

# Barbour's Map Turtle

## *Graptemys barbouri*



Photograph by Jonathon Mays, FWC.

## Species Overview

**Status:** Listed as state Threatened on Florida's Endangered and Threatened Species List

### Current Protections

- 68A-27.003(a), F.A.C. No person shall take, possess, or sell any of the Endangered or Threatened species included in this subsection, or parts thereof or their nests or eggs except as allowed by specific federal or state permit or authorization.
- 68A-27.001(4), F.A.C. Take – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. The term “harm” in the definition of take means an act which actually kills or injures fish or wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. The term “harass” in the definition of take means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

## Biological Background

This section describes the biological background for this species and provides context for the following sections. It focuses on the habitats that support essential behaviors for the Barbour's map turtle, threats faced by the species, and what constitutes significant disruption of essential behaviors.

Barbour's map turtles are medium to large sized riverine turtles endemic to large rivers and their tributaries, associated primarily with the Apalachicola River drainage in the southeastern gulf coastal plain (occurring in Alabama, Florida and Georgia). They have been documented in the Aucilla and Ochlockonee River drainages to the east, and Choctawhatchee River drainage to the west. Barbour's map turtles are listed as state Threatened in Georgia, and are a protected nongame species in Alabama. They are listed as vulnerable by the International Union for Conservation of Nature (IUCN; van Dijk 2011).

NatureServe (2017) estimates the natural population of Barbour's map turtles to be between 1,000 and 10,000 individuals range-wide. In late 2017 the U.S. Fish and Wildlife Service (USFWS) did not find sufficient evidence to federally list this turtle (USFWS 2017).

Female Barbour's map turtles appear markedly different than their male counterparts. Females are larger overall and may reach over 30 cm (12 in) in length, whereas males may reach over 11 cm (4.5 in). Females have large bulbous heads and powerful jaws that are adapted to crush mollusks. Males have smaller heads and jaws, and prefer to prey on smaller crustaceans and soft-shelled invertebrates (Cagle 1952, Sanderson 1974, Ewert et al. 2006). Females eventually develop a large domed shell that often becomes dark and typically loses pattern with age. Males are more likely to retain both patterning and knobby keels on their shells. Pleural and marginal scutes have yellowish “C” shaped markings on them. Hatchlings and juveniles are more brightly patterned and have a prominent knobbed keel on their shell (Figure 1).

The lifespan for Barbour's map turtles is unknown; however, these turtles are thought to be long lived. Females reach sexual maturity between 15 – 20 years, while males reach sexual maturity at 4 years (Sanderson 1974, Ewert et al. 2006, Moulis 2008). Aside from basking, these turtles will only leave the water to nest, which generally occurs from April through August. Nest sizes contain 3 – 15 eggs per clutch, and a female turtle may produce up to three clutches per year (Wahlquist and Folkerts 1973, Sanderson 1974, Ewert et al. 2006). Sex is determined by incubation temperature, eggs incubated between 25° C – 28.2° C (77° F – 82.7° F) result in broods comprised of primarily males. Eggs incubated between 28.2° C – 30° C (82.7° F – 86° F) result in primarily female hatchlings (Ewert et al. 2006). Incubation time is often over 70 days (Bartlett and Bartlett 2011). Hatchlings can spend considerable time within the nest, and typically emerge from the nest in late summer through fall (Wahlquist and Folkerts 1973, Sanderson 1974, Ewert et al. 2006).

Further background information pertaining to the Barbour's map turtle may be found in the [Biological Status Review Report](#) for the Barbour's map turtle and the [Species Action Plan for the Barbour's Map Turtle](#).

### Habitat Features that Support Essential Behavioral Patterns

Barbour's map turtles are typically found in high-quality waterways such as the Apalachicola, Choctawhatchee, Chipola, and Ochlockonee Rivers (Carr 1952, Rhul 1991, Goodwin 2002, Enge and Wallace 2008, Mays and Hill 2014, 2015; Figure 2). These rivers and streams often have moderate to swift currents and range from clear water with limestone substrates to broad alluvial rivers containing high sediment loads. Sterrett et al. (2015) found that female Barbour's map turtles were often found in pools that were greater than 3 m (9.8 ft) deep, and that female turtles are generally associated with deeper areas of rivers. Male turtles typically use shallower shoal habitats which contain higher abundances of macroinvertebrates. Rivers that support Barbour's map turtles are generally rich in mollusks (Moulis 2008). It does not appear that these turtles prefer native species of mollusks over introduced species, and may benefit from increased forage from introduced mussels (i.e., Asian clams (*Corbicula fluminea*); Moulis 2008). Little is known about home range size, although Sterrett et al. (2015) found that female turtles used an average of  $839 \pm 199$  m ( $2752 \pm 653$  ft) of creek length, and  $3.13 \pm 2.74$  ha of creek area.

Snags, stumps, exposed rocks and other basking sites are important habitat features for Barbour's map turtles (Sterrett et al. 2015). These structures provide areas where turtles can thermoregulate and can also be used as cover. Barbour's map turtles have been observed basking at temperatures as low as 10° C (50° F) during winter months (Moulis 2008). Smaller tributaries are generally not suitable habitats for Barbour's map turtles as they do not typically have open canopies required for basking, nor do they generally contain rich populations of mussels. Maintaining the water quality and ecological integrity of these smaller streams is important as mismanagement may degrade the water quality of their associated rivers.



Figure 1. Male (top) and female (bottom) Barbour's map turtles. Photographs by Jonathan Mays and Brad O'Hanlon, FWC.

Nesting locations for Barbour's map turtles are primarily sand bars with loose sandy soil and few herbaceous plants (Figure 2). Eroded river banks, bluffs, and artificial spoil mounds are also infrequently used as nesting sites. These locations are usually adjacent to waterways, although in some circumstances females can travel up to 200 m (656 ft) away from the water to select a nesting site (Moulis 2008).

Variation in river course and structure are seasonally important to Barbour's map turtles. During periods of flooding and high-water flow turtles will move to areas along the river perimeter with slower water flow (Moulis 2008).

### Threats

Habitat alteration is the most immediate threat to populations of Barbour's map turtles. Examples of habitat alteration that affect Barbour's map turtles include channel dredging, creating impoundments, water withdrawal, the removal of snags, and alteration of riparian zones (Ewert et al. 2006, Sterrett et al. 2010; Figure 3). Dredging and channelization can cause direct mortality to both turtles and molluscan fauna, and negatively impact river substrate. Dredge spoils from channelization may benefit the species at some level by creating nesting habitat; however, disturbed sites may also attract predators. Dredge spoils may also have higher levels of sun exposure relative to natural nesting sites. Excess slurry from dredging may bury existing nests.

There is a high demand for water within the southeastern United States which has resulted in legal actions between states that share riverine resources. The increasing withdrawal of water from these systems may affect river flow and is likely a concern for all aquatic species that occur there. Artificially lowered water levels and river flow may expose temporarily suitable areas for turtle nests only to be submerged with increased flows. The removal of snags from river systems reduces available basking and cover locations. Land alterations, such as logging or development, and disruptive activities (e.g., off-road vehicle use) adjacent to occupied habitat may also affect Barbour's map turtles (Ewert et al. 2006). Sterrett et al. (2010) found that captures of Barbour's map turtles declined as agricultural disturbance to riparian habitat increased. Reduction of riparian habitat can also lead to increased siltation from agricultural runoff, create excess erosion and alter in-stream habitat for turtles (Dodd 1990, Moll and Moll 2000, Sterrett et al. 2010).

Direct take from human activity is a threat to the species; however, the current level of take for



Figure 2. Typical Barbour's map turtle habitat (top) and nesting habitat (bottom). Photographs by Jonathan Mays, FWC.

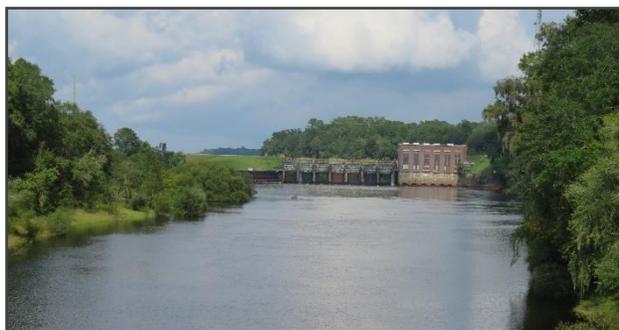


Figure 3. The Talquin Dam between Leon and Gadsden Counties, Florida, is an example of an impoundment in Barbour's map turtle habitat.

this species is unknown. Take is illegal in each state where Barbour’s map turtle occurs. Historically, take from the Chipola River in Florida has caused significant local population declines (Ernst and Barbour 1972, Mount 1975, Moler 1986), and take for the pet and meat trade likely still occurs. Ingestion of fishing gear is documented in several species of freshwater turtles (Steen 2014); however, no study has examined the prevalence of fish hooks within Barbour’s map turtles. Injuries and mortalities from boat strikes occur to some extent although the rate of mortality from these collisions is unknown. The act of shooting basking turtles from watercraft (known as “plinking”) is well- documented (e.g., Ewert et al. 2006, Moulis 2008), yet the prevalence and consequences to populations are largely unknown (J. Mays personal communication 2017) although evidence of plinking still persists (S. Sterrett, personal communication 2017). If the largest turtles (i.e., females) are targeted sustained “plinking” could be particularly threatening.

### Potential to Significantly Impair Essential Behavioral Patterns

Barbour’s map turtles rely on high-quality waterways that provide ample areas to forage, bask, shelter, and nest, hence actions that result in the loss, degradation or fragmentation of those areas may impair or disrupt the essential behavioral patterns of these turtles. Activities that alter the natural flow and water regime of inhabited rivers, such as dredging, creating impoundments, or altering the structure of rivers by removing snags can impair basking, foraging, and nesting behaviors (Moore and Seigel 2006). Activities that alter the structure of riparian areas adjacent to waterways can make nests more susceptible to predation.

## Distribution and Survey Methodology

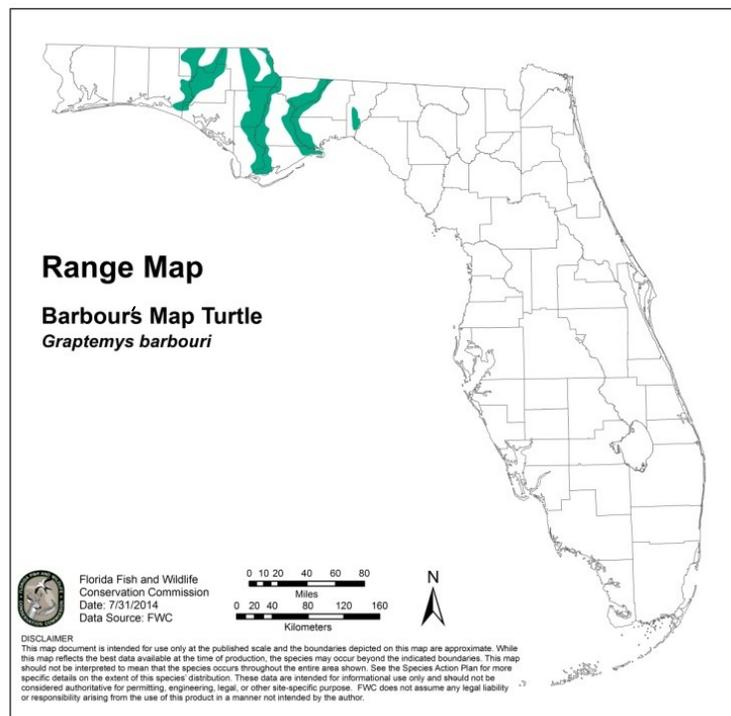
The range map (right) represents the principle geographic range of the Barbour’s map turtle, including intervening areas of unoccupied habitat. This map is for informational purposes only and not for regulatory use.

**County List:** Calhoun, Franklin, Gadsden, Gulf, Holmes, Jackson, Jefferson, Leon, Wakulla, Walton, Washington.

### Recommended Survey Methodology

Surveys for Barbour’s map turtles are not required, but are recommended during project planning. Surveys conducted by passive watercraft are effective in determining presence of Barbour’s map turtles. Turtles may easily be observed basking on structures such as logs, bridges or boat ramps within the river (e.g., Ruhl 1991, Lindeman 1999, Enge and Wallace 2008, Mays and Hill 2015). In general, Barbour’s map turtles are weary animals and may be more difficult to detect by basking surveys compared to other species. Surveys for Barbour’s map turtle should coincide with the active season for this species (spring, summer and fall). Surveys that use the following methods will not require an FWC permit:

- Surveys should be performed by a slow-moving watercraft. Canoes and kayaks allow an approach close enough to make positive identification on basking turtles. Because turtles are weary of approaching boats, binoculars and cameras can be used to aid identification.



- Surveys should examine all potential shorelines and structures that a turtle may use, and surveys may cease once a turtle has been observed. A minimum of 4 surveys should be completed during favorable weather conditions before assuming absence of the species (based on results within Lindeman 1999).
- For the highest chance of detection, surveys should take place between April and September on warm sunny days (Lindeman 1999). Rain and wind events may discourage basking behavior and make identification difficult, therefore surveys should be performed during periods of calm weather.

It is possible to use aquatic traps, such as hoop traps or floating basking traps, to capture Barbour's map turtles (see methods used in Sterrett et al. 2010). The use of traps to monitor Barbour's map turtles may be time consuming, expensive, and take years to produce robust results. Trap use may capture non-target species including other Threatened species, and thus is not recommended for surveys unless coordinated with FWC. A scientific collecting permit will be required for any activity that may trap or capture a Barbour's map turtle.

- The Escambia map turtle occurs in the western portion of the Barbour's map turtle range. This species may be difficult to distinguish from Barbour's map turtles, so a professional biologist may be required to verify any sightings.

The objective of the surveys is to detect Barbour's map turtles; thus, if observers detect this turtle there is no need to continue surveying. If Barbour's map turtles are found, the applicant should [coordinate with FWC](#).

## Recommended Conservation Practices

Recommendations are general measures that could benefit the species but are not required. No FWC permit is required to conduct these activities.

- Avoid causing changes that would degrade aquatic habitats inhabited by Barbour's map turtles. Specifically, avoid creating artificial impoundments, dredging channels in rivers, creating dredge spoils within rivers, and removing snags from waterways. Avoid the displacement of existing snags and rocks to maintain basking structures in rivers.
- The removal of submerged logs, called deadhead logging, is particularly bad for riverine turtles and should be avoided.
- Avoid activities that would move excess water from rivers, especially during times of drought.
- Avoid activities that would degrade or alter riparian zones adjacent to areas inhabited by Barbour's map turtles. Specifically, avoid removing trees and shrubs, disturbing soil and ground cover, and operating off-road vehicles in riparian zones. Maintaining a minimum riparian buffer of 50 m (164 ft) between a stream and upland activities would benefit the species and a buffer of 100-200 m (328-656 ft) would benefit most other turtle species that occur in inhabited waterways (Steen et al. 2012 U.S. Fish and Wildlife Service [USFWS] 2001, Wegner 1999).
- Minimize or eliminate activities that degrade water quality (e.g., siltation and pollution) in waterways inhabited by Barbour's map turtles. Guidelines for minimizing erosion and runoff from roadways can be found in the State of Florida Best Management Practices (BMP's) for [stormwater runoff](#) and within the Florida Department of Agriculture Consumer Services (FDACS) [silviculture BMP's](#).
- Minimize livestock access to waterways inhabited by Barbour's map turtles.
- Locate stormwater management systems to provide the maximum treatment for any potential input into occupied habitat.

## Measures to Avoid Take

### Avoidance Measures that Eliminate the Need for FWC Take Permitting

The following measures will eliminate the need for an FWC take permit.

- Avoid disturbing riverine sandbars, especially during the nesting season (June – August). Specifically, avoid impacting vegetation that is growing on the sandbars or activities that would encourage predators to visit sandbars (e.g., litter, food scraps, deep ruts from off-road vehicles or any other activities).
- Avoid activities that cause channelization or altered water flow in areas inhabited by Barbour’s map turtles.
- Avoid activities that degrade water quality (i.e., siltation and pollution) in waterways inhabited by Barbour’s map turtles.
- Avoid activities that degrade riparian zones. A 61 m (200 ft) buffer on both sides of Outstanding Florida Waters is sufficient to avoid degradation (Department of Agricultural and Consumer Services 2008, DEP 2011).
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### Examples of Activities Not Expected to Cause Take

This is not an exhaustive list of exempt actions. Please contact FWC if you are concerned that you could potentially cause take.

- Commercial and recreational fishing are not subject to take of incidentally captured Barbour’s map turtles if they are using approved and legal fishing methods (68A-23 FAC). Trotlines (including bush hooks) should be used following FWC regulations (68A-23.004, F.A.C).
- Recreational fishermen should release turtles hooked accidentally by removing the hook when possible. If a turtle has ingested a hook that can’t be dislodged or removed the line should be cut as close to the hook as possible.
- Lawful recreational boating within river channels is not likely to cause take. Boaters should follow any signage at ramps or along the river to avoid basking turtles or landing on nesting sites. Boaters who accidentally strike a Barbour’s map turtle are encouraged to report the strike to the FWC and may not be subject to prosecution if they were operating the boat in lawful manner.
- Boat landings on exposed sandbars should be avoided during the nesting season (May – August).

### Florida Forestry Wildlife BMP’s and Florida Agricultural Wildlife BMP’s

- Agriculture, as defined in Section 570.02, F.S., conducted in accordance with Chapter 5I-8, F.A.C., and the wildlife Best Management Practices adopted in Rule 5I-8.001 and 5M-18.001, F.A.C., by the Department of Agriculture and Consumer Service pursuant to Section 570.94, F.S., is authorized and does not require a permit authorizing incidental take despite any other provision of Rule 68A-27.007 or 68A-27.005, F.A.C.
- Participation in the Florida [Forestry Wildlife BMP’s](#) and Florida [Agricultural Wildlife BMP’s](#) program and implementation of these BMP’s provides a presumption of compliance with regard to incidental take of Barbour’s map turtles.
- Florida Department of Agriculture Consumer Services Florida Forestry Wildlife Best Management Practices apply to this species through the application of Streamside Management Zones (SMZ’s).
- [The FDACS BMPs for silviculture](#) as they relate to stream crossings would benefit the Barbour’s map turtle.
- The FDACS BMPs for Water Quality/Quantity for specific operations ([Cow/Calf](#), [Dairy](#), [Equine](#), [Nurseries](#), [Poultry](#), [Sod](#), [Specialty Fruit and Nut Crops](#), [Vegetable and Agronomic Crops](#)), as they

relate to waste management, water resource protection, irrigation, erosion control, sediment control, stormwater management, etc. would benefit the Barbour's map turtle.

### **Other authorizations for Take**

- As described in Rule 68A-27.007(2)(c) F.A.C., land management activities (e.g., aquatic habitat management, prescribed fire, mechanical removal of invasive species, and herbicide application) that benefit wildlife and are not inconsistent with FWC Management Plans are authorized and do not require a permit authorizing incidental take.
- In cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity, power restoration activities and non-routine removal or trimming of vegetation within linear right of way in accordance with vegetation management plan that meets applicable federal and state standards does not require an incidental take permit from the state.
- Emergency water management actions for human health and safety, such as flood control.

## **Coordination with Other State and Federal Agencies**

The FWC participates in other state and federal regulatory programs as a review agency. During review, FWC identifies and recommends measures to address fish and wildlife resources to be incorporated into other agencies' regulatory processes. For example, the FWC participated in the Species Status Assessment (SSA) created for the Barbour's map turtle by the U. S. Fish and Wildlife Service.

FWC provides recommendations for addressing potential impacts to state listed species in permits issued by other agencies. If permits issued by other agencies adequately address all of the requirements for issuing a state-Threatened species take permit, FWC will consider those regulatory processes to fulfill the requirements of Chapter 68A-27, F.A.C., with no additional application process. This may be accomplished by issuing a concurrent take permit from FWC, by a memorandum of understanding with the cooperating agency, or by a programmatic permit issued by another agency. These permits would be issued based on the understanding that the implementation of project commitments will satisfy the requirements of 68A-27.003 and 68A-27.007, F.A.C.

### **Review of Land and Water Conversion projects with State-Listed Species Conditions for Avoidance, Minimization and Mitigation of Take**

- FWC staff, in coordination with other state agencies, provide comments to federal agencies (e.g., the Army Corps of Engineers) on federal actions, such as projects initiated by a federal agency or permits being approved by a federal agency.
- FWC staff works with landowners, local jurisdictions, and state agencies such as the Department of Economic Opportunity on large-scale land use decisions, including long-term planning projects like sector plans, projects in Areas of Critical State Concern, and large-scale comprehensive plan amendments.
- FWC staff coordinates with state agencies such as the Department of Environmental Protection and the five Water Management Districts on the Environmental Resource Permitting (ERP) program, which regulates activities such as dredging and filling in wetlands, flood protection, stormwater management, site grading, building dams and reservoirs, waste facilities, power plant development, power and natural gas transmission projects, oil and natural gas drilling projects, port facility expansion projects, some navigational dredging projects, some docking facilities, and single-family developments such as for homes, boat ramps, and artificial reefs.

- Sector plans, developments of regional impacts, and county comprehensive plans are all reviewed currently and FWC provides conditions that would be beneficial to the Barbour's map turtle. All of the rivers or river systems inhabited by Barbour's map turtle are designated as Outstanding Florida Waters, specifically the Choctawhatchee, Apalachicola–Chipola, Ochlockonee, and Aucilla–Wacissa rivers. See Appendix 3 of the [Species Action Plan for the Barbour's Map Turtle](#) for more information.

## FWC Permitting: Incidental Take

As defined in Rule 68A-27.001, F.A.C., incidental take is take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Activities that result in impacts to Barbour's map turtles may require an Incidental Take Permit from the FWC (see above for actions that do not require a permit). Permits may be issued when there is a scientific or conservation benefit to the species and only upon showing by the applicant that that the permitted activity will not have a negative impact on the survival potential of the species. Scientific benefit, conservation benefit, and negative impacts are evaluated by considering the factors listed in Rule 68A-27.007(2)(b), F.A.C. These conditions are usually accomplished through a combination of avoiding take when practicable, minimizing take that will occur, and mitigating for the permitted take. This section describes the minimization measures and mitigation options available as part of the Incidental Take Permit process for take of this species. This list is not an exhaustive list of options.

### Minimization Measure Options

The suite of options below can help to reduce or minimize take of the species, and lessen the mitigation necessary to counterbalance take. All of the options below assume that adhering to avoidance measures that eliminate the need for FWC permitting described above is not possible, and that some level of take may occur. These options can lessen the impact of activities, and ultimately may reduce what is needed to achieve a Conservation or Scientific Benefit (see below). The FWC recommends surveys to determine the presence of Barbour's map turtles; however, rigorous surveys are not recommended unless as a component of Scientific Benefit.

#### Seasonal, Temporal, and Buffer Measures

- Barbour's map turtles nesting peaks between April and August, and hatchlings emerge from nests through the fall. Destruction or disturbance of nesting sites, primarily vegetated sandbars, should be avoided or minimized during this time to prevent take of eggs and hatchlings.
- Barbour's map turtles are sensitive to riparian zone degradation. Upland activities that have the potential to disturb riparian zones should follow Outstanding Florida Waters recommendations and minimize activities within 60-91 m (200-300 ft) of the waterway (DEP 2011).

#### Design Modification

- Minimize the amount of channelization required for riverine modifications.
- Design projects that minimize the number of impoundments created along waterways.
- Minimize activities that would result in the displacement and removal of snags and rocks, and that would disturb naturally occurring sandbars.
- Minimize the amount of sedimentation and erosion to waterways by using turbidity and sediment screens and by following guidelines described within the Silviculture BMP Manual.
- Follow buffer measures (above) to limit the amount of runoff entering waterways.

#### Method Modification

- When activities must occur within habitat occupied by Barbour's map turtles, refer to Seasonal and Temporal Restrictions above to minimize take.
- Allow any turtles observed during construction or restoration activities to move safely away

from an area by ceasing activity until the animal has moved away. All sightings observed within construction sites should be immediately reported to the FWC.

- Provide turtle identification information to project personnel.
- When creating waterway crossings, top down bridge construction would minimize impacts Barbour's map turtles and other aquatic species. Specific project guidance can be obtained by contacting the [Florida Department of Transportation](#).

### **Mitigation Options**

Mitigation is scalable depending on the impact, with mitigation options for take that significantly impairs or disrupts essential behavioral patterns. The DEP's [ERP process](#) forms a basis of mitigation for loss or degradation of Barbour's map turtle breeding, feeding and sheltering habitat. Following the ERP process, the FWC will review the resulting wetland mitigation to assess whether the mitigation meets the definition of conservation benefit for Barbour's map turtles. In most cases, wetland mitigation through the ERP process will satisfy the applicants' responsibilities under Chapter 68A-27, F.A.C., and associated rule enforcement policies. Under certain circumstances, the FWC may require additional measures to achieve scientific or conservation benefit specific for the take of Barbour's map turtles. Potential options for mitigation are described below. References to specific actions within the [Species Action Plan for the Barbour's Map Turtle](#) (FWC 2013; Actions) are provided. This list is not an exhaustive list of options.

#### **Scientific Benefit**

This section describes research and monitoring activities that provide scientific benefit, per Rule 68A-27.007, F.A.C. Conducting or funding these activities can be the sole form of mitigation for a project. As new information becomes available the options below are subject to change.

- Following established survey methods, projects to fill data gaps related to information on nesting sites, predation, extents of habitation in occupied waterways, and population sizes and demography (Actions 3, 7, 8).
- Scientific studies (e.g., radio telemetry, trail camera nest monitoring) can help address life history questions. Collecting movement data and habitat data can provide information on metapopulation dynamics, dispersal, and explain how turtles react to habitat restoration. Additional taxonomic studies that examine the relationship of Barbour's map turtles with other turtles in the *Graptemys* genus are warranted (Action 10). These projects should be conducted with input from the FWC to achieve results in concert with ongoing management actions.

#### **Habitat**

- Habitat acquisition may be a mitigation option. Acquiring river floodplains and adjacent uplands that extend at least 200 m (656 ft) through easements or land use agreements will provide suitable areas for turtles to nest (Action 1).
- Habitat restoration options include those that maintain the natural flow, water volume, and channel structure of rivers within the range of the Barbour's map turtle. Additionally, the restoration of artificial channels and removal of dams are considered desirable habitat restoration outcomes (Action 2).
- Enhanced management of riparian zones can qualify as habitat restoration. These strategies include maintaining a natural community within these zones and controlling runoff that may degrade water quality. In some circumstances management of riparian areas may include predator control (Actions 4, 6).
- To limit runoff, convert heavily traveled dirt and earthen roads to paved roads.

#### **Funding**

- No funding option has been identified at this time. Funding options as part of mitigation will be

considered on a case by case basis. Potential options that could be supported include developing outreach materials, installing educational kiosks and signage at boat ramps, and provide viewing opportunities through maintenance of trails or construction of river viewing platforms (Actions 16, 17, 18).

#### Information

- Sharing Barbour’s map turtle sightings data (live and dead observations) with FWC, including latitude and longitude. If possible, a photograph should be submitted with sightings data. (Actions 1, 7, 9).
- Provide dead specimens to FWC for location vouchers, disease monitoring, and future genetics work (Actions 7, 9, 10).
- Sharing invasive species sightings in riparian areas bordering rivers occupied by Barbour’s map turtles (Action 5).
- Sharing sightings of turtle nest predation where nests are found in areas consistent with Barbour’s map turtle nesting habitat. Because several species of turtles use the same nesting habitat, photographs showing signs of predation are necessary (Action 6).

#### Programmatic Options

- FWC’s Landowner Assistance Program is a voluntary program that can offer financial assistance to landowners who implement conservation plans. This program allows the FWC to gather information on private lands slated for development, and provide assistance in evaluating development practices to create suitable avoidance, minimization and mitigation options for specific properties.
- Conservation banking may be an option for mitigation if the conservation bank is in the same watershed or river system as the Barbour’s map turtle.
- A watershed-based Habitat Conservation Plan (HCP) for multiple aquatic species may be a mitigation option. Currently, there is no HCP for the Barbour’s map turtle and the HCP option is only suitable for large-scale projects. Close coordination with the FWC is required for this option.

#### Multispecies Options

- State- and federally listed species that have overlapping ranges and habitat preferences, such as the alligator snapping turtle (*Macrochelys* spp.) may benefit from measures that protect Barbour’s map turtles.
- The ERP process can serve as a multi-species option for Barbour’s map turtles and other species that use large rivers and their tributaries. In many circumstances, mitigation provided through the ERP process may be sufficient to cover take of Barbour’s map turtles and other state-Threatened wetland dependent species.

## FWC Permitting: Intentional Take

Intentional take is not incidental to otherwise lawful activities. Per Rule 68A-27, F.A.C., intentional take is prohibited and requires a permit. For state-Threatened species, intentional take permits may only be considered for scientific or conservation purposes (defined as activities that further the conservation or survival of the species taken). Permits are issued for state-Threatened species following guidance in Rule 68A-27.007(2)(a), F.A.C.

#### Intentional take for human safety

- There are no circumstances for which Barbour’s map turtles may be taken for human safety.
- Permits will be issued only under limited and specific circumstances, in cases where there is an immediate danger to the public’s health and/or safety, including imminent or existing power

outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity. Applications submitted for this permit must include all information that is required from any other applicant seeking a permit, along with a copy of the official declaration of a state of emergency, if any. This permit process may be handled after the fact or at least after construction activities have already started. An intentional take permit may be issued for such purposes.

#### **Aversive Conditioning**

- Not applicable for Barbour's map turtle.

#### **Permits Issued for Harassment**

- Not applicable for Barbour's map turtle.

#### **Scientific Collecting and Conservation Permits**

- Scientific collecting permits may be issued for the Barbour's map turtle using guidance found in Rule 68A-27.007(2)(a), F.A.C. Activities requiring a permit include any research that involves capturing, handling, or marking wildlife; conducting biological sampling; or other research that may cause take. Barbour's map turtles that are used for education and outreach events should have a Scientific Collecting permit. A scientific collecting permit will not be issued for the sole purpose of removing a turtle from the wild to use as an educational or outreach animal. Barbour's map turtles permitted for educational and outreach purposes should be used for a minimum of 12 educational engagements equating to a minimum of 48 hours of contact time.

#### **Considerations for Issuing a Scientific Collecting Permit**

- 1) Is the purpose adequate to justify removing the species (if the project requires this)?
  - Permits will be issued if the identified project is consistent with the goal of the Species Action Plan (i.e., improvement in status that leads to removal from Florida's Endangered and Threatened Species List), or addresses an identified data gap important for the conservation of the species.
- 2) Is there be a direct or indirect effect of issuing the permit on the wild population?
- 3) Will the permit conflict with program intended to enhance survival of species?
- 4) Will purpose of permit reduce likelihood of extinction?
  - Projects consistent with the goal of the Species Action Plan or that fill identified data gaps in species life history or management may reduce the likelihood of extinction. Applications should clearly explain how the proposed research will provide a scientific or conservation benefit for the species.
- 5) Have the opinions or views of other scientists or other persons or organizations having expertise concerning the species been sought?
- 6) Is applicant expertise sufficient?
  - Applicants must have prior documented experience with this or similar species; applicants should have met all conditions of previously issued permits; and applicants should have a letter of reference that supports their ability to handle the species.

#### **Relevant to all Scientific Collecting Permits for Barbour's map turtles**

- Visual encounter surveys that do not involve handling animals do not require a permit.
- Any activity that requires trapping or handling a Barbour's map turtle requires a permit. For example, these activities include collecting blood or genetic material for taxonomic analyses.
- Applications must include a proposal that clearly states the objectives and scope of work of the

project, including a justification of how the project will result in a conservation benefit to the species. The proposal should also include a thorough description of the project's methods, timeframe and final disposition of all individuals. Permit amendment and renewal applications must be "stand alone" (i.e., include all relevant information on objectives and methods).

- Permits may be issued to display a specimen if the specimen was obtained via rehabilitation facility or was encountered dead.
- Permits may be issued for captive possession (removal from the wild) if the individual is deemed non-releasable.
- Capturing and handling protocols, and a justification of methods, must be included in the permit application and should identify measures to lessen stress for captured turtles.
- Methodologies for any procedures, including radio transmitter attachment, should be clearly described, including measures taken to reduce stress and injury to the turtles.
- Methodologies for any collection of tissues such as blood and should be clearly spelled out, including measures taken to reduce stress and injury to the turtles.
- Disposition involving captive possession for any period of time must include a full explanation of whether the facility has appropriate resources for accomplishing the project objectives and for maintaining the animals in a safe and humane manner.
- Any mortality should be reported immediately to the FWC at the contact information below. The FWC will provide guidance on proper disposition of specimens.
- Geographical or visual data gathered must be provided to FWC in the specified format.
- A final report should be provided to the FWC in the format specified in the permit conditions.

### **Additional information**

Information on Economic Assessment of this guideline can be found at

<http://myfwc.com/wildlifehabitats/imperiled/management-plans/>.

### **Contact**

For more species-specific information or related permitting questions, contact the FWC at (850) 921-5990 or [WildlifePermits@myfwc.com](mailto:WildlifePermits@myfwc.com). For regional information, visit <http://myfwc.com/contact/fwc-staff/regional-offices>.

## **Literature Cited**

- Bartlett R. D. and P. P. Bartlett. Florida's turtles, lizards, and crocodylians, a guide to their identification and habits. University Press of Florida, Gainesville, Florida.
- Cagle, F. R. 1952. The status of the turtles *Graptemys pulchra* and *Graptemys barbouri* Carr and Marchand, with notes on their natural history. *Copeia* 1952:223-224.
- Dodd, C. K. 1990. Effects of habitat fragmentation on a stream dwelling species, the flattened musk turtle *Sternotherus depressus*. *Biological Conservation* 54:33-45.
- Enge, K. M., and G. E. Wallace. 2008. Basking survey of map turtles (*Graptemys*) in the Choctawhatchee and Ochlockonee rivers, Florida and Alabama. *Florida Scientist* 71:310-322.
- Ernst, C. H. and R. W. Barbour. 1972. *Turtles of the United States*. The University Press of Kentucky, Lexington, Kentucky.
- Ewert, M. A., P. C. H. Pritchard, and G. E. Wallace. 2006. *Graptemys barbouri* – Barbour's map turtle. Pages 260–272 in P. A. Meylan, (ed.) *Biology and conservation of Florida turtles*. Chelonian Research Monographs No. 3, Lunenburg, Massachusetts.

- Florida Department of Agriculture and Consumer Services [FDACS]. 2008. Silvicultural best management practices handbook. [http://freshfromflorida.s3.amazonaws.com/Media%2FFiles%2FFlorida-Forest-Service-Files%2Fsilvicultural\\_bmp\\_manual.pdf](http://freshfromflorida.s3.amazonaws.com/Media%2FFiles%2FFlorida-Forest-Service-Files%2Fsilvicultural_bmp_manual.pdf). Accessed 23 August 2017.
- Florida Department of Environmental Protection [DEP]. 2011. Outstanding Florida waters fact sheet. <https://floridadep.gov/dear/water-quality-standards/content/outstanding-florida-waters-fact-sheet>. Accessed 23 August 2017.
- Florida Fish and Wildlife Conservation Commission [FWC]. 2013. A species action plan for the Barbour's map turtle *Graptemys barbouri*. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.
- Garner, M. M., R. Herrington, E. W. Garner, M. M., R. Herrington, E.W. Howerth, B. L. Homer, V. F. Nettles, R. Isaza, E. B. Shotts, Jr., and E. R. Jacobson. 1997. Shell disease in river cooters (*Pseudemys concinna*) and yellow-bellied turtles (*Trachemys scripta*) in a Georgia (USA) Lake. *Journal of Wildlife Diseases* 33(1):78-86.
- Herrington, R. 1994. Proliferative shell disease in Lake Blackshear turtles. Report to Georgia Department of Natural Resources.
- Lindeman, P. V. 1999. Surveys of basking map turtles *Graptemys* spp. in three river drainages and the importance of deadwood abundance. *Biological Conservation* 88:33-42.
- Mays, J. D., and E. P. Hill. 2015. Barbour's map turtle survey. Florida Fish and Wildlife Conservation Commission. Fish and Wildlife Research Institute. Final Report Study #9724-295-6263.
- Moler, P. E. 1986. Barbour's map turtle census and habitat. Florida Game and Freshwater Fish Commission. Bureau of Wildlife Research Final Report Study #E-1-10-III-A.
- Moll, E.O., and D. Moll. 2000. Conservation of River Turtles. Pp. 126-155 in Klemens, M. W. (ed.). *Turtle Conservation*. Smithsonian Institution Press, Washington, D.C.
- Moore, M.J.C. and R. A. Seigel. 2006. No place to nest or bask: Effects of human disturbance on the nesting and basking habits of yellow-blotched map turtles (*Graptemys flavimaculata*). *Biological Conservation* 130:386-393.
- Moulis, R. A. 2008. Barbour's map turtle. Pp. 478-480 in Jensen, J. B., C. D. Camp, W Gibbons, and M. J. Elliott. *Amphibians and Reptiles of Georgia*. University of Georgia Press, Athens, GA. 575pp.
- Mount, R. H. 1975. *The Reptiles and Amphibians of Alabama*. Agricultural Experiment Station / Auburn University. Auburn, AL.
- NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>.
- Natural Resources Conservation Service (NRCS). 2012. Conservation practice standard overview. United States Department of Agriculture. December 2012. [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1255022.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1255022.pdf). Accessed 5 September 2017.
- Ruhl, J. D. 1991. Barbour's map turtle survey, Apalachicola River Wildlife and Environmental Area. Florida Game and Fresh Water Fish Commission Report. Tallahassee, Florida.
- Sanderson, R. A. 1974. Sexual dimorphism in the Barbour's map turtle, *Malaclemys barbouri* (Carr and Marchand). Masters of Arts thesis, University of South Florida, Tampa, Florida.
- Steen, D. A., B. C. Hopkins, J. U. Van Dyke, W. A. Hopkins. 2014. Prevalence of ingested fish hooks in freshwater turtles from five rivers in the southeastern United States. *PLoS One* 9: e91368.

- Steen, D. A., J. P. Gibbs, K. A. Buhlmann, J. L. Carr, B. W. Compton, J. D. Congdon, J. S. Doody, J. C. Godwin, K. L. Holcomb, D. R. Jackson, F. J. Janzen, G. Johnson, M. T. Jones, J. T. Lamer, T. A. Langdon, M. V. Plummer, J. W. Rowe, R. A. Saumure, J. K. Tucker, and D. S. Wilson. 2012. Terrestrial habitat requirements of nesting freshwater turtles. *Biological Conservation* 150:121-128.
- Sterrett, S. C., L. L. Smith, S. W. Golladay, S. H. Schweitzer, and J. C. Maerz. 2010. The conservation implications of riparian land use on river turtles. *Animal Conservation* 2010:1-9.
- Sterrett, S. C., L. L. Smith, S. H. Schweitzer, and J. C. Maerz. 2010. An assessment of two methods for sampling river turtle assemblages. *Herpetology Conservation and Biology* 5:490-497.
- Sterrett, S. C., L. L. Smith, A. Kaeser, R. A. Katz, J. C. Brock and J. C. Maerz. 2015. Spatial ecology of female Barbour's map turtle (*Graptemys barbouri*) in Ichauwaynotchaway Creek. *Copeia* 2015:263-271.
- U.S. Fish and Wildlife Service [USFWS]. 2017. Endangered and threatened wildlife and plants; 12-month findings on petitions to list 25 species as endangered or threatened species. Federal Register 82:46624-46626.
- U.S. Fish and Wildlife Service [USFWS]. 2001. Buffers: an efficient tool for watershed protection. [http://fwcg.myfwc.com/docs/Wetland\\_Buffers\\_USFWS.pdf](http://fwcg.myfwc.com/docs/Wetland_Buffers_USFWS.pdf). Accessed 16 August 2017.
- Van Dijk, P. P. 2011. *Graptemys barbouri*. The IUCN Red List of Threatened Species 2011: e.T9496A97417240. <http://dx.doi.org/10.2305/IUCN.UK.2013.RLTS.T9496A12995762.en>. Accessed 10 July 2017.
- Wahlquist, H., and G. W. Folkerts. 1973. Eggs and hatchlings of Barbour's map turtle, *Graptemys barbouri*. Carr and Marchand. *Herpetologica* 29:236-237.
- Wegner, S. 1999. A review of the scientific literature on riparian buffer width, extent and vegetation. Office of Public Service and Outreach, Institute of Ecology, University of Georgia, Athens, Georgia.