Information |
|--|-----------------|----------------|----------------|-----------------|--------------|---|
| Middle Leaf (Hattiesburg) | 80 (22.8)* | 120 (25.1)* | 96 (23.2)* | 89 (29.8)* | 60 (9.1) | Selman and Qualls 2008, 2009; Brown et al. 2016 |
| Lower Chickasawhay (Leakesville) | 93 (21.1) | ---- | ---- | ---- (24.9)* | 26 (6.3) | Selman and Qualls 2008, 2009; Brown et al. 2016 |
| Lower Pascagoula¹ (Vanceave) | 602 (119.9)* | 321 (109)* | 281 (73.9)* | 292 (89.5)* | 543 (97)* | Selman and Qualls 2008, 2009; Brown et al. 2016 |

¹Pascagoula population declined in 2006 due to impacts from Hurricane Katrina. *Population meets minimum basking density criteria of 22 basking turtles/rkm (Chickasawhay and Leaf Rivers) or 44 basking turtles/rkm (Pascagoula River).

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4(a)(1) of the Act, including: Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: overutilization for commercial, recreational, scientific, or educational purposes; Factor C: disease or predation; Factor D: the inadequacy of existing regulatory mechanisms; Factor E: other natural or manmade factors affecting its continued existence. A summary of this assessment is detailed below, and a more thorough assessment is available in the 2018 5-year status review.

a. The present or threatened destruction, modification, or curtailment of its habitat or range:

Original listing of the yellow-blotched map turtle was attributed to habitat modification and water quality deterioration (Service 1991). As summarized in the previous 5-year review (see Service 2018), map turtles rely upon coarse woody debris for a variety of physiological (temperature regulation, egg development) and behavioral reasons (feeding, resting areas), as well as water quality that allows for sufficient growth and abundance of freshwater prey sources (i.e., sponges; Selman and Lindeman 2018).

Deadwood removal for navigation, flood control, and/or bridge construction can impact habitat quality; however, recommendations to keep deadwood within the river system, rather than complete removal out of the waterway, can mitigate impacts from these threats. Currently, impaired water quality occurs in 2.5% (27.1 rkm) of the yellow-blotched map turtle range (303d impaired waterways; MDEQ 2022), a decline from 4.1% (45 rkm) in 2016 (MDEQ 2016). Additional evidence of improving water quality is the seeming increase in abundance of a population in the 3.8 rkm section of the Leaf River adjacent to sewage treatment lagoons that was previously reported to have reduced population numbers (Selman and Qualls 2009); a single basking survey conducted in March 2022 observed more than 100 basking yellow-blotched map turtles within this section (Devros and Jaunsen pers. comm. 2022). It is possible that a historic dioxin spill in the lower reach of the Pascagoula River drainage is still impacting reproductive hormones in the yellow-blotched map turtle (see Shelby and Mendonça 2001), but additional research is necessary.

Two reservoirs for recreation/economic stimulus were proposed for drainages of the Pascagoula River in George and Jackson Counties, Mississippi; however, this project was closed in 2019 by the U.S. Army Corps of Engineers (Corps) due to lack of sufficient information to justify a purpose or need (Litteken 2019). Encroaching invasive vegetation such as cogon grass (*Imperata cylindrica*) and Chinese tallow tree (*Triadica sebifera*) continues to reduce the quantity and quality of sandbar nesting habitat by forcing turtles to nest in suboptimal areas that are more flood-prone (Janzen 1994; Kolbe and Janzen 2002; Selman and Jones 2011). The suitability of these sites is also threatened by erosion and human recreation that disturbs female turtles attempting to nest (Selman and Jones 2011; T. Brooks pers. comm. 2022).

b. Overutilization for commercial, recreational, scientific, or educational purposes:

Shooting of basking yellow-blotched map turtles for recreation and collecting turtles for commercial purposes were described as threats to the species in the listing rule (Service 1991). Shooting of yellow-blotched map turtles for target practice (plinking) was occurring

as recently as 2011 (Selman and Jones 2011), presumably is still occurring, and can have negative effects on population viability due to the demographic importance of adult females (Spencer and Janzen 2010). Illegal collection of yellow-blotched map turtles is occasionally reported, such as in 2005, when an individual in Georgia was apprehended with 28 yellow-blotched map turtles held illegally (Jensen 2005); however, it is unknown how extensive trade is of wild-caught yellow-blotched map turtles. A 2006 to 2022 report from the Law Enforcement Management Information System (LEMIS) database, which contains information on the international import and export of wildlife from the U.S., does not list the yellow-blotched map turtle as a traded turtle, but the species may have been included under the generic name “Map Species”.

c. Disease or predation:

We have no indication that disease poses a significant threat to the species, although new diseases are being reported in other turtle populations in the southeastern United States (see Adamovicz et al. 2020). Nest predation rates ranged from 41.9 to 100%, with the most significant nest predator being fish crows (Horne et al. 2003). Anthropogenically subsidized fish crow populations near garbage dumps and heavy recreational use have led to increased predation of yellow-blotched map turtle nests (Horne et al. 2003), which is believed to be a significant threat to the species. Additional predation from raccoons and invasive feral hogs is also likely, and more extensive reproductive studies are necessary to determine impacts from these anthropogenically subsidized predators.

d. The inadequacy of existing regulatory mechanisms:

The State of Mississippi lists this species as Endangered, which provides protection from collection (Mississippi Natural Heritage Program 2015). No laws in Mississippi protect the yellow-blotched map turtle against the loss or alteration of its habitat. However, monitoring of water quality is conducted under Section 305(b) of the Clean Water Act (CWA) and 303(d) impaired waterways were briefly discussed for Factor A. Direct mortality through shooting and boat collisions, and indirect harm through disturbance of nesting turtles on sandbars and sandbar habitat degradation caused by speeding boats with excessive wakes, are very difficult to regulate even when these events occur in conservation areas. In 2004, the Corps designated four nesting sandbars on Ward Bayou WMA as off limits to human recreation during yellow-blotched map turtle nesting season (May 1 through October 31); however, the current level of law enforcement presence has not been adequate to prevent use and threats to these areas, including the direct take of turtles (T. Brooks pers. comm. 2022). On the other hand, Corps efforts to manage these sandbars for invasive plant species have been productive and improved some degraded nesting areas.

e. Other natural or manmade factors affecting its continued existence:

The primary threat to survival of yellow-blotched map turtles is the impact of human population growth in southeast Mississippi, and the subsequent urbanization and recreational use of nearby river systems. Urbanization, and associated pollution, are known to negatively impact prey sources (see Gál et al. 2019), while chemical stressors can inhibit endocrine cycles and alter reproductive output (see Shelby and Mendonça 2001; Selman and Qualls 2005, 2006). Yellow-blotched map turtles frequently abandon their perches when people boat or float by their basking sites (Lindeman 1999; Moore and Seigel 2006; Selman and Qualls 2011; Selman et al. 2013), resulting in negative effects to their physiological health (Selman

et al. 2010, 2012). Although presumably impacting a small proportion of the population, direct mortality from boat collisions may disproportionately affect females (see Bulté et al. 2010; Bennett and Litzgus 2014) since they are larger-bodied and more commonly found in open water channels than males (Jones 1996). Female yellow-blotched map turtles are highly sensitive to the presence of humans on nesting sandbars, which can reduce the number of nesting forays (Moore and Seigel 2006). Direct impacts to nesting sandbars also include ATV/UTV use and erosion of sandbars from boat wakes (Moore and Seigel 2006; T. Brooks pers. comm. 2022).

Hurricanes pose a current but unpredictable threat capable of causing severe population declines in the yellow-blotched map turtle (Selman and Qualls 2008). Climate change may increase the intensity and frequency of similar hurricane events (IPCC 2022), resulting in potentially severe impacts to the lower Pascagoula and Escatawpa rivers. Sea level rises are predicted to inundate 21.7 rkm (13.5 rmi) and 60 rkm (37.3 rmi) of occupied habitat by 2070 in the lower Escatawpa and Pascagoula rivers according to National Oceanic and Atmospheric Administration's (NOAA) Sea Level Rise Viewer, Dauphin Island, for an intermediate to high sea level rise of 0.91 meter (3 feet; <https://coast.noaa.gov/slr/#/layer/sce/3/-9862054.526184013/3573135.961733861/13/satellite/11/0.8/2070/interHigh/midAccretion>, accessed 17 January 2023). Although we would expect individual turtles to move in response to inundation, suitable habitat will be lost in an area that supports a robust population of the species.

Synthesis

The yellow-blotched map turtle is a riverine species endemic to the Pascagoula River drainage of southeastern Mississippi, dependent on heterogeneous microhabitats including coarse woody debris, steep cutbanks, and large sandbars. Due to a lack of standardization across most surveys conducted for this species, it is difficult to determine its current population status. Results from two comparable surveys have reported a slight population decline in the Leaf River and Chickasawhay River and recovery of the lower Pascagoula River population to pre-Hurricane Katrina abundances, which exceeds minimum required population size for the Pascagoula River population. The species' range was extended ~30 rkm (18.6 rmi) upstream in the Escatawpa River, indicating potential for expanding populations; however, the status of the Escatawpa population is not known. The yellow-blotched map turtle is currently present in all known historical localities throughout the Pascagoula River drainage, indicating no known range contractions. A standardized sampling methodology using mark-resight surveys needs to be incorporated into future surveys to better assess population trends over time.

Threats to the species are ongoing, albeit seemingly reduced since the time of listing. Urbanization, removal of deadwood, and "recreational" shooting (plinking) and collection for the pet trade are the species' primary threats. However, growing intensity and frequency of hurricanes and summer flooding may become increasingly problematic for populations in the lower Pascagoula and Escatawpa rivers, as well as nest survival throughout the drainage due to out-of-season flooding. Recreational use of nesting sandbars, as seen at Ward Bayou WMA, are also directly and indirectly impacting frequency of nesting forays, nest success, and nest predation rates. The purchase of conservation lands has provided a measure of habitat protection for the yellow-blotched map turtle along the mainstem Pascagoula River. Prioritizing land

acquisition in the lower Leaf and Chickasawhay rivers, as well as the lower Escatawpa River, would provide a step forward in meeting the minimum land conservation goal outlined in Criterion 2.

In summary, progress has been made towards partially achieving recovery goals regarding habitat protection (Criterion 2); however, Recovery Criterion 1 needs to be revised to reflect the most up-to-date scientific information for the species. The yellow-blotched map turtle still meets the definition of a threatened species due to a lack of recovery criteria being met, despite progress towards achieving these criteria. Neither reclassification to endangered, nor removal from the list of Threatened and Endangered Species, is warranted at this time.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 1993). In the course of this status review, new and/or targeted potential recovery activities were identified and are included below. These actions are recommended to support and promote recovery of the yellow-blotched map turtle. Use of a numbered list for these recommendations is for convenient reference only and does not necessarily imply prioritization.

Recovery Activities

1. Reassess how best to define “stable” or “increasing” populations and determine if density numbers as currently defined in recovery criteria of the existing recovery plan are appropriate.
2. Revise the yellow-blotched map turtle recovery plan to amend the recovery criteria and more accurately reflect the current data on life history, ecology, and distribution.
3. Develop a Standard Operating Procedure for data collection to determine turtle population density/viability, demography, growth and survivorship rates, long-distance movements, and longevity.
4. Designate populations of yellow-blotched map turtles in the Leaf, Chickasawhay, Escatawpa, and Pascagoula rivers for regular mark-resight monitoring surveys to assess population densities and importance of specific microhabitats.
5. Educate the public about the protected status of the yellow-blotched map turtle to reduce the direct take of turtles by shooting and encourage support of limiting public use of nesting sandbars.
6. Pursue land acquisition of selected river reaches in order to achieve further protection of crucial yellow-blotched map turtle populations.
7. Continue control of invasive plant species on select sandbars to maintain suitable nesting sites, as currently being implemented at Ward Bayou WMA.
8. Provide training to Law Enforcement personnel on identifying turtles of conservation concern and the threats they face from disturbance and collection while encouraging enforcement of existing laws and regulations.

9. Work with partners to limit threats to the yellow-blotched map turtle, such as restricting the size of boats that access occupied river reaches and enforcing speed limits to reduce the negative impacts of excessive boat wakes, primarily in the lower Pascagoula River.

Monitoring and Research Activities

1. Continue long-term mark-resight surveys to estimate abundances and trends at the Vancleave, Leakesville, and Hattiesburg populations, as well as other designated monitoring sites throughout the Pascagoula River drainage.
2. Evaluate the size and status of the Escatawpa yellow-blotched map turtle population and conduct a telemetry study in this region to assess this population's spatial use of coastal environments.
3. Assess nest success, predation rates, clutch size, and clutch frequency at representative populations throughout the Pascagoula River and determine the impact of these reproductive parameters and nest predation on recruitment.
4. Conduct research to determine if clutch frequency and size differences between north and south Pascagoula River populations are affecting long-term population viability.
5. Conduct a comparative ecological study (i.e., body size, reproductive output, etc.) of upper Pascagoula River drainage populations. The availability of data indicates there are differences in size and possibly reproductive output along the river continuum that may influence future management decisions.

RESULTS / SIGNATURES

U.S. Fish and Wildlife Service Status Review of Yellow-blotched Map Turtle

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

- Downlist to Threatened
- Uplist to Endangered
- Delist:
 - The species is extinct*
 - The species does not meet the definition of an endangered or threatened species*
 - The listed entity does not meet the statutory definition of a species*
- No change needed

Field Supervisor, Mississippi Ecological Services Field Office, Fish and Wildlife Service

Approve _____

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