

# Searching for Sawfish: A History of the Hunt

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**B**rother Simon, Am sending you my latest photo with a sawfish that I speared several nights ago. Length 6 ft. 7 in. Weight 42½ lbs. . . . Was there [in Pensacola] when the ships and boys left for Mexico. I also saw four airships fly at once. . . .”

— F. J. Heintz

This is the message on the back of a postcard mailed from Panama City, Florida, on 25 April 1914, to Rome, Wisconsin. It is remarkable because Mr. Heintz witnessed an important event in world history: the departure of United States troops to Vera Cruz for the overthrow of Mexican dictator General Victoriano Huerta (Neubeck, 1971). It is also remarkable because Mr. Heintz participated in a peculiar activity in natural history: the hunting of a sawfish.

## Native Toothy Giants

Sawfishes are familiar in form but mysterious in habit. Their distinctive appearance makes them immediately recognizable to even the most casual observer, but many details of their lives remain unknown to even the most devoted ichthyologist. Broadly distributed throughout tropical seas, sawfishes are included in numerous references on marine fishes but are rarely encountered in the wild. Curious about the history of these unusual fishes, I have amassed a collection of sawfish specimens, literature and images. These items tell a fascinating story of two species once common along Gulf and Atlantic coasts but which today are uncommon and imperiled.

Identifications of North American sawfish species are based on characteristics of the saw and fins (Baughman, 1943; Breder, 1948; Robins and Ray, 1986; Parsons, 2006).

The Smalltooth Sawfish (*Pristis pectinata*) has been observed in this country for more than 200 years. It has a longer saw, comprising approximately 25% of its total length (TL), usually with 23-34 rostral teeth per side. The first dorsal fin is directly over the pelvic fins and the caudal fin lacks a lower lobe. The Largetooth Sawfish (*P. perotteti*) was not discovered in U.S. waters until the 1940s. It has a shorter saw, approximately 20% of the total length of the fish, usually with 16 to 22 rostral teeth per side. The first dorsal fin is forward of the pelvic fins and the caudal fin has a small lower lobe. Smalltooth Sawfish occur along the Atlantic coast of North America; both species occur in the Gulf of Mexico and in the Atlantic Ocean south to Brazil. In Texas waters, collections of rostra indicate that the Smalltooth Sawfish once outnumbered Largetooth Sawfish 3:1. Both species are huge, documented at 5.5 m TL in U.S. waters (Bigelow and Schroeder, 1953).

Both species inhabit shallow water and tolerate low salinities. The Largetooth Sawfish, in particular, is known to ascend rivers and occupy freshwater for extended lengths of time (Compagno and Cook, 1995). The best-known freshwater population of Largetooth Sawfish occurs in Lake Nicaragua. Life history and commercial exploitation are documented by Thorson (1976) and Thorson (1982). In the U.S., sawfish have also been found in freshwater. Constantine Samuel Rafinesque reported sawfish 1-2 m TL from the Mississippi River, Lake Pontchartrain, Red River, and even in the Ohio River (Rafinesque, 1820).

## Fabulous Fish Tales and Anatomical Artifacts

Sawfishes are cartilaginous fishes intermediate in form between the torpedo-shaped sharks of open water and the

Fig. 1.

Ventral view of Smalltooth Sawfish, *Pristis pectinata*.  
Drawing by H. L. Todd of specimen collected from  
Gulf of Mexico, Pensacola, FL, in 1882, by Silas Stearns  
(United States National Museum Catalog Number 30678).  
Courtesy: NOAA Photo Library.

disc-shaped rays of ocean bottoms (Daniel, 1934). The posterior portion of their body is terete, like that of a shark; the anterior portion is flattened with spiracles on top of the head and gill slits on the lower surface of the head, like those of a ray. Swimming, by undulation of the body and caudal fin, is similar to that of a shark. Pectoral fins are broad, flat, and contiguous with the head, like those of a ray. Unlike most sharks or any other rays, sawfish possess a long rostrum equipped with large, conspicuous teeth (which are modified scales). The saw is swung through the water column at small fish, stunning, injuring, and sometimes killing them. It may also impale fish on the teeth, after which it swims to the bottom, rubs them off, and eats them (Breder, 1952).

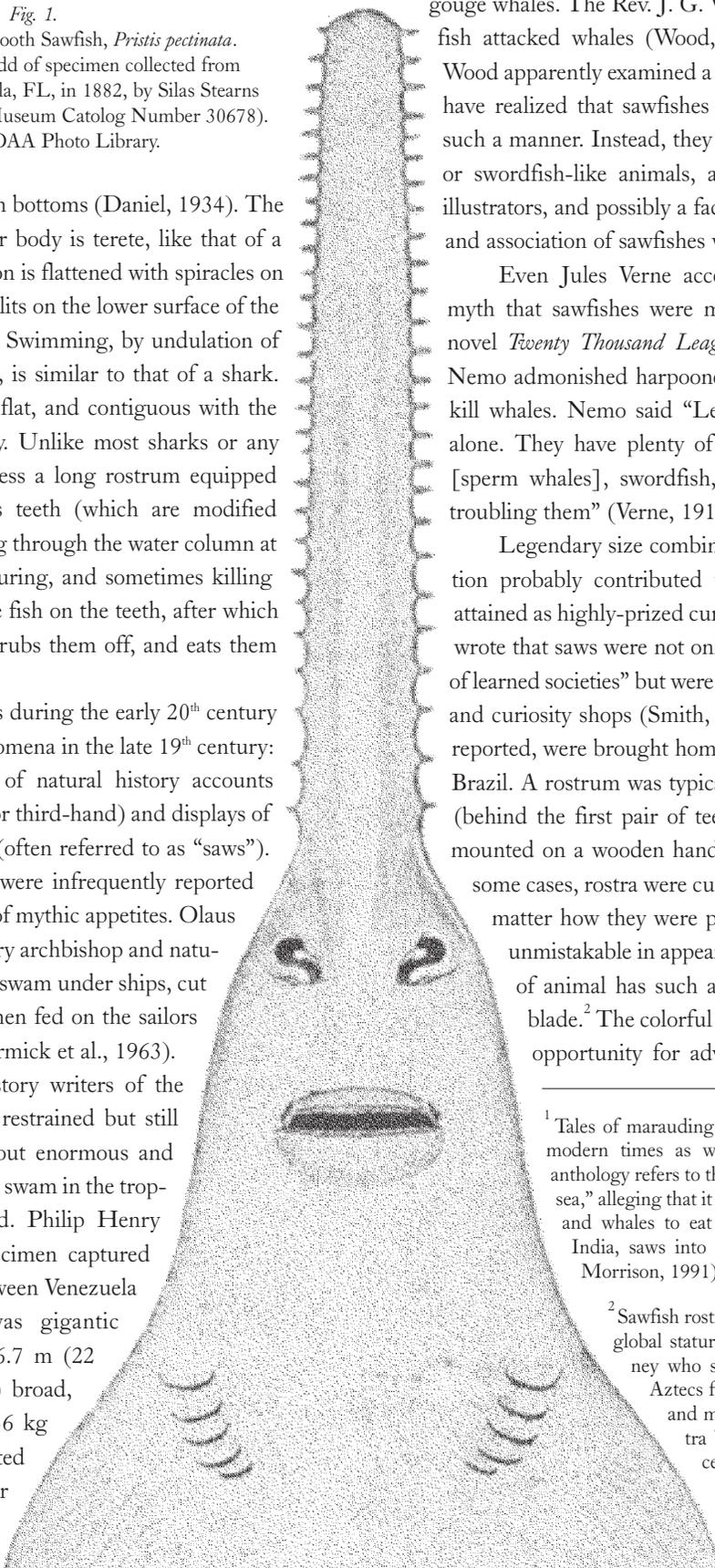
Interest in sawfishes during the early 20<sup>th</sup> century was piqued by two phenomena in the late 19<sup>th</sup> century: widespread publication of natural history accounts (many of them second- or third-hand) and displays of detached sawfish rostra (often referred to as “saws”). Prior to that, sawfishes were infrequently reported and rarely seen animals of mythic appetites. Olaus Magnus, the 16th century archbishop and naturalist, wrote that sawfish swam under ships, cut them from below, and then fed on the sailors as the ship sank (McCormick et al., 1963).

Popular natural history writers of the 19<sup>th</sup> century were more restrained but still told fantastic stories about enormous and dangerous sawfishes that swam in the tropical waters of the world. Philip Henry Gosse reported one specimen captured in the Gulf of Paria, between Venezuela and Trinidad, that was gigantic (Gosse, 1874). It was 6.7 m (22 feet) long, 2.4 m (8 ft) broad, and weighed nearly 4536 kg (5 tons). He also reported that sawfish used their well-armed rostra to attack ships and to

gouge whales. The Rev. J. G. Wood also reported that sawfish attacked whales (Wood, 1899). Neither Gosse nor Wood apparently examined a sawfish closely or they might have realized that sawfishes are not designed to feed in such a manner. Instead, they depicted sawfishes as shark- or swordfish-like animals, a practice adopted by other illustrators, and possibly a factor in the public’s confusion and association of sawfishes with other mega-predators.

Even Jules Verne accepted and promulgated the myth that sawfishes were mammal-killers. In his 1868 novel *Twenty Thousand Leagues Under the Sea*, Captain Nemo admonished harpooner Ned Land for wanting to kill whales. Nemo said “Leave the unfortunate cetacea alone. They have plenty of natural enemies—cachalots [sperm whales], swordfish, and sawfish—without you troubling them” (Verne, 1917).<sup>1</sup>

Legendary size combined with an unsavory reputation probably contributed to the status sawfish rostra attained as highly-prized curios. Naturalist J. V. C. Smith wrote that saws were not only in “museums and cabinets of learned societies” but were also common in barber shops and curiosity shops (Smith, 1867). Those specimens, he reported, were brought home by sailors, principally from Brazil. A rostrum was typically amputated near the base (behind the first pair of teeth), dried, and occasionally mounted on a wooden handle (to form a “weapon”). In some cases, rostra were cut off just behind the eyes. No matter how they were prepared, sawfish rostra were unmistakable in appearance (Fig. 1). No other kind of animal has such a long, broad, tooth-studded blade.<sup>2</sup> The colorful reputation of the fish and the opportunity for adventurers to own a tangible



<sup>1</sup> Tales of marauding sawfishes have been repeated in modern times as well. One recent natural history anthology refers to the sawfish as the “carpenter of the sea,” alleging that it saws fish in half, attacks large fish and whales to eat their skin and entrails, and, in India, saws into human swimmers (Hanson and Morrison, 1991).

<sup>2</sup> Sawfish rostra are curios of long-standing and global stature. Matthew McDavitt, an attorney who studied anthropology, found that Aztecs featured sawfish in their paintings and mythos (and buried dozens of rostra beneath the Great Temple in the center of Mexico City), and that there is a “pan-Asian” belief that rostra are useful in warding off demons, disease spirits, and ghosts (Raloff, 2007).



Fig. 2.

Sawfishing on the Indian River, Florida (Anon., 1888).

The fish is misrepresented as having a terminal mouth, fusiform body, and a homocercal tail. Pectoral fins are incorrectly shown as falcate and discrete from body.

and toothy trophy certainly would have encouraged the peculiar “sport” that developed shortly afterwards in North and Central America—hunting sawfish.

### The Hunts Begin

A newspaper account (Anon., 1888) describes such a hunt on the Atlantic coast of Florida:

Amongst the splendid variety of quaint, picturesque or exciting sports offered by the wild lakes and streams of Florida, that of spearing sawfish deserves a high place. It is great fun, though cruel, and somewhat hazardous, and, while it does not reinforce the camp menu, it reveals something rich in the way of specimens for naturalist or curiosity-seeker. The Indian River, into which the sawfish make raids from their ocean home to prey upon the schools of little fishes, gives the

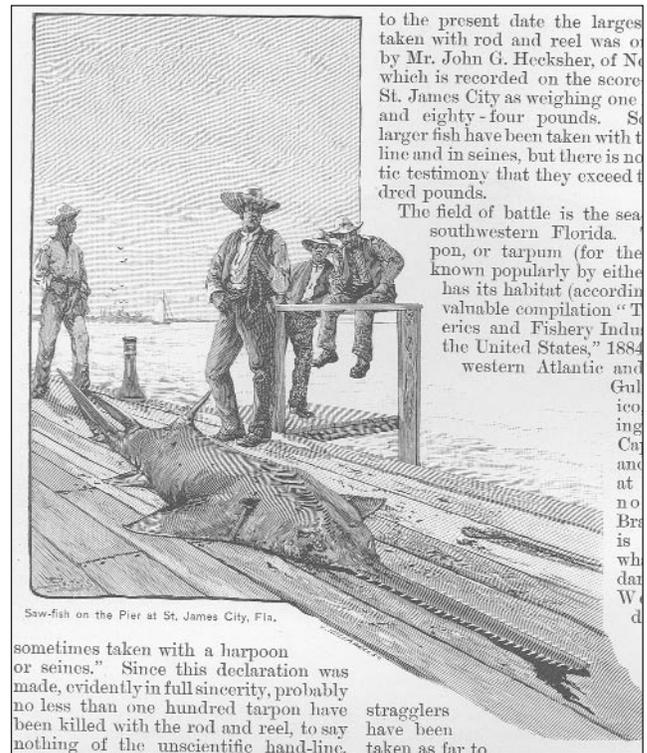


Fig. 3.

Sawfish at St. James City, Florida (Grant, 1889). The fish is correctly represented with an inferior mouth, a dorso-ventrally flattened body, and a heterocercal tail. Pectoral fins are correctly portrayed as triangular and contiguous with body. Western attire of onlookers is unexplained.

hunter a first-rate chance at the big aquatic “game.” The tactics of the sawfish consist in lying close to the bottom until a shoal of fish pass by, when, suddenly elevating the formidable toothed “saw” of his long upper jawbone, he thrashes furiously about, killing or disabling a great number of fish, to be disposed of at his leisure. The spearer, provided with harpoons attached to long coils of rope, approaches gently in his boat, until he perceives the sawfish lurking below in the shallow water. A well-aimed harpoon is driven into the body of the great fish, which instantly starts for the ocean inlet, drawing out the line with a velocity that causes it to smoke. When the stricken monster gets to the end of the rope, he drags along boat and all; but this soon tires him, and the hunter, playing him into a shoal place, finishes him with a rifle-ball. Sawfishes twelve feet long [3.7 m] and weighing 800 pounds [363 kg], are not uncommon in these Florida waters.

Sawfish, though “not uncommon,” were still unfamiliar to many people. The cover illustration of this article depicted a fish that looks very little like a sawfish (Fig. 2). That lack of familiarity would change very quickly. A magazine article that followed shortly showed an anatomically correct specimen from the Gulf coast of Florida (Fig. 3), suggesting that recreational

sawfishing was taking place in other parts of the state (Grant, 1889). An article published 20 years later in *National Geographic Magazine* described the sawfish as “abundant” and “well-known” to those who reside in the South Atlantic and Gulf seaboards (Smith, 1909). The article observed that the sawfish is without economic value and is “never sought” but is caught when it becomes entangled in nets. The article also noted that saws are “familiar objects in curio stores all over the country,” suggesting that a domestic commercial market and a common desire for people to have a memento from this very unusual fish.

### Sawfish Systematics

Sawfishes are not classified as sharks, Subdivision Selachii, but as rays, Subdivision Batoidea (Nelson, 2006). There are (or were) two families of sawfishes: Sclerorhynchidae (Ganopristinae in older literature) and the Pristidae (Capetta, 1987; Carroll, 1987). The sclerorhynchids, extinct sawfishes, lived from the Early Cretaceous, 140 million years ago, to the early Paleocene, 62 million years ago. Their rostral teeth had a saddle-shaped base that straddled the rostrum, a covering of enamel, and some were conspicuously barbed. Their barbed rostral teeth may have allowed these prehistoric sawfishes to feed more efficiently than modern sawfishes by enabling them to retain all fishes killed or wounded in a foray, to be shaken off and eaten at will, with little loss to scavengers (Thurmond and Jones, 1981). Fossilized rostral teeth of this group (Fig. 4), many originating from Morocco, are frequently available from commercial dealers. The pristids, extant sawfishes, lived from the Early Cretaceous to the present. Their teeth are long flattened shafts of dentine. Fossil rostral teeth have been collected in Gulf coastal states including Alabama, Florida, Louisiana, Mississippi, and Texas (G. Stringer, pers. comm.). While complete rostra of prehistoric sawfishes of either group are very rare, the rostral teeth and rostral fragments are fairly common in several Cenozoic formations along the Gulf coast.

The rostra of saw sharks (Pristiophoridae) resemble those of sawfishes and are occasionally used as curios, but they are much smaller, thinner, and more tapered than sawfish rostra (McCormick et al., 1963). Additionally, they typically retain the prominent mid-rostral barbels characteristic of the group and absent in sawfishes. Rostral teeth of the saw sharks are not uniform in size, nor are they set into sockets like those of living sawfishes. In addition, the rostral teeth of saw sharks are continuously replaced, while those of the sawfishes are not

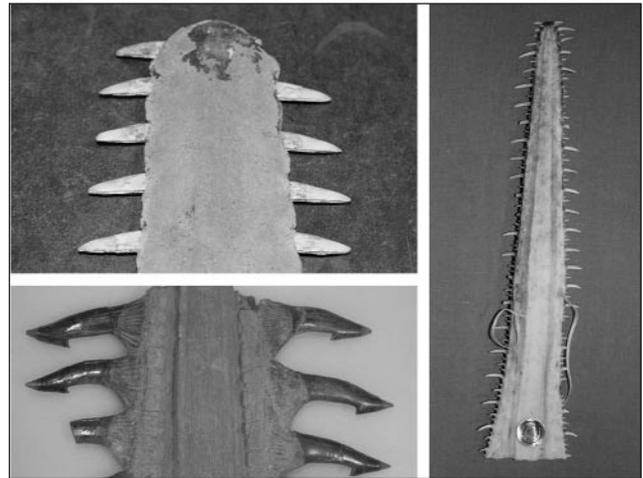


Fig. 4.

Rostral teeth of modern pristid sawfish (top, left), an extinct sclerorhynchid sawfish, *Onchopristus numidus* (bottom, left), and a modern pristiophorid saw shark (right).

(Slaughter and Springer, 1968), although re-growth is possible as long as the root is undamaged (Clippinger, 1993). Saw sharks, unlike sawfish, are true sharks, with gill slits on the side of their neck.

Taxonomists recognize three groups of sawfish species based on the shape of their dermal denticles or “scales” (Deynat, 2005). One group, with tricuspid denticles, is comprised of a single species: Knifetooth Sawfish (*Anoxypristis cuspidata*) found only in the Indo-Pacific. A second group, with simple monocuspid denticles, is comprised of three species: Smalltooth Sawfish (*Pristis pectinata*), Green Sawfish (*P. zijsron*), and Dwarf Sawfish (*P. clavata*), which are found collectively throughout the tropics. The third group, with keeled monocuspid denticles, includes three pan-tropical species: Largetooth Sawfish (*P. perotetti*), Common Sawfish (*P. pristis*), and Greattooth Sawfish (*P. microdon*). Sawfish experts are not in complete agreement on taxonomy and many references (including two commonly used field guides) identify Largetooth Sawfish in North America using the same binomial (*Pristis pristis*) as the Common Sawfish (e.g., Robins and Ray, 1986; McEachran and Fechhelm, 1998; Nelson et al., 2004; Parsons, 2006).

The genus *Pristis* was proposed by John Latham, a British physician and naturalist, to distinguish the sawfishes from the true sharks, which at the time were in the genus *Squalus* (Latham, 1794). The generic name was apparently taken from the Greek word *pristis*, meaning a sawyer, file, or saw (Jaeger, 1947). One scholar, however, noted over a century ago the similarity between the Greek words for “saw” and

“bite,” and the possible confusion over sawfish and sharks, and suggested that “*pristis*” could have multiple or ambiguous meanings (Torr, 1890). The ancient Greek encyclopaedist Pliny used the term *pristis* to describe a monstrous, whale-like fish, presumably referring to a sawfish.

### Picture Perfect *Pristis*

Magazine writer A. W. Dimock provided a detailed account of a turn-of-the-century sawfish hunt in southernmost Florida (Dimock, 1926). Dimock and his guide were in a small skiff when they saw a “sawfish of majestic proportions.” Dimock threw a harpoon into the fish and the skiff was rapidly towed for 200 yards. The fish slowed but continued pulling the skiff for another quarter mile, when, running out of deep water, it reversed direction and pulled the skiff past another boat in which the author’s son, a photographer, was riding. Encountering shallow water again, it changed direction a second time and was joined for a short time by three other sawfish, each about 4 m long. Dimock eventually fastened a hunting knife to a harpoon pole and when he next drifted over the resting fish, drove the knife repeatedly into the fish. The fish surfaced and struck the boat several times with its rostrum, breaking off the tip of it, before racing through the water again. When the fish reached shallow water once more, Dimock looped line over its saw and lashed it to the skiff. Returning to his launch, Dimock secured a line around the fish’s tail and to the launch, started the motor, and dragged the fish away. The fish continued to struggle, repeatedly throwing the boat off course and “jarring the craft from propellor to bow.” It measured a respectable 477 cm. One photograph showing the fish in lateral view supports the reported size. Fin placement indicates that it was a Smalltooth Sawfish.

Dimock’s account became well-known and cited by other authors who wrote about fishing in Florida. One writer, Nevin O. Winter, added this editorial comment: “One need not have any compunctions of conscience at killing a sawfish, and need not turn it loose again after capturing it, for the sawfish belongs to the shark tribe, and the shark is persona non grata to the fisherman” (Winter, 1918). This attitude was not shared by all fishermen, however, including Mr. Dimock himself. He reported emotions during sawfish hunts ranging from “gentle agitation” to “delirious excitement.” Some of that excitement resulted no doubt from his intimate interactions with an animal having a wildly-swinging meter-long weapon, armed with 52 teeth and believed to have the “power of a pile-driver.” Other sportsmen in the 1910s also wrote similar

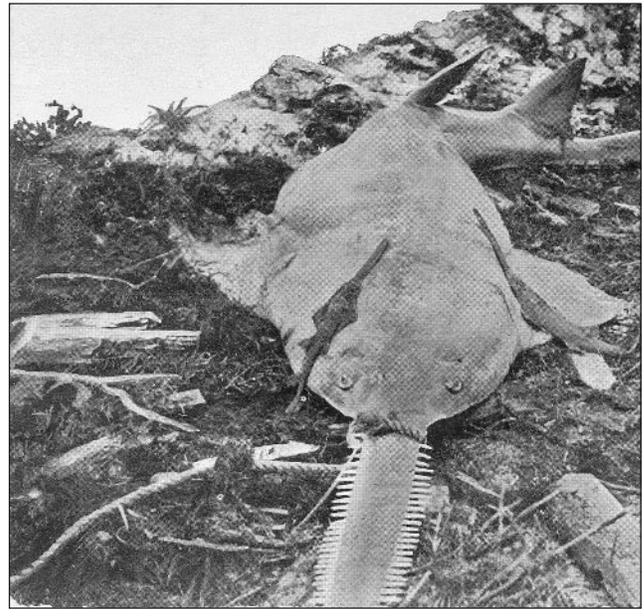


Fig. 5.

Sawfish and young. Image reproduced on postcards published by H. and W. B. Drew Co., Jacksonville, Florida (No. A-21452), Leighton and Valentine, Co., New York (No. 9292), and Tichnor Quality Views, Cambridge, Massachusetts (No. 123643).

narratives about their experiences with sawfish.

Van Campen Heilner, a novice harpooner, encountered a large sawfish near Indian Key, Florida, in 1916 and wrote a detailed and well-illustrated article about the experience (Heilner, 1917). The fish was first sighted by the boat’s captain, who speared it with an iron trailing a length of cable and life preserver. The preserver acted as a floating tag and was followed by the fishermen and recovered. The fish was then allowed to drag the charter boat into shallow water, where it was harpooned again by the author. The fish repeatedly struck the bottom of the boat with its saw causing the small launch to shiver “from stem to stern under the impact of the mighty blows inflicted by the huge weapon.” While surfacing, the fish was roped about the rostrum. After multiple shots from the author’s revolver, the fish was dragged up, tied to the stern, and taken “triumphantly” to camp where “he was the admiration of all who saw him.” The saw from that fish, along with those from three baby sawfish, became wall ornaments for the author’s study.

William C. Schroeder, a solitary angler equipped only with rod-and-reel, hunted a mysterious fish for several days before he successfully captured a sawfish (Schroeder, 1918).<sup>3</sup> He reported having “the fight of my life . . . the very thing that I had long been hoping for.” Of the sawfish, Schroeder said, “His dangerous weapon anteriorly [*sic*] always kept me

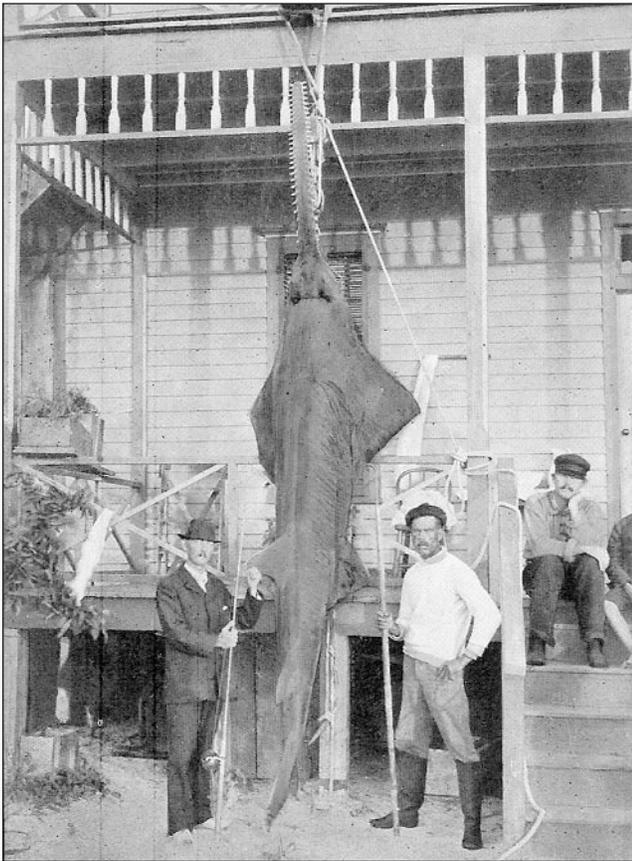


Fig. 6.

Postcard published by St. Petersburg Post Card Ass'n, St. Petersburg, Florida (No. A-21357). Specimen was reported to be 14.5 ft (4.4 m) in length and to have weighed 660 lb (299 kg). Also published by H. and W. B. Drew Co., Jacksonville, Florida (No. A-21357).

at a distance and his cruel-looking eyes seemed to express the anger under which he was laboring.” After a three-hour struggle, Schroeder finally beached the fish on an uninhabited island. He had to place large stones on either side of its head to keep it from escaping while he retrieved a pickaxe to “make short work” of the “powerful foe.” Given their boat-bashing and saw-swinging reputation, it was no wonder that sawfishes

<sup>3</sup> Records of sawfish from northern waters are rare and old. The available account of the Schroeder sawfish from the *Literary Digest* is abridged but suggests that the fish was caught somewhere in New York waters (Schroeder, 1918). If so, it may be the only 20<sup>th</sup> century record of sawfish from New York state. A recent review of the New York marine ichthyofauna lists only one previous record: a Smalltooth Sawfish captured in July 1782 (Briggs and Waldman, 2002). A Smalltooth Sawfish, approximately 3.3 m TL, was taken in Chesapeake Bay, near Ocean City, Maryland, in 1911, and was mounted (Fowler, 1914). Three Smalltooth Sawfish, one of which was nearly 4.5 m TL and mounted for public exhibition, were recorded prior to 1906 from New Jersey: two from Cape May (at the southern tip) and one from Grassy Sound (behind eastern barrier islands) (Fowler, 1906).



Fig. 7.

Postcard of sawfish caught at Port Isabel, Texas. Pronounced lower lobe of caudal fin indicates that it is a Largetooth Sawfish.

were also reputed to be man-killers and were frequent subjects of early postcards.

From the beginning, these postcards emphasized the size and oddity of the fish. One 1906 postcard of a fish caught in Melbourne, Florida, shows a specimen with 13 of its young dangling in front of it. Unusual for such a postcard, the saw of the adult is not visible. The body is more than twice the length of the men with it, however, so that the stated length of 4.6 m (15 ft), if not precise, is certainly realistic. Another, color-tinted card from the same period shows a Florida specimen suspended from scaffolding with three people alongside for scale. Both specimens were Smalltooth Sawfish.

One of the most frequently reproduced postcards showing a sawfish depicted a large female with two aborted (or dissected young) on shore with two men (Fig. 5). The fish was photographed with its rostrum pointed toward the camera and its tail bent to the side, so the size of the fish cannot be estimated with accuracy. Rostra tooth counts (26) indicate that it is a Smalltooth Sawfish. This postcard was in use for several decades. My own copies are postmarked 1911, 1912, and 1920-something. Typical of that period were photographs of a single sawfish aligned with the horizontal or vertical axis of the card with people positioned nearby for perspective. One such card showed a Smalltooth Sawfish caught in St. Petersburg, Florida, strung up by its rostrum alongside two men (Fig. 6). Another in my collection showed a similar-sized fish caught in nearby Palmetto, Florida, with a group of people.

Postcards depicting Largetooth Sawfish are rare. I have one, postmarked 1925, that depicts a 17 ft 2 in (5.2 m) specimen caught at Port Isabel, Texas (Fig. 7). Unfortunately, weight and other details of the capture were not provided, but the high degree of precision with which its length was reported suggests that size was unusual and carefully documented.

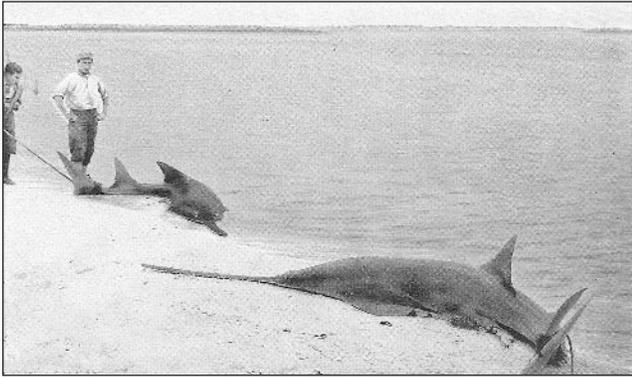


Fig. 8.

Postcard published by the St. Petersburg Investment Co., St. Petersburg, Florida (No. R-70875), of two sawfish “landed on one of the beaches” near St. Petersburg, Florida. Curt Teich Company logo and number indicate production date of 1916.

Also rare are commercial cards showing multiple catches. One card from St. Petersburg, Florida, showed two specimens pulled onto a beach by ropes tied around their tails (Fig. 8). Another card suggests a more dramatic story of six sizeable Smalltooth Sawfish brought to shore (Fig. 9). Printed text on the card noted that sawfishes, although “not edible,” were “highly prized by tourists for their saws as souvenirs” and that the fish often weighed 300-400 pounds (136-181 kg).

Less sensational than mass-marketed postcards, but perhaps more representative of a typical sawfish of the period, were “real photo” postcards. These cards, as their name suggests, were postcards made by developing photographs onto paper having the same size, weight, and markings as postcards, allowing them to be conveniently mailed. The card sent by Mr. Heintz to his brother was one such postcard. Showing a fish of only modest size, it unambiguously depicted the length and all the taxonomic characters needed for a credible assessment of size and taxon (Fig. 10). It, too, was a Smalltooth Sawfish.

One of the best-known photographs of a sawfish from this period was that of an unusual specimen that survived its own capture—at least for a while. The photograph is of a moderate-sized adult Smalltooth Sawfish laying dockside on a piece of canvas. It appeared in *National Geographic Magazine* (Mowbray, 1922). The caption read: “Female sawfish taken alive in a net and exhibited for several weeks in a 36-foot tank at the Miami Aquarium. She gave birth to nine young, the only record of sawfish being born in captivity.” The Miami Aquarium had opened a year earlier and the “36-foot tank” was touted as “probably the largest display tank in the world” capable of housing fish up to 12 feet in length (La Gorce,

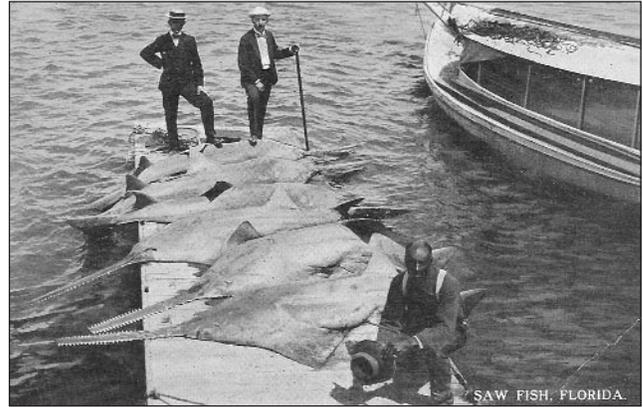


Fig. 9.

Postcard published by W. J. Harris Co., St. Augustine, Florida (No. R-31521), of six sawfish from unknown location in Florida. Curt Teich Company logo and number indicate production date of 1911.

1921). The young sawfish were later reported to have lived several months (Mowbray, 1939). Unfortunately, no other information was provided in the article and the National Geographic Society has no additional information in its records (M. R. Lambertson, National Geographic Society, pers. comm.). The picture, with essentially the same caption, was reproduced in the Society’s long-running and highly popular publication, *The Book of Fishes*, at least from 1924 through 1961. As a result, it may have been seen by more people than any other single image of the species. Another sawfish, from the same period and depicted in the same publication, was not so fortunate. A Smalltooth Sawfish collected off the Louisiana coast was shown suspended from hooks, its rostrum severed (Graves, 1930).

Some of the most remarkable, but possibly suspect, reports and photographs of sawfish were recorded by angler-adventurer-author F. A. Mitchell Hedges (1923). Mitchell Hedges (he later hyphenated his last two names as a single moniker) persuaded Lady Richmond Brown to underwrite and share in an “ambitious programme of two years’ deep-sea exploration work,” which formed the basis for his fat tome on fishing. Mitchell Hedges’ book is filled with death-defying tales and fascinating photos of himself with huge rays, sharks, and crocodiles. Photographs and data for sawfish, however, are especially impressive. Using harpoons, tackle, and small dinghies, Mitchell Hedges and company caught three sawfish near Taboga, an island off the coast of Panama. The smallest of these fish reputedly weighed just over one ton (906 kg). Each fish was “dispatched” with gunshots and the last moments of each are described in graphic detail (e.g., convulsions, fountains of blood, heart torn to pieces).

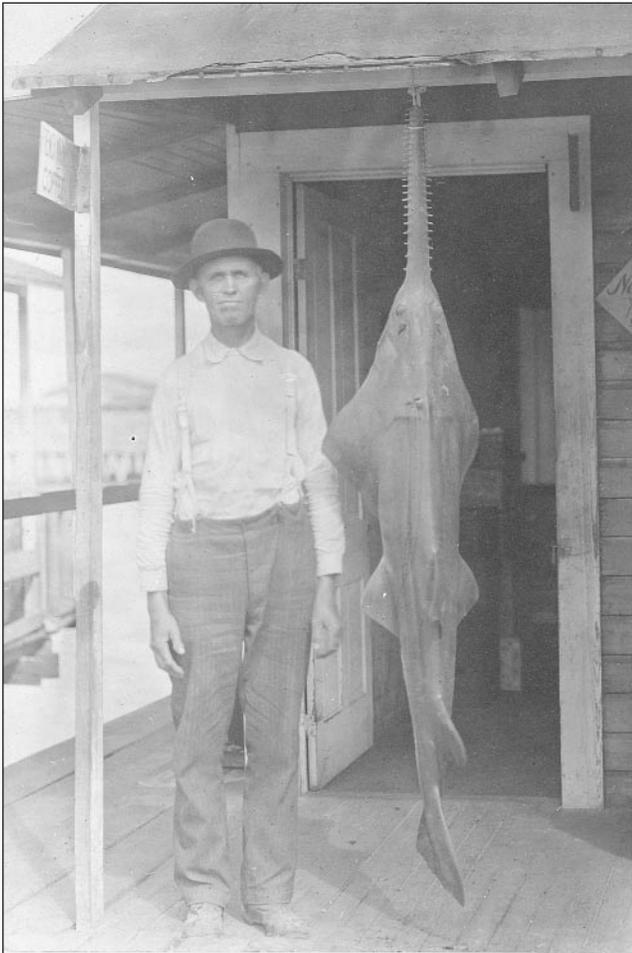


Fig 10.

Real photo postcard of F. J. Heintz and his Smalltooth Sawfish, 1914.

Photographs from the Mitchell Hedges expedition do not allow reliable identification of sawfish species, or even an accurate approximation of size, but some effort was made to record data and document the catches for scientific purposes. Mitchell Hedges describes processing the specimens to obtain measurements, remove saws, and, in one case, extract a spinal column. A fourth specimen was caught by Lady Brown that reportedly measured 9.4 m (31 ft), of which 2 m (6 ft 5 in) was saw.<sup>4</sup> That sawfish was a female containing 36 young and

<sup>4</sup> A sawfish >8 m TL (>26 ft) would be extraordinary but not necessarily unbelievable. John Treadwell Nichols, who was familiar with the group, indicated that adults could range in size from 3 m (10 ft) to 9 m (30 ft) (Nichols and Bartsch, 1945). Hugh Smith, a fisheries adviser to the Siamese government during the period 1923-1934, also indicated that sawfish attain large sizes (Smith, 1945). He reports one specimen in central Thailand (taxon uncertain due to a probable misidentification) that was 8 m TL, with a saw 2.5 m long and 40 cm broad at base. He also notes that saws from large fish were frequently kept in temples and shrines of Thailand and India.

a large number of ova measuring up to 37 cm (14.75 in) in diameter. Sawfish young were preserved and presented to museums in England at the conclusion of their trip.<sup>5</sup>

### Scientific, Culinary and Promotional Pursuits

Given scientific curiosity in sawfishes, and the paucity of specimens in most early 20<sup>th</sup>-century museum collections, it is a bit surprising that more hunts were not conducted by ichthyologists. John Treadwell Nichols, the founder of *Copeia*, was an exception (Nichols, 1917). In spring 1917, he spent three weeks on a yacht, sailing in the Florida Keys and searching for sharks. In early April, he observed a 61 cm (2 ft) specimen of Smalltooth Sawfish and collected a 457 cm (15 ft) female bearing 33 cm (13 in) embryos. He compared these to three specimens in the American Museum of Natural History and hypothesized that gestation lasts about one year and that the young are born in September at a size of 46 cm (18 in). At that time, Nichols indicated that sawfishes were not utilized commercially in the United States (Nichols and Mowbray, 1917). This may have been inaccurate.

Commercial shark fisheries in the United States were well-established by the 1920s in Florida and the American Virgin Islands (Barrett, 1928). Capture methods included gear such as gillnets, trot lines, harpoons, and dynamite. Modest “factories” processed the fish into a wide variety of products: shagreen (a type of leather) and sandpaper from the hides; vitamin oil from the livers; dried cutlets, animal feed, and fertilizer from the meat; canes and watch fobs from the backbone and teeth; soup starter from dried fins. Fins of the sawfish were especially prized. The price for the fins of nurse sharks was only a few cents apiece, but price for sawfish fins was two dollars or more a pound. A well-known field guide

<sup>5</sup> I was curious about the fate of the Mitchell Hedges sawfish specimens and did some sleuthing. Simon Chaplin, senior curator of the Museums of the Royal College of Surgeons of England, confirmed that Mitchell Hedges did indeed donate a fetal *Pristiurus* [sic] to the institution in 1924. It was not added to the permanent collection but rather to the research collection and there is no record of what became of it. James Maclain, curator at the Natural History Museum of London, also located a record for a Mitchell Hedges specimen identified as a Largetooth Sawfish. That specimen still exists and James examined it for me. It is approximately 415 mm TL and the saw is still contained in its protective sheath. The fish was, unfortunately, preserved in a “scrunched” position for the previous 80 years, but it was in good enough condition to provide taxonomic information. Rostral tooth count was 18, first dorsal fin was posterior to the pelvic fins, and there was a lower lobe on the caudal fin, all diagnostic characteristics of the Largetooth Sawfish. James also reports that the rostrum is about 120 mm or 29% the total length of the fish.

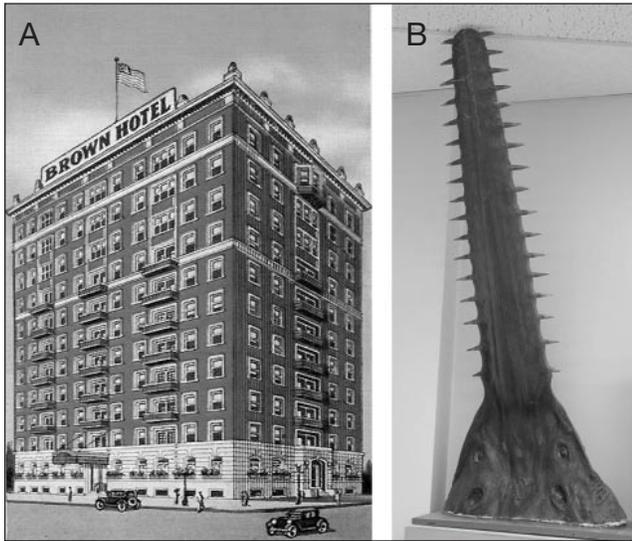


Fig. 11.

Mr. Brown's business and its main attraction. A) Postcard published by E. C. Kropp, Milwaukee, No. 4494, of the Brown Hotel.

B) Head of the sawfish caught by Mr. Brown and displayed in his Marine Museum (photograph by Richard Busch, Denver Museum of Nature and Science).

published subsequently also noted that small sawfish were "delicious" as breakfast steaks (Breder, 1948).

Sawfish were not only useful for scientific and culinary purposes; in one case, a sawfish was an important advertisement. In 1917, hotel owner and avid fisherman Ernest Warren Brown caught a large sawfish in the waters near Port Aransas, Texas (Lutz, 2003a). Mr. Brown had the sawfish mounted and shipped back to his hotel in Des Moines, Iowa (Fig. 11a). There it formed the nucleus for a collection of marine taxidermy that eventually numbered more than 400 specimens. The Brown Marine Museum, housed in the hotel lobby, was touted as one of the largest private collections in the world and was a "major attraction." The giant sawfish was seen by many inland citizens and it helped to promote the hotel—not only by luring in and entertaining visitors but through the sale of postcards.

Two such postcards were published locally by New Era Sales Co., Des Moines, and are "white border" cards. One shows a solitary image of a sawfish and identifies it as the one caught by Mr. Brown. The other card is a tinted photograph showing Mr. Brown's collection of fishes as it must have appeared to hotel guests—displayed on a wall behind a viewing "window" and illuminated by shaded chandeliers. There is no sawfish, but in the corner, underneath a sturgeon and next to a shark, is a sawfish rostrum, apparently from a smaller fish. The Curt Teich logo and number on the cards

indicate that they were produced in 1921. A more recent linen postcard in my collection, postmarked 1944, depicts a diverse and dense collage of fish pictures and is identified as "Part of the Collection of Brown Marine Museum." In the midst of pike, puffer, and pompano, is the partial, but unmistakable, image of a Largetooth Sawfish. It suggests that the specimen was still intact more than 25 years after it was caught, but the card gives no clue on current whereabouts of the specimen.

Mr. Brown died in 1934, but his son maintained the museum sometime into the 1940s (Lutz, 2003a). After the exhibit had closed, the specimens were stored but eventually dispersed to several institutions (Lutz, 2003b). One of these, the Denver Museum of Nature and Science, acquired the sawfish in 1975 (Jeff Stephenson and Richard Busch, DMNS, pers. comm.). The mount still exists, but in abbreviated form. The body was sawn off, either to conserve space or because of damage sustained while stored in the Brown Hotel Garage (Fig. 11b). No longer in advertising, now in education, the original head of the 90-year old specimen now resides in a museum classroom used for children's workshops on ocean life (Richard Busch, DMNS, pers. comm.).

### The Hunts Continue . . . and End

As the 20<sup>th</sup> century continued, publicity and commercial harvest failed to diminish the sensational reputation of sawfishes. E. G. Boulenger, director of the Zoological Society of London aquarium, successfully maintained skates, rays, and small sharks, but indicated that large cartilaginous fishes were not exhibited because they made "serious inroads on the weekly food-bill" and required too much "elbow room" (Boulenger, 1934). He described sawfishes as "formidable and ferocious," "exceedingly savage," and noted "numerous instances of bathers being cut in two by a single sweep of a saw-fish's snout" (Boulenger, 1925). He characterized the sawfish as "one of the most dangerous inhabitants of the seas . . . fierce and bloodthirsty, sometimes ascending tidal rivers and there attacking bathers and waterside fishermen" (Boulenger, 1935). During this time, sawfishes were still reported by some writers to ferociously stab and carve chunks of blubber from the whales on which they would then feed (Protheroe, 1937).

Other writers working with sawfishes portrayed them differently. William T. Hornaday had first-hand experience with sharks and rays, having handled and dissected fresh specimens. His earlier accounts were even-handed and correct (Hornaday, 1919). His illustration of the Smalltooth Sawfish

as a ray-like fish was accurate and recognizable and he included quantitative data on size and relative size of the rostrum. Hornaday made no mention of sawfish attacks on whales, boats or humans, and noted that the rostrum was used only as a defensive weapon or food-gathering tool. Samuel F. Hildebrand, a biologist with the U.S. Fish and Wildlife Service, “netted many specimens” while collecting in tropical American waters (Hildebrand, 1944). He commented that the saw was presumed to be a dangerous weapon but observed that the movements of the fish, although powerful, were slow and clumsy. Unfortunately, these conservative representations of sawfish biology and temperament were easy to ignore when compared with the livelier accounts of other authors.

One such story appeared in *Life* magazine in 1940 by filmmaker and sportswriter Grantland Rice (Rice, 1940). The brief text described sawfish feeding (lying on the bottom of shallow pools to slash at small fish), flavor (“tasty and tender like alligator meat”), and perception by fishermen (hated because they tear nets to pieces). The text also noted that although “it is a clumsy weapon and can only be maneuvered sideways,” the saw is “very dangerous and can rip up the bottom of a canoe.” What followed were eight remarkable photographs of legendary herpetologist Ross Allen at work in the Everglades. Allen drifted over the sawfish in a canoe, slipped a piano wire noose around its rostrum, was dragged about by the fish, and then lept out of the canoe and onto its back, after which he dragged it into shallow water and then onto the beach. The fate of the fish is unknown, but Allen was well-known for capturing animals alive and unharmed (e.g., Rawlings, 1942). It was probably released but it, or one like it, may have been exhibited by Allen at his wildlife attraction in Silver Springs, Florida. No records have been found documenting this, but officials at Silver Springs indicated that it seemed likely (Steven Specht, pers. comm.), and at least one promotional postcard exists showing Allen with the sawfish (Fig. 12).

Large public aquaria grew in number during the mid-20<sup>th</sup> century and sawfishes were frequently captured for permanent display in large exhibition tanks. Sawfish were maintained by the Shedd Aquarium in Chicago (Chute, 1950), Marineland of Florida in St. Augustine (Hill, 1956), and the Seaquarium in Miami (Phillips, 1964). Famous fish collector William B. Gray described a sawfish hunt for Marine Studios which was very similar in drama to that of A. W. Dimock a quarter-century earlier, but with the fish captured alive (Gray, 1960). Captain Gray had to improvise a live-well for the fish by salvaging an old launch, drilling holes in it (to allow water to circulate), and attaching empty oil drums for flotation. He

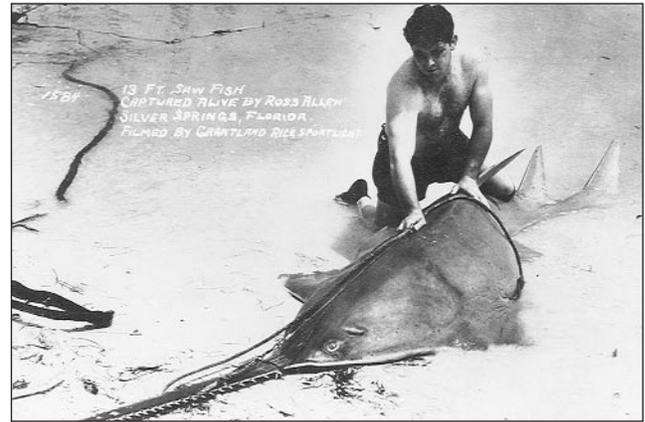


Fig. 12.

Real photo postcard of Ross Allen and sawfish collected in the Everglades.

slowly towed the sawfish back to the aquarium where it “lived for many a happy day.”

Craig Phillips was also innovative when transporting sawfish (Phillips, 1964). He took two large sawfish, 335 cm (11 ft) and 396 cm (13 ft) long, captured by fishermen, and wrapped their saws in burlap and twine. He placed both in a 10-foot-long box by bending the smaller fish into an S-shape and letting the tail of the larger fish hang out. Craig filled the box with enough water to support their weight and minimize thrashing, and then dropped an airstone supplied with compressed oxygen into the spiracles of each fish to directly aerate their gill cavities. He drove them back to the Seaquarium where they recovered and were put on display.

During this same period, Smalltooth Sawfish were also displayed at Theater of the Sea on Islamorada in the Florida Keys. Postcards from this very unusual oceanarium, a quarry converted into outdoor “tidal pools” during the 1940s, depicted a 488 cm (16 ft) fish named Rip and a 518+ cm (17+ ft) unnamed specimen (Fig. 13). These fish, collected in nets during the 1950s, were on display for several years (Theater of the Sea, pers. comm.).

Hunts (unrelated to public aquaria) may have taken place, but recreational fishing for sawfish in the middle and latter part of the century were probably not common (SSSRT, 2000). Only a few records are available after the early 1950s (Seitz and Poulakis, 2002). Long-term changes in Largetooth Sawfish populations are uncertain (due to a lack of data), but the geographic range of the Smalltooth Sawfish diminished substantially, from most of the Gulf and Atlantic coasts prior to 1960 to, at present, the southwest coast of Florida (O’Hara, 2006). Florida’s population, however, based on interviews with anglers, may be larger than previously

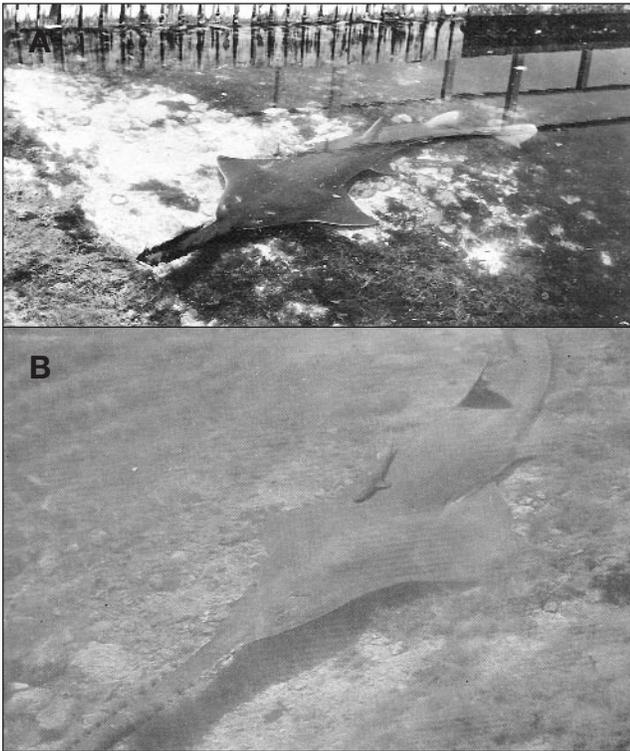


Fig. 13.

Residents at Theater of the Sea, Islamorada, Florida.  
 A) Real photo postcard of Rip. B) Postcard published by Clark Bradenburg, Miami, Florida (No. 45762) of 17 ft sawfish.

believed (Seitz and Poulakis, 2002). Large fish (>3 m) are rare, but size structure demonstrated recruitment.

In specific parts of their range, numbers have declined. Commercial bycatch of sawfish in Louisiana diminished from more than 30,000 pounds per year in 1949, to approximately 10,000 pounds per year during the 1950s, a few thousand pounds in the 1960s, and less than 2000 pounds in the 1970s (Simpfendorfer, 2000). Long-term declines in Smalltooth Sawfish (and presumably Largetooth Sawfish) are not attributed to sawfish hunters, however, but principally to the loss of fish through incidental capture as commercial bycatch (e.g., entanglement in nets) combined with the species' late maturity, slow growth, and the production of small numbers of large-sized young. Recent data has demonstrated some impacts from pollutants (e.g., plastic debris, discarded fishing line) and injuries caused by humans (Seitz and Poulakis, 2006). Also, extraordinary prices fetched by sawfish parts may encourage poaching. A large rostrum can fetch more than \$1000 whole as a curio (O'Hara, 2006), and more than \$6000 for the individual teeth as cock-fighting spurs (Raloff, 2007). Fins, for sharkfin soup, are worth as much as \$550 per pound or \$3000 a pair.

Except for a few collectors and biologists, legal sawfish hunts are a thing of the past. In 1991, the Smalltooth Sawfish was proposed as a candidate for endangered species status, and in 2003 it gained the dubious distinction of being the first North American elasmobranch listed as an endangered species (USFWS, 2005). The Largetooth Sawfish, of which there are no confirmed sightings since the 1970s, is feared extirpated in the United States (Raloff, 2007). Heightened public awareness and new fishing regulations reduce the likelihood of any incidental catch being kept as a trophy or destroyed as a nuisance, but sawfish are likely to remain a highly endangered group for years to come. All known species of sawfish are listed as critically endangered by the World Conservation Union (Anon., 2007). In 2007, the Convention on the International Trade in Endangered Species banned international sales on all sawfish species—dead or alive, whole or partial (Raloff, 2007).

#### Postscript to a Postcard

When Mr. Heintz (Fig. 10) wrote to his brother in 1914 about spearing a sawfish, he also mentioned that he had seen "four airships fly at once." What a tragedy it would be if our far-ranging and abundant populations of sawfishes, like those far-flying fleets of airships, became little more than footnotes in history and relicts of a bygone century.

#### Acknowledgments

Steven George confirmed my measurements and weight of the Douglas sawfish. Todd Slack provided data on the specimen from the Mississippi Museum of Natural Science. Lavon Jeffers made multiple scans of an old oversized newspaper and re-assembled those images into Fig. 2. Gary Stringer reviewed and edited the section on palaeontology. Krista Varble scanned my postcards. Jim Dolan and Andy Borgia provided several important references. Jason Seitz provided citations and valuable insights on sawfish biology. Manuscript was reviewed by Dena Dickerson, Jim Franks, Eric Hoffmeyer, Jason Seitz, and Krista Varble. My thanks to all of the above.

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## Weighing Sawfish

Sawfishes in the early 20<sup>th</sup> century, like those reported by F. A. Mitchell Hedges, were not only long, they were massive! Just how massive is uncertain. Weights, like much of the older, popular information on sawfish, were almost certainly exaggerated. I was curious about the degree of exaggeration.

Determining the weight of a large, unusually shaped fish is challenging today and was even more difficult a hundred years ago. The most direct method was to weigh the fish. This required a reliable scale and, typically, some structure from which to suspend the fish, neither of which was likely to be available to even the well-equipped turn-of-the-century harpooner or angler. Another technique was to estimate the weight from the dimensions of the fish using a mathematical formula based on solid geometry and the weight of water. This technique (still in use by fishermen today) was quite easy, requiring only two or three measurements from the fish, but presupposed a specific geometric form (e.g., spindle, oblate spheroid) for the shape of the fish which most species approximate only very roughly. Probably the most commonly used technique was to simply guess—the least accurate method of all.

Length-weight regression equations, based on paired measurements of lengths and weights of individual fish, allow easy and accurate estimates of weight for fish of known size. Unfortunately, these equations were not readily available in the early 20<sup>th</sup> century and for field-collected North American sawfishes still do not exist. An equation exists based on nine captive Smalltooth Sawfish at oceanarium theme parks (Clark et al., 2003). It calculates weight (kg) from total length (cm):

$$\text{Weight} = 0.00004\text{TL}^{2.565}$$

An equation also exists for the freshwater population of Largetooth Sawfish in Lake Nicaragua (Simpfendorfer, 2000). Based on 24 specimens, 69-732 cm TL, the relationship between weight and length is:

$$\text{Weight} = 0.00004\text{TL}^{2.56}$$

The two equations suggest that for a given size, both species will be comparable in weight. This seems counterintuitive since Smalltooth Sawfish have a longer, narrower, thinner rostrum (i.e., a lighter “nose” and a shorter “body”) than Largetooth Sawfish, and a lighter, more slender body (J. Seitz, pers. comm.). These are the only length-weight models available, however, and are used here to roughly approximate weight for comparisons to reported weights.

I used these relationships to estimate weight for 11 specimens described in the accompanying article (Table 1, p. 14). Also included are two empirical observations of Smalltooth Sawfish. Todd Slack, Mississippi Museum of

Natural Science, obtained data from a specimen (MMNS 5881) collected near Biloxi in 1937 (rostral tooth counts of 26 left, 25 right). Neil Douglas, University of Louisiana at Monroe Museum of Natural History, provided a specimen collected several decades earlier somewhere in the northern Gulf of Mexico (rostral tooth counts of 27 left, 28 right).

Reported weights of most sawfish, especially larger specimens, were substantially higher than those regression-based calculations of predicted weight (i.e., 32-45%) and were probably the result of overestimates of observers (Table 1, p. 14). Reported weights of the fish that were small (i.e., <2.5 m) were 19-56% lower than predicted weights. Preservation of the two museum specimens may have influenced weight to some extent, but values are probably close to that of the live animals. Mr. Heintz’s sawfish (Fig. 10, p. 8) was brought back to a community well known for its fishing. Its weight, reported to the nearest half-pound, suggests that it too was weighed with some care and precision. The high values for the predicted weights of the two specimens may be attributable to statistical properties of the regression model itself (i.e., it may predict weights of smaller specimens with less accuracy).

Reported weights of the fish that were medium in size (i.e., 400-500 cm) were higher than predicted weights, but degree of difference was highly variable. Reported weight of the Schroeder sawfish was remarkably close to that predicted by the regression model. Method of weighing the fish was not reported, but Mr. Schroeder went to exceptional effort to safeguard, retain, and document his specimen. It seems reasonable that similar effort went towards accurate assessment of its weight. The fish on the Drew Co. postcard (Fig. 6, p. 6) was obviously brought back to shore and suspended, so a measured weight using some kind of scale is probable. The weight is comparatively high, however, suggesting either measurement error or a particularly robust fish. The photograph does not support the latter explanation. The Heilner sawfish is only a little larger but substantially heavier. Mr. Heilner had a scale capable of weighing a 175 kg (387 lb) sea turtle, but the sawfish was too heavy for that scale. We can guess that it must have weighed objects up to 182 kg (400 lb) or possibly 227 kg (500 lb). The predicted weight of 241 kg (531 lb) would still have exceeded ability to weigh such a fish. The weight almost certainly was a guess. Likewise, the reported weight of the Ross Allen sawfish (Fig. 12, p. 10) also appears to have been a guess. Precise location of the fish was not provided (but was likely remote), method of determining weight unreported, and fate of the specimen unclear. The well-documented Dimock fish was recovered and could have been weighed on board the boat. Because

no information was provided on how weight was determined, however, it is quite possible that a weight was reported based on a best “guesstimate” of the crew.

After the discovery of Largetooth Sawfish in the Gulf of Mexico in 1942, E. F. Reid caught seven fish in Galveston waters (Baughman, 1943). These fish ranged in size from 427-530 cm TL and reported weights of 227-590 kg. One of those specimens, however, suggests overestimates. Mr. Brown’s sawfish was reported to be 4.9 m (16 ft) TL (Lutz, 2003a) and 5.5 m (18 ft) TL (undated postcard). Two feet can make a substantial difference in weight estimates. To decide which of the two lengths to use, I contacted Richard Busch at the Denver Museum of Science and Nature. He measured the length of the Brown rostrum. It was 112 cm. Since rostra of adult Largetooth Sawfish are approximately 20% of the total length, I multiplied 112 x 5 to get an estimate of 559 cm TL (=18.4 ft). This length gave me a weight that suggested an overestimate, but one well within the range of overestimates for other specimens.

If Mr. Brown’s Largetooth Sawfish was huge, then the Mitchell Hedges specimens are veritable lunkers—in length and mass! In his book, Mitchell Hedges indicates that he “weighed” the fish, but this may have been verbal shorthand for “assigned a weight to them based on size.” His possible use of a geometry-based formula is suggested

by his reported measurements of rostrum length and girth. Such formulas typically require measurements of body length (e.g., from tip of lower jaw to fork of tail) and girth (e.g., around broadest part of body). If Mitchell Hedges used a formula that assumed a conventional fusiform shape for the fish, then it would at least partially account for the disparity in reported and predicted weights. Unfortunately, we will never know just how large and heavy these fish were. None were examined by local authorities for independent confirmation of these remarkable “data.”

Overall, reported weights of large sawfish are higher than predicted weights, but they are not necessarily wrong. Regression equations for Smalltooth and Largetooth Sawfish were based, respectively, on a few captive specimens and a geographically disjunct “population” living in fresh water, respectively. They may not accurately represent length-weight relationships for wild-caught fishes from waters of the Gulf of Mexico, Caribbean Sea and Atlantic Ocean. If the predicted weights are accurate, however, they indicate an “exaggeration factor” of <50% in the reported weights. This may not be acceptable by scientific standards, but is certainly understandable when an excited (and unprepared) angler confronts an unusual animal of monstrous proportions.

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**Table 1.** Length, reported weight, and predicted weight for 13 sawfishes. Lengths were all assumed to be total lengths. Predicted weights were calculated from length-weight regressions for Smalltooth (Clark et al., 2003) and Largetooth (Simpfendorfer, 2000) Sawfish.

Specimen: Collector/Curator and Period	Species	TL (cm)	Reported Wt. (kg)	Predicted Wt. (kg)	Difference
Todd Slack, 1937	Smalltooth	83	0.6	3.3	-81%
Neil Douglas, 1960s	Smalltooth	133	6	11	-44%
F. J. Heintz, 1914	Smalltooth	201	20	32	-60%
Ross Allen, 1940	Smalltooth	411	340	203	40%
W. C. Schroeder, 1918	Smalltooth	429	238	226	5%
Drew Co. postcard, undated	Smalltooth	442	299	244	18%
V. C. Heilner, 1917	Smalltooth?	445	454	248	45%
A. W. Dimock, 1926	Smalltooth	477	453	296	35%
E. F. Reid, 1942	Largetooth	530	590	377	36%
E. W. Brown, 1917	Largetooth	559	680	432	36%
F. A. Mitchell Hedges, 1923 (p. 225)	Largetooth	747	1588	906	43%
F. A. Mitchell Hedges, 1923 (p. 259)	Largetooth	884	2041	1396	32%
F. A. Mitchell Hedges, 1923 (p. 290)	Largetooth	945	2585	1656	36%

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What's this? A *saltwater* fish on the cover of *American Currents*? Despite the fact that most of us are primarily interested in North America's freshwater fishes, marine fishes are natives, too. The species shown here is the Smalltooth Sawfish, *Pristis pectinata* (captive specimen), which occurs along the Atlantic coast of North America. Photograph by Andy Murch, from the Elasmodiver Shark and Ray Picture Database (<http://elasmodiver.com>).