Water Log

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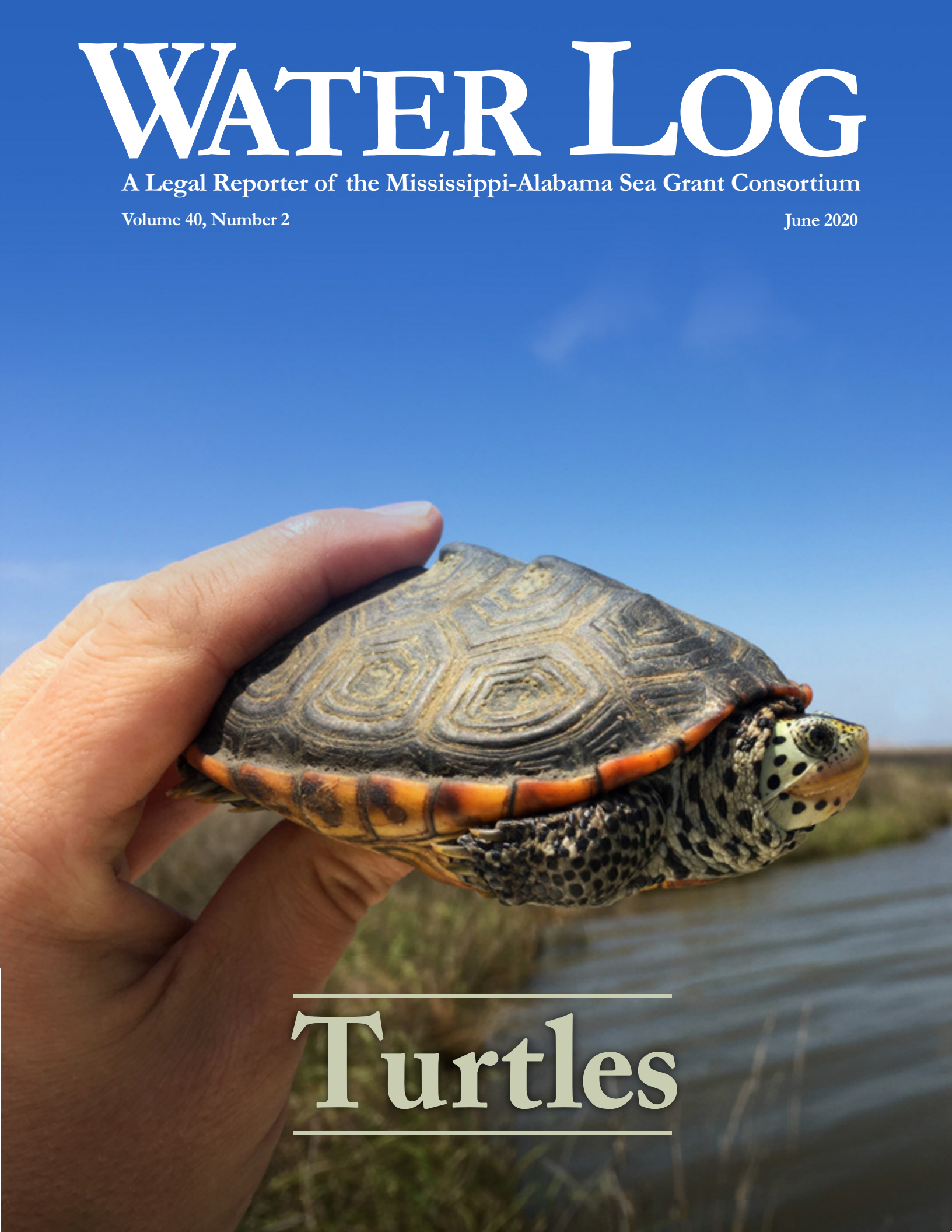

Turtles

WATER LOG

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Cover photograph: Male terrapin
Credit: Tom Mohrman

Table of Contents photograph: Group of turtles
Credit: Urban Bamboo Photos

COVID-19 Resources photograph: Lighthouse in Biloxi, MS
Credit: Steve McClanahan

COVID-19 RESOURCES

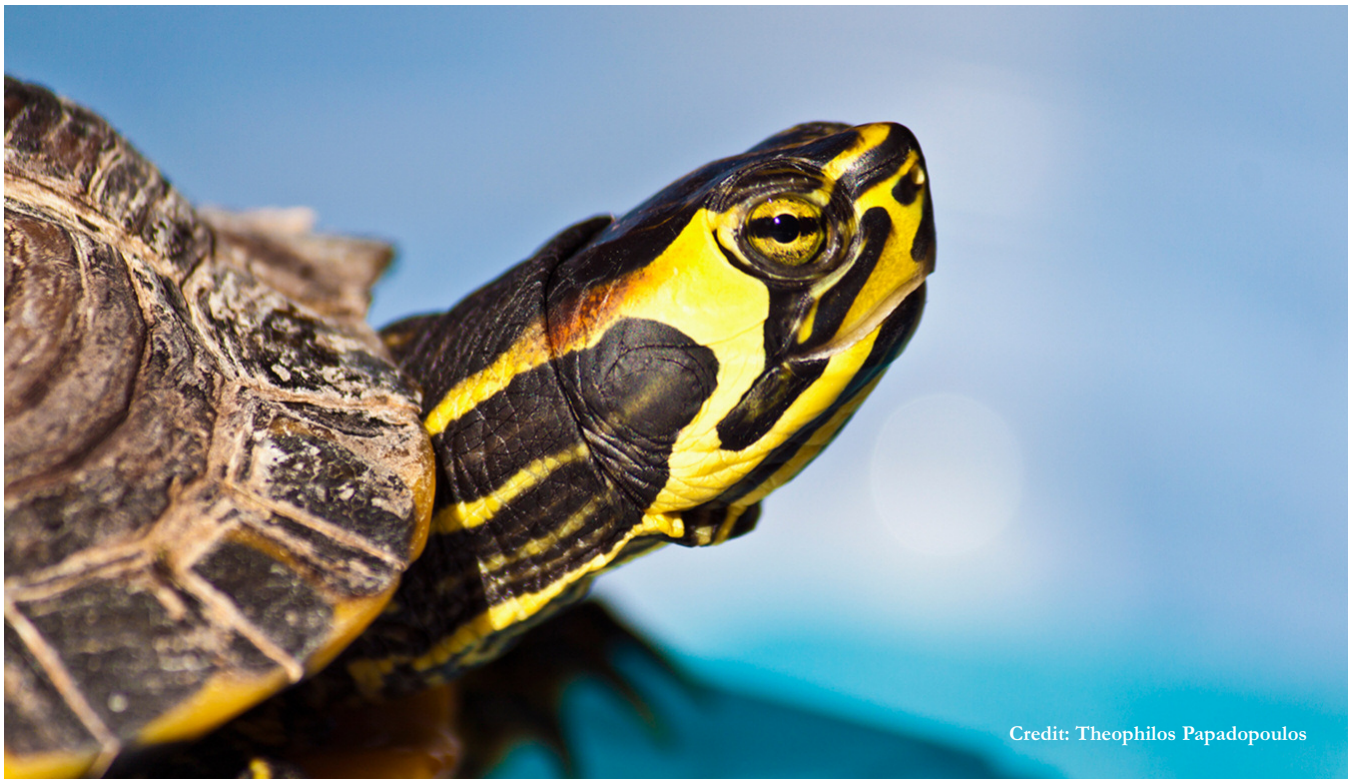
To help stakeholders navigate the complicated federal assistance offered to address financial hardships due to COVID-19, the Mississippi-Alabama Sea Grant Legal Program has worked with the National Sea Grant Law Center to develop online resources for those who live and work on the coast.

General information about the CARES Act and the amendment offering additional funds, including details on the different loan/grant programs and tax credits is available at http://nsglc.olemiss.edu/covid19.

Resources for financial assistance in Mississippi and Alabama are available at http://masglp.olemiss.edu/covid19.

The Law of the Turtle

Kristina Alexander


Credit: Theophilos Papadopoulos

Background

A turtle is unlike anything else. It has legs and a shell, and it gets along in almost every habitat, except extreme cold, and nobody blames it for that. The term turtle, despite what your neighbor might tell you, can mean shelled creatures living on land and sea, although some land turtles are further distinguished by being called tortoises and some aquatic (or semi-aquatic) turtles are called terrapins. They are all reptiles, although sea turtles (loggerhead, leatherback, green turtle, hawksbill, Kemp's ridley, olive ridley, and flatback) spend most of their lives swimming, while desert tortoises, for example, spend most of their lives far from water bodies.

A turtle shell is more properly called carapace for the top part, plastron for underneath. The divisions on the carapace are called scutes. Like the boat part of the same name, the keel is the ridge that runs vertically along the top of the carapace in many species. Turtles keep their shells for their lifetime. It is not an exoskeleton; they still have a skeletal system.

Turtles have natural predators, and they are at the most risk when they are small. Their biggest threat is from humans. Some of the threats to sea turtles include being caught in fishing gear, having their beach nesting sites eliminated by development, and dying from trash in the ocean. Land turtles risk being sold for pets, getting killed by cats, being shot for target practice, and being killed by habitat change – such as from pollution or damming rivers.

A raft of laws protects turtles from human threats. Federal laws run the gamut of limiting sale of turtles to requiring certain shrimping vessels to use devices to allow sea turtles to escape from nets. State laws describe rules on capturing and keeping turtles for personal and commercial use, including which turtles are so at risk of extinction that no capture is allowed.

Alabama Law

Both Alabama and Mississippi allow people to catch turtles that are not federally or state protected. Turtles that are not protected species fall into the category of nongame wildlife.

Alabama turtle regulations use terms seldom found elsewhere, like "turtle farmer" and "nuisance turtle." A turtle farmer needs a license to raise turtles for sale – as pets or food. A nuisance turtle is not doing anything different than a regular turtle but is called a nuisance when it interferes with humans fishing. Turtles tend to cluster around fish feeders in aquaculture ponds, or grab lines stealing bait meant for fish, but overall, they do not harm fish, and they improve the quality of the water body they call home. And so it is a crime in Alabama for anybody other than a permitted turtle farmer to take a nuisance turtle, no matter how annoying.

The state limits the number of turtles a person can catch for personal purposes to two a day. However, the turtles may not be trapped. They can be captured only by hand, dip net or hook and line. Breaking these rules can lead to a $100 fine. Additionally, certain turtles may not be captured in any quantity. Those are:

- Diamondback terrapin
- Gopher tortoise
- Alabama red-bellied turtle
- All map turtles
- Flattened musk turtle
- Alligator snapping turtle
- Razor-backed musk turtle
- Any turtle protected under federal law.[1]

The flattened musk turtle, endemic to Alabama (meaning it is found only there), demonstrates it is good to have friends in high places. What makes the flattened musk turtle special is that it has its own state law imposing a $5,000 fine for harming it.[2] The state fine is 50 times higher for taking a flattened musk turtle than for taking any other nongame turtles. It is also protected under the federal Endangered Species Act.

The nongame list of protected reptiles does not include sea turtles, but Alabama state law still prohibits their capture. Alabama has separate rules for what they call "marine or salt water turtles."[3] It is illegal to "take, catch, molest or [possess]" sea turtles. The penalty under state law is $100.

Mississippi Law

The Mississippi regulatory structure is similar to Alabama's except it puts more limits on the number of turtles people may take or possess, and it has larger fines. Under Mississippi wildlife regulations turtles fall into the category of nongame species in need of management. The names of Mississippi nongame turtles do not disappoint. The list includes the chicken turtle and the stinkpot. In general, only licensed hunters or fishers may catch nongame turtles for personal use, and there are limits on quantity depending on species. For example, only one alligator snapping turtle per person. Turtles may not be taken to be sold or traded, or raised for sale.

Catching or possessing turtles that do not fall into the category of nongame species in need of management, requires a permit in Mississippi. Those turtles include four sea turtles: green, hawksbill, Kemp's/Atlantic ridley, and leatherback; three map turtles: yellow-blotched, black-knobbed, and ringed; the Alabama red-belly turtle; and the gopher tortoise.

For any violations of the laws protecting nongame in need of management turtles (i.e. not the protected turtles), there is a $2,000-$5,000 fine, with an optional additional fine of $100 per turtle.[4]

Federal Law Protecting Turtles at Risk of Extinction

The federal Endangered Species Act (ESA) protects all sea turtles found in Alabama and Mississippi waters and shores. Additionally, the ESA protects four other turtles found in Mississippi and Alabama (T means threatened, and E, endangered): yellow-blotched map turtle (T); ringed map turtle (T); Alabama red-bellied turtle (E); and flattened musk turtle (T).

Under the ESA it is illegal to catch, harm, sell, possess, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to do any of those things with any endangered species. These actions are referred to as "takes" in ESA-talk. A knowing violation can lead to a criminal penalty of up to $100,000.[5] By "knowing," the law does not mean that the person knows that a particular turtle was a protected species before stomping on its eggs, for example, but that the person knew he was stomping on eggs.

In addition, the ESA makes it illegal to harm the habitat of a listed species if that damage disturbs the eating, mating, or nesting habits of the species. Also,

federal agencies must consider alternatives to programs and actions that would adversely affect designated critical habitat of listed species.

Threatened species, which include green and loggerhead sea turtles in the Gulf of Mexico, are protected to the same extent as endangered species unless a special rule is put in place. For example, there is a Special Rule for green sea turtles in the Gulf. Under that rule it is not considered a "take" of a green turtle if it is incidentally caught in fishing gear,[6] meaning while fishing for something else a turtle is caught by accident. There are no special rules for loggerhead sea turtles or any of the listed land turtles in Alabama and Mississippi.

Federal Law Limiting Incidental Sea Turtle Capture

As mentioned above, sea turtles are federally protected under the ESA, which makes injuring or killing them illegal, even if done without intending to hurt them. When fishing catches animals other than what was being fished for, it is known as bycatch. The Magnuson-Stevens Fishery Conservation and Management Act (the Magnuson-Stevens Act) requires regional fisheries to establish a bycatch reduction program.[7] Fishery Management Plans developed by eight regional councils around the United States consider bycatch reduction for each fishery. While the amount of bycatch is hotly debated, longline fisheries contribute to sea turtle deaths. According to one study, those rates could be reduced two to three times by the use of a circle hook rather than a J-hook (which refers to the shape of the hook).[8] And turtle bycatch is even lower when fish bait, rather than squid, is used to lure the intended fish. Rates of captured loggerhead dropped by 55 percent and for leatherbacks 64 percent when both techniques are used, according to that study.

Specific Federal Rules for the Gulf of Mexico

The Magnuson-Stevens Act regulations limit where pelagic longline gear may be used in certain parts of the Gulf when sea turtles come ashore to lay their eggs, from April 1 through May 31. They also require use of circle hooks.[9] Additionally, vessels with pelagic or bottom line gear must have on board the National Marine Fisheries Service (NMFS) document: "Careful Release Protocols for Sea Turtle Release with Minimal Injury."[10] When a sea turtle is snagged on a longline, the vessel must retrieve the gear and move at least 2 km away.

The Gulf of Mexico Fishery Management Council addressed sea turtle protection in 2018 when it revised the Fishery Management Plan (FMP) for reef fish, which include red snapper. FMPs are reviewed under the ESA to see if they are likely to jeopardize the continued existence of listed species, such as sea turtles. This review results in a Biological Opinion (BiOp) assessing the risk to the species by the proposed federal plan. In 2005 a BiOp was issued for the reef fish FMP, finding that sea turtles are incidentally caught in the lines while reef fishing, but that the FMP did not jeopardize the continued existence of any sea turtle species. The BiOp included measures for the fishery to take to increase survival rates of sea turtles.

Accordingly, the FMP requires specialized gear to limit the harm to turtles caught by accident. Those measures were updated in 2008, 2010, and 2018. The 2018 changes include using a collapsible hoop net, dehooking device, and small turtle hoist, and they required pliers of at least 11" to release hooked sea turtles. The hoop net is used to haul aboard turtles that are caught on the lines so that the fishing gear can be removed from the turtle on deck. Some of the more surprising additional gear for vessels using longlines include a tire to rest any snagged turtle on while the hook is extracted and two sturdy nylon dog bones to keep the turtle's mouth open.[11] When an injured turtle is "boated," among other procedures, fishers must attempt resuscitation for 4-24 hours.[12]

Longline fisheries are not the only fishery posing a risk of sea turtle bycatch. Turtle Excluder Devices, or TEDs, are required for shrimp trawlers in the Gulf of Mexico (and the South Atlantic) as part of the ESA incidental take provisions. A TED is a cage-like structure fitted midway in a shrimp net, allowing large creatures to push out, but the shrimp to pass into the net.[13] Under the rules, any shrimp trawler must have a TED in any net "rigged for fishing," basically meaning extra nets sitting on the boat do not need a TED installed.[14] There are some exceptions for shrimp trawlers depending on their size and gear.

Federal Law Limiting Turtle Sales, Internationally

Many more turtle species are protected under an international treaty than are listed under the ESA, however the protections for those turtles are limited. The international treaty, the Convention on International

Trade in Endangered Species of Fauna and Flora (CITES, pronounced sigh-tease), limits trade of listed species. The treaty is intended to protect species whose survival is threatened by commerce, such as elephants. The 178 member countries to CITES may list species within their countries that are harmed by trade. The United States, through the Fish and Wildlife Service (FWS), has listed dozens of turtle species for which commerce is banned, primarily due to risks from the pet trade.[15]

While that stops poachers from grabbing turtles, CITES does not address habitat protection. Therefore, although CITES forbids a developer from catching a desert tortoise to sell, the treaty does not prohibit killing the turtles. (Whether that's a violation of other laws is another matter.)

Federal Law Limiting Turtle Sales, Domestically

Other federal restrictions apply to turtles, even if they are not listed under the ESA. In 1975 Congress passed a law regulating turtle sales, putting the U.S. Food and Drug Administration in charge. The law was aimed at reducing salmonella, a disease that turtles can carry. As recently as January 2020, the Centers for Disease Control (CDC) linked contact with pet turtles to salmonella in 26 people in 14 states. One bit of advice from the CDC: "Don't kiss or snuggle turtles."

In terms of legal restrictions, the federal regulations prohibit selling or distributing turtle eggs or small live turtles (with shells smaller than 4") within the United States.[16] The size restriction is based on what the government thinks is too big for a turtle to fit in children's mouths, but the guidance notes that turtles bigger than 4" (which is almost all of them at maturity) still can carry salmonella. Online searches for small turtles lead to websites selling turtles, despite this law.

This law does not make it legal to sell *any* turtle bigger than 4 inches. It applies only to those turtles for which sales are not against the law. Thus, a turtle farmer cannot sell an Alabama red-bellied turtle no matter how big.

The most common pet turtle is the red-eared slider, a native to Mississippi and Alabama. Because sliders can get to 16" long, pet owners often let them loose when they have outgrown their cuteness, and now red-eared sliders are on a list of international invasive species. In comic books they are heroes: four red-eared sliders became the Teenage Mutant Ninja Turtles. These turtles live 4-6 months as a pet, on average, but 20-30 years in the wild.[17]

Conclusion

Admire from a distance might be the lesson of the Law of the Turtle. Turtles come in many shells, many sizes, and many locales, but one thing they all have in common is being at risk of human-caused harm. Some harm is intentional, such as folks selling turtles for pets or food, but much of it is incidental to other activities, like catching turtles in fishing gear. The laws are designed to curb human damage so that turtles can thrive.

Kristina Alexander is the Editor of Water Log and a Senior Research Counsel at the Mississippi-Alabama Sea Grant Legal Program.

Endnotes

1. Ala. Admin. Code r. 220-2-.92(c), (f).
2. Ala. Code Ann. § 9-11-269.
3. Ala. Admin. Code r. 220-2-3-33.
4. Miss. Code Ann. § 49-7-141.
5. 16 U.S.C. § 1540(b) indicates that the maximum criminal penalty for an ESA violation is $50,000. But under the Alternative Fines Act, a knowing violation of the ESA is a Class A misdemeanor when it is punishable by up to a year in jail (18 U.S.C. § 3559), and accordingly, the criminal penalty is adjusted to a maximum of $100,000 (18 U.S.C. § 3571).
6. 50 C.F.R. § 17.42(b)(1)(v).
7. 16 U.S.C. § 1865.
8. Yonat Swimmer, et al., *Sea Turtle Bycatch Mitigation in U.S. Longline Fisheries*, Frontiers in Marine Science (Aug. 25, 2017).
9. 16 U.S.C. § 635.21(c)(5)(iii)(B).
10. 50 C.F.R. § 635.21(b)(1).
11. 50 C.F.R. § 635.21(c)(5).
12. 50 C.F.R. § 635(c)(5)(ii)(B).
13. For more on TEDs, *see* Ryan Bradley, *A Fisheye Perspective on Bycatch Reduction Devices in the Gulf of Mexico Shrimp Fishery*, Water Log (Sept. 2019).
14. 50 C.F.R. § 223.206(d)(2)(i).
15. The turtles listed under CITES in addition to sea turtles are: alligator snapper, common snapper, southern painted, chicken, common map, Pascagoula map, pearl map, Mississippi map, Alabama map, Ouachita map, diamondback terrapin, river cooter, Carolina box, red-eared slider, eastern mud, razorback musk, stripeneck musk, stinkpot, smooth softshell, and spiny softshell. *See* CITES, *Checklist of CITES Species*.
16. 21 C.F.R. § 1240.62.
17. 40 Fed. Reg. 22543 (May 23, 1975).

A Shell of Their Former Selves:

Environment Groups Seek Greater Protections for Sea Turtles

Andrew W. Rock

Nonprofit environmental protection groups sued the National Marine Fisheries Service (NMFS), arguing that it failed to protect endangered sea turtles. The first lawsuit in the federal District Court for the Northern District of California succeeded. The court found that NMFS broke the law by allowing longline fishing that could harm sea turtles. The second suit is in progress, and the same nonprofits argue that NMFS failed to preserve sea turtles by neglecting to protect their habitat. They claim the government's failure violated the Endangered Species Act (ESA). Both of these cases could increase protections for endangered sea turtles in the Gulf of Mexico.

Sea turtles are marine reptiles that live in the ocean. They nest and lay eggs on beaches, and spend most of their lives at sea, often migrating hundreds or thousands of miles through the ocean to feed and reproduce.[1] Humans have long been a threat to them. People hunt turtles for their meat and shells, ensnare them in fishing equipment, or destroy the habitat turtles need to survive. Of the seven existing species of sea turtles, five are present in the Gulf of Mexico.[2] (These species are loggerhead, green, leatherback, Kemp's Ridley, and hawksbill.) All five of these species are listed as threatened or endangered under the ESA. This means they are at risk of dying out.

California Longline Fishing Lawsuit

In the first lawsuit, the federal court in California ruled that NMFS violated environmental protection laws because it issued two permits that allowed longline fishing in the Pacific.[3] Longline fishing is a large-scale fishing technique in which a boat pulls thousands of yards of fishing line. These lines carry hundreds or thousands of baited hooks, which allows mass harvesting of fish. Unfortunately, the lines also hook sea creatures such as turtles, a phenomenon known as "bycatch." Each year, longline fishing operations ensnare many endangered sea turtles. Turtles snagged by these lines often drown because they cannot reach the surface to breathe, or starve after swallowing hooks that obstruct their digestive tracts. Others survive but suffer painful injuries from the hooks. Longline fishing is therefore essentially banned off the coast of California due to the threat to endangered sea turtles.

The nonprofits Center for Biological Diversity (CBD) and Turtle Island Restoration Network (Turtle Island) filed a lawsuit arguing that NMFS had violated numerous environmental laws by allowing longline fishing to resume. The nonprofits quickly asked the court to rule in their favor because, they argued, the facts and law were clearly on their side, so there was no reason to continue the case. The court granted the nonprofits' request, holding that NMFS had violated the ESA, the National Environmental Policy Act (NEPA), and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The court decided that it was against the law for NMFS to risk harming turtles by issuing the longline fishing permits.

The ESA requires a federal agency to use the "best scientific and commercial data available" when it considers an action that may threaten an endangered species.[4] To achieve this goal, NMFS is required to research and write Biological Opinions, or BiOps. The scientific studies in this case analyzed sea turtle populations and the dangers of longline fishing. The court found (and the government admitted) that NMFS had ignored a BiOp from 2017 when it issued the longline fishing permits. This BiOp showed an alarming decline in the population of leatherback sea turtles. The judge decided that NMFS had broken the law by issuing longline fishing permits despite the warnings in the 2017 BiOp.

The court further explained that NMFS had also violated the Magnuson-Stevens Act. The Magnuson-Stevens Act requires federal agencies to follow federal law, including the relevant parts of the ESA. The court therefore found that violating the ESA resulted in a violation of the Magnuson-Stevens Act.

The court was not finished. The judge said that NMFS had violated another law: NEPA. This law required NMFS to evaluate whether its actions significantly harmed the environment. NMFS contradicted itself on this issue. At one point, it claimed that the death of a single turtle from longline fishing was a significant impact on the environment. It later said that it was not. This contradiction led the court to find that calling a single turtle's death insignificant violated NEPA, because NMFS had not thoroughly evaluated its actions.

Gulf of Mexico Longline Fishing

There are similar problems with longline fishing in the Gulf of Mexico. NMFS has previously enacted restrictions on longlining in the Gulf to protect endangered turtles. In the summer of 2009, temporary rules decreased the areas of the Gulf where longline fishing was permitted.[5] NMFS issued this rule after determining that bycatch from longlining was hurting too many sea turtles. (For example, the National Bycatch Report estimated that the Gulf Bottom Longline Fishery caught approximately 10.37 sea turtles per year as of 2005).[6] The authorities later issued a permanent rule banning longline fishing in certain areas from June – August of each year. This rule also reduced the number of longline fishing vessels allowed in the area.[7] The government claims that these measures significantly reduced bycatch and that the fishery is no longer a threat to the turtle population. However, it has acknowledged that the general practice of longline fishing is still a threat to sea turtle recovery.

Recall the California court's no-tolerance treatment of hurting sea turtles. It was illegal for the government to ignore the possibility of a single turtle dying from longline fishing. Some could argue that if the government was wrong to risk a *single* sea turtle death, then it is much worse to risk ongoing deaths in the Gulf. Keep in mind that the California case only involved two permits for longline fishing—a very small operation contrasted with the Gulf fishery. Permitting an entire longline fishery to continue creates a larger chance of bycatch. After all, the term bycatch "reduction" indicates that bycatch still occurs, just in smaller numbers than before. This is especially important since the government has acknowledged the ongoing dangers of longline bycatch to sea turtles. In light of this admission, advocacy groups could argue that an abundance of caution disfavors longline operations in the Gulf.

Critical Habitat Lawsuit

Gulf longline fisheries are not the only area where NMFS arguably needs to protect sea turtles. CBD and Turtle Island (the same nonprofit organizations from the California case above) filed a lawsuit in January 2020 against both NMFS and the Fish and Wildlife Service (FWS) (together, the Services) for their failure to protect critical habitat for green sea turtles. The ESA requires the Services to designate protected habitat for a species once they list the species as threatened or endangered. If there is not enough information to determine the species' critical habitat at the time, the Service must designate it within a year.

According to the ESA and the regulations that accompany it, a species is endangered when it is at risk of extinction in the area it occupies. It is threatened when it is at risk of becoming endangered. In other words, if a species or part of a species is in danger of dying out, it is likely threatened or endangered. A species' "critical habitat" includes areas "essential to the conservation of the species."[9] This means places that the creatures need in order to survive, such as beach areas where sea turtles nest and lay eggs. It is difficult for the turtles to reproduce when human activity damages these spots. The ESA does not protect these areas until the Services designate them as critical habitats. A failure to designate critical habitat puts sea turtles at risk of damage or destruction from pollution or new construction.

The nonprofits argue that in 2015 NMFS and FWS listed eleven distinct populations of green sea turtles in the Atlantic and Pacific as endangered or threatened. The North Atlantic distinct population segment of green sea turtles includes those of the Gulf of Mexico. Nearly five years later, the Services still have not designated critical habitats for these populations. The nonprofits claim that regulations gave the agencies a year maximum to designate the habitats. However, they allowed that deadline to pass without action. The nonprofits contend


Credit: Alan Graf

that this failure by NMFS and FWS is against the law. Therefore, CBD and Turtle Island argue that the court needs to intervene and compel the agencies to act.

Specifically, they are asking the court to declare that NMFS and FWS broke the law by missing the original deadline. The nonprofits also asked the court to set a deadline for the agencies to designate critical habitats for the green sea turtle.

Critical Habitat in the Gulf of Mexico

Critical habitat is relevant to protecting sea turtles in the Gulf of Mexico. A court ordering NMFS and FWS to protect the critical turtle beach habitats for North Atlantic populations of the green turtle arguably will increase protection for all Gulf sea turtles. The government has only designated critical habitat in the Gulf for one of the five sea turtle species that live there. Specifically, NMFS and FWS designated areas of the Gulf as critical habitat for the loggerhead sea turtle in 2014.[10] Three of the other species—the green sea turtle, leatherback, and hawksbill—have critical habitat designated elsewhere, but none in the Gulf.[11] Perhaps worse, NMFS and FWS have not designated critical habitat anywhere for Kemp's Ridley turtles.[12] Turtle Island requested that the administration designate Gulf beaches where Kemp's Ridley turtles nest as critical habitat in 2017, to no avail.[13] Environmental groups have repeatedly requested critical habitat protections for the Kemp's Ridley species since at least 2010.[14] The current lawsuit to identify green sea turtles' Atlantic and Pacific critical habitats is based on missed deadlines to designate critical habitat for them.

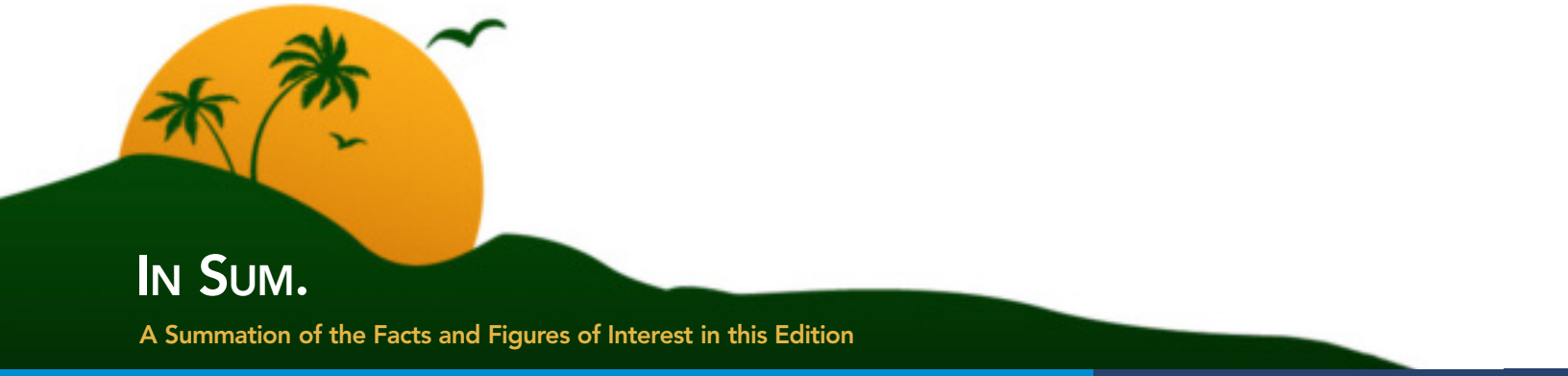
Conclusion

The twin issues of longline fishing in California and failure to designate critical habitats for green sea turtles both show promise for protecting Gulf turtles. Although sea turtle bycatch from longline fisheries in the Gulf has decreased, it is still an issue. The recent court decision from California demonstrates that one turtle dying may be too many. This creates the possibility of an argument against allowing the risks of longlining to continue in the Gulf. Likewise, a lawsuit requiring habitat protections for green sea turtle populations in the Atlantic and Pacific could lead to enhanced protection for all sea turtles in the Gulf of Mexico.

Andrew W. Rock was a Legal Intern with the Mississippi-Alabama Sea Grant Legal Program at the time of writing this article. He graduated from the University of Mississippi School of Law in May, 2020.

Endnotes

1. National Geographic, *Sea Turtles, Facts and Information*, nationalgeographic.com (2020).
2. National Oceanic and Atmospheric Administration, *Frequent Questions: Northern Gulf of Mexico Sea Turtle Strandings*, noaa.gov (*revised* July 16, 2019).
3. Center for Biological Diversity v. Ross, 2019 WL 7020195 (N.D. Cal. 2019).
4. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).
5. World Fishing and Aquaculture, *Longlining Restrictions in the Gulf of Mexico*, worldfishing.net (June 1, 2009).
6. National Oceanic and Atmospheric Administration, *U.S. National Bycatch Report*, noaa.gov (Sep. 30, 2011).
7. National Marine Fisheries Service, *Endangered Species Act - Section 7 Consultation Biological Opinion*, fws.gov (Feb. 10, 2016).
8. Center for Biological Diversity v. Bernhardt, 2020 WL 95717 (*filed* Jan. 8, 2020).
9. 16 U.S.C. § 1532(5)(A).
10. National Marine Fisheries Service, *Endangered and Threatened Species: Critical Habitat for the Northwest Atlantic Ocean Loggerhead Sea Turtle Distinct Population Segment (DPS) and Determination Regarding Critical Habitat for the North Pacific Ocean Loggerhead DPS*, 79 Fed. Reg. 39855 (July 10, 2014); National Marine Fisheries Service, *Loggerhead Turtle - Northwest Atlantic Ocean DPS Critical Habitat Map*, fisheries.noaa.gov (June 26, 2019); Fish and Wildlife Service, *Index Map of Critical Habitat Units for the Northwest Atlantic Ocean Loggerhead Sea Turtle DPS*, fws.gov (2014).
11. Fish and Wildlife Service, *Leatherback Sea Turtle Fact Sheet*, fws.gov (April 2015); Fish and Wildlife Service, *Designated Critical Habitat; Green and Hawksbill Sea Turtles*, 63 Fed. Reg. 46693 (Sep. 2, 1998).
12. Fish and Wildlife Service, *Kemp's Ridley Sea Turtle Fact Sheet*, fws.gov (Apr. 5, 2015).
13. Turtle Island Restoration Network, *Consider the Kemp's Ridley Sea Turtle*, seaturtles.org (Dec. 18, 2017).
14. National Oceanic and Atmospheric Administration, *Kemp's Ridley Turtle* (Lepidochelys kempii), nrc.gov (Nov. 15, 2013).



In Sum.

A Summation of the Facts and Figures of Interest in this Edition

★ *State fine (max.) in Alabama for harming a flattened musk turtle:*	$5,000
★ *Federal fine (max.) for harming a flattened musk turtle:*	$100,000
★ *Species of sea turtles found in the Gulf of Mexico:*	5
★ *Rank of red-eared slider among the world's most invasive species:*	Top 100
★ *Number of red-eared sliders named after Renaissance artists:*	4 (at least)

Conserving Gulf Coast Diamondback Terrapins

Tom Mohrman

Credit: Christina Mohrman

The diamondback terrapin is probably the most charismatic turtle you haven't heard about. They are shy aquatic inhabitants of the Gulf and Atlantic coasts. A medium-sized turtle, they live in the brackish waters, estuaries, bays and bayous, that are neither too salty nor too fresh. They are hard to spot in their native salt marsh and mangrove habitats, but sometimes they can be seen basking in the sunshine. Or, if you are lucky enough, you might see a small turtle head poking above the water line while it is on the hunt for food.

Diamondback terrapins get their name for the diamond shaped "scutes" on the back of their shells. There is a lot of variation among these turtles, with many subtle differences in shell color that includes natural tones of orange, yellow, and brown. They can have contrasting skin patterns that can include stripes, spots, or speckles in different combinations. Some terrapins have pale yellow or blue tones to their faces, and others even have a dark pigmented skin stripe or "mustache" that runs above their beak.

Once terrapins get to an adult size, they are among the top predators in the estuary. These opportunistic feeders target a variety of invertebrates such as crabs, snails, and bivalves, as well as fish (dead or alive), and anything else edible they can get a hold of. Of particular note, terrapins feed on marsh grazing snails, helping to control those populations of herbivores.

Terrapins are only distantly related to sea turtles and are more closely kin to river turtles and map turtles. They are aquatic, spending the majority of their lives in the water, and have webbed toes instead of flippers. They tend to stay close to their estuarine home, and typically do not venture into the open waters of the Gulf. Female terrapins are roughly the size of a cantaloupe cut in half. Females are about twice as large as males as they need the extra size to develop eggs.

During nesting season, terrapins need to leave the water for high ground. Pregnant females leave the marsh searching for suitable nesting sites above the high tide line. Terrapins eggs do not survive being flooded by water for long, so nest

site selection is very important. Historically, terrapins would seek out pocket sand beaches, oyster hash islands, or other "dry" embankments that are adjacent to wetland habitat. As development has occurred, terrapins have incorporated nesting on road causeways, permeable driveways, or front yards if they are accessible by water. Access to land from water is important as terrapins typically cannot overcome bulkheads or other man-made obstructions. The number of eggs a terrapin lays can vary based on several factors such as geography, climate, and the individual variation of the turtle, but in general terrapins lay between 6 and 12 eggs. In a typical year a female may lay more than one "clutch" or group of eggs a year.

Over the last century or so, terrapins have been in decline. A craze for terrapin stew in the 1920s saw thousands of terrapins shipped out of the Gulf to satisfy the fad. Little historic data exist from that period other than fisheries landing records, so it is difficult to know if the species ever fully recovered.

Terrapins are a long-lived species once they get to be an adult sized turtle, living 30 years or more, but their eggs and hatchlings are an easy meal for many predators. In order to be sustainable, the species needs to have at least one or two offspring survive to reproductive maturity, which isn't necessarily an easy task with so many other animals trying to gobble them up. Today, potential concerns include the loss of wetland and nesting habitat, predation of turtle nests, interactions with abandoned or lost fishing gear, and the illegal collection for export. In most Gulf states they are classified as a "species of conservation concern" and considered to be in decline.

To address concerns related to diamondback terrapins, The Nature Conservancy is leading a collaborative effort to create a conservation action plan to outline strategies to support the turtle or abate its threats. Working with stakeholders from all five Gulf states, development of this plan draws on the expertise of resource managers, academics, conservationists, educators, and outreach specialists to develop actions that are reasonable and achievable to implement. Strategies can take the form of prioritizing research topics, protection of key habitats, education and outreach efforts, volunteer efforts, or management actions such as supporting derelict fishing gear roundups. The process is designed to be a collaborative approach that connects different stakeholder groups to one another.

Credit: Tom Mohrman

Working together and building teams makes implementation of recommended actions reasonable to achieve. Hopefully, this level of collaboration will have a real and measurable impact on the species that would help support a reversal of its status as a species considered to be in decline.

At the time of this article, the project has completed three webinars with several more planned. With the impact of the COVID-19 outbreak, what would traditionally be in-person workshops have been adapted to a series of webinars and eventually conference call style conversations. At this point, over 100 individuals have participated or contributed in some way to the project. We anticipate having a specific chapter and set of strategies to guide each state as well as overall strategies that apply Gulf wide.

This project is being funded by the Gulf of Mexico Alliance Gulf Star program. Gulf Star is a public-private partnership with flexibility to collaborate with others in the Gulf region. The goal of the Gulf Star program is to facilitate partnerships between the Gulf of Mexico Alliance and outside funders who wish to use their investments strategically to achieve measurable results around priority issues that are common to all five states of the Gulf of Mexico region: sustainable seafood, loss of critical habitats, coastal resilience, water quality and quantity, living marine resources, and data and monitoring. The project was recommended by the GOMA Wildlife and Fisheries team and supports actions recommended in the Governors' Action Plan III.[1]

Tom Mohrman is the Director of Mississippi Marine Programs for The Nature Conservancy.

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Striking a Balance Between Starry Skies and Urban Illumination

Stephen Deal

For countless centuries, people have looked up at the night sky in awe and wonder. However, the starry night skies have been increasingly subsumed by ambient light from cities. Many urban areas across the world are over-illuminated, leaving city dwellers unable to take in the natural day-night pattern of the skies. This disruption is not merely a setback for stargazers; excessive lighting from city streets can have an adverse impact on wildlife and human welfare. Sea turtle hatchlings, which instinctively crawl towards the night sky to reach the safety of the ocean, may be enticed by the stronger glow of nearby streetlights. Artificial lights also steer migratory bird species off course and interfere with their ability to detect ideal conditions for nesting.[1] Overly bright lighting in residential areas can disrupt human sleeping habits as well. These impacts associated with excess lighting show that cities have an important role to play in regulating lighting sources.

Understanding Light Pollution

If cities are to successfully curb light pollution, it is important to understand how light illumination is measured. One basic measure employed when discussing lighting sources is the term lumen. The International Dark Sky Association, a group calling attention to light pollution, defines a lumen accordingly: "[a] unit of luminous flux; the flux emitted within a unit solid angle by a point source with a luminous intensity of one candela."[2] A candela is a unit of measurement for luminous intensity. For the purposes of regulatory enforcement, city governments generally use lumen totals to describe the acceptable range of streetlights and other forms of artificial illumination.

Another term to be mindful of is color temperature, which measures a light source's warmness or coolness. Color temperature range, measured on the Kelvin scale, is based on what a piece of metal would look like if heated to a certain temperature.[3] For example, a lamp with a color temperature of less than 3,200 K would emit a pinkish color and be considered warm. By comparison, a lamp with a temperature greater than 4,000 K would emit a bluish-white light and be considered cool. The concept of color temperatures is important when examining LED lights.

With the arrival of LEDs to the lighting market in the early 2000s, the ability to procure cheap sources of illumination became easier. Traditional incandescent light bulbs provided 10 lumens for every watt of power; by comparison a new LED light bulb can deliver more than 100 lumens per watt. While LEDs are prized for their energy efficiency and longevity compared to older lighting technologies, they bring new challenges. LEDs emit a different type of light than traditional incandescent bulbs, enhancing blues and whites in contrast to incandescents, which enhance reds and yellows. Older streetlights, for example, emit a color temperature of 2,000 K; LEDs, by comparison, emit cooler color temperatures of 3,000 or even 4,000 K.[4] Cool color temperatures that are in the blue or white spectrum are more comparable to regular sunlight; thus, such wavelengths can suppress melatonin at night, interfering with human sleeping patterns. Lights in the white spectrum also increase skyglow much more than comparable illumination levels with a warmer color temperature.

When Tucson, Arizona phased out high-pressure sodium lighting fixtures in favor of LED fixtures, the city reduced its lumen budget from about 480 million lumens to 170 million lumens. This reduction in the city's lumen budget for streetlights effectively compensates for the cooler color temperatures emitted by its LED lights.

Cities may opt to connect new streetlights to a wireless network to control the amount of light from city light fixtures. In Tucson local officials connected 23,000 new streetlights to a wireless network that enables dimming and

also collects data on energy usage.[5] The new streetlights are used at reduced luminosity as a way to limit light pollution. For example, all the lights were dimmed to 90 percent brightness when first installed, and in areas with low nighttime foot traffic the lights are dimmed to 60 percent brightness at midnight or at 3 am in other areas.

Learning Lessons from Flagstaff's Dark Sky Approach

One city at the forefront of using lighting regulations to control light pollution is Flagstaff, Arizona. Flagstaff, which is home to the U.S. Naval Observatory, has a compelling economic interest in ensuring that city lights do not interfere with night sky observation. The city first adopted lighting regulations nearly 60 years ago, and it continues to modify its regulatory approach to address new lighting technologies. Its innovation in lighting regulation and use of dark sky friendly urban illumination earned the city the world's first International Dark Sky City designation in 2001.[6]

Flagstaff's lighting regulations divided the city into lighting zones, with maximum lumens per net acre set for each zone. Three distinct lighting zones are set within the city, and the lumens per net acre range from 10,000 lumens for zone 1 residential properties to 100,000 lumens for zone 3 commercial and industrial properties. To comply with lighting zone standards property owners generally have two options: install lights with low illumination outputs or deploy full or partial shielding on city light sources to ensure that illumination doesn't spill over onto adjacent properties. For external illumination, Flagstaff recommends installing low-pressure sodium lamps or narrow-spectrum amber LED lights.

In highly developed commercial zones, however, more high-powered sources of illumination are needed to advertise, and that is where light shielding becomes more pressing. Lighting ordinances in Flagstaff stipulate that all light fixtures, even security lighting, must be aimed and shielded so that illumination is confined to the property boundaries of the light source. Shielding is an opaque material that blocks or constrains the transmission of light. Shielding may be installed internally within the casing of the light fixture or attached externally to the light fixture. External shields must be painted black to minimize reflectivity. Shields bring more high-powered light sources into compliance and confine light to the area where external illumination is needed.

In addition to having lighting regulations, cities can also help keep urban illumination to a minimum by educating the citizenry on the value of dark skies and providing basic information on how to reduce light pollution. Flagstaff has helped enhance dark sky education by obtaining community buy-in for city projects to reduce light pollution. When Flagstaff was planning on installing new streetlights, local government officials put up test sections of different fixtures, so citizens could see the new lighting options in action and provide feedback. The city's commitment to dark skies is also heavily touted in city marketing campaigns. Around 2019 the city conceived the Flagstaff Lunar Legacy Campaign, which promotes astronomy-based tourism.[7] The city's night skies are prominently displayed on the front cover of the 2020 Flagstaff Visitor Guide and a locally organized Dark Skies Coalition helps organize events centered on stargazing.

Regulating Illumination for the Benefit of Wildlife

Preserving dark skies for astronomy is a primary driver of lighting regulations, but it is not the only one. For coastal cities and counties, one consideration for lighting regulations is the protection of sea turtles that use the shorelines as nesting sites. The problems city lights pose for sea turtles are twofold: nesting females may be confused by bright lights and leave the beach unable to nest, and new turtle hatchlings may mistake city lights for the starry sky and wander into populated areas away from the safety of the ocean.[8] The longer it takes turtle hatchlings to reach the ocean increases the likelihood of hatchlings succumbing to dehydration, predation, and death.

To better understand lighting regulations within this policy context, a good starting point is to review the different ordinances enacted in Florida with its vast shoreline and large number of coastal communities. In Florida, officials there have developed a model lighting ordinance for the purposes of marine turtle protection. The model ordinance is available for download at the Florida Fish and Wildlife Commission website.[9] The website lists the different Florida municipalities and county governments that have adopted sea turtle protection ordinances.

For Mississippi and Alabama, the City of Gulf Shores, Alabama, is a good example of a local coastal community that imposes lighting standards for sea turtle conservation within its zoning ordinances.[10] To start, Gulf Shores designated a Marine Turtle Conservation Zone which includes the beach and all land abutting the beach from the mean high tide line between two highways within city limits. Within that zone, only certain exterior lighting on structures is allowed.

According to the zoning ordinances, the regulations are "intended to protect marine turtle hatchlings from the adverse effects of artificial lighting, to provide overall improvement in nesting habitat degraded by light pollution, and to increase successful nesting activities and production of hatchlings on the beaches located within the Marine Turtle Conservation Zone." Additional restrictions are placed to limit light from within structures. The zoning ordinance requires tinted glass in all windows and glass doors that can be seen from the beach, including structures outside of the Marine Turtle Conservation Zone. The tinted glass is required to limit transmittance value light from inside to outside to 45 percent or less. Street lights, including existing fixtures, must meet three requirements to help turtles:

- The point source of light or any reflected surface of the light fixture is not directly visible from the Beach;
- Areas seaward of the Frontal Dune are not directly or indirectly illuminated; and
- Areas seaward of the Frontal Dune are not cumulatively illuminated.

Artificial light fixtures near, or adjacent to sea turtle nesting habitats should try and conform to three basic management principles: keep it low, keep it long, and keep it shielded. Light fixtures should remain low to the ground to minimize light trespass (where light shines beyond the area it is intended to illuminate) and use long wavelength light sources, such as amber and red light bulbs. It is also strongly recommended that any beachfront illumination use shielding to keep light from shining beyond the area it needs to illuminate. For beachfront properties, many regulations also advise tinting windows to reduce artificial illumination.

An analysis of existing sea turtle lighting ordinances conducted by the University of Florida highlights best management practices for ensuring that sea turtle protection regulation is robust.[11] One best practice is prohibiting direct or indirect illumination in areas seaward of the frontal dune system. A coastal lighting ordinance may also place seasonal restrictions on building bonfires while sea turtles are nesting. Since sea turtle nesting can range from as early as March 1st to as late as October 31st, public education is critical in achieving compliance with local regulations. Many coastal jurisdictions, such as Escambia County, maintain a sea turtle lighting webpage which details the impacts associated with excess lighting and gives basic recommendations to residents on how they can make their home sea turtle friendly. The Florida Fish and Wildlife Commission also has a "wildlife lighting" designation coastal communities can reference that identifies artificial lighting options that will not interfere with coastal wildlife such as sea turtles.

Conclusion

As urban lights have become a hallmark of human settlement, their negative externalities have grown such that they disrupt natural rhythms and cycles. This has negative consequences for animals and for city-dwellers as well. In light of these findings, planners should consider developing regulatory standards aimed at curbing the intensity of light sources. Cities may enact lighting zones, which set different lighting standards for different regions of the city, or provide regulatory guidance on properly shielding light fixtures to minimize their impact. Through a careful application of city lighting regulations and continual monitoring of external lighting innovations, cities will be able to take back the night in some modest measure for local stargazers and animal life.

Stephen Deal is the Extension Specialist in Land Use Planning for the Mississippi-Alabama Sea Grant Legal Program.

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The University of Mississippi
WATER LOG
Mississippi-Alabama Sea Grant Legal Program
258-E Kinard Hall
University, MS 38677-1848

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Editor: Kristina Alexander

Publication Design: Barry Barnes

Contributors:
Stephen C. Deal
Tom Mohrman
Andrew W. Rock

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