

Equatorial Minnesota

Minnesota paleontology and geology, National Park Service paleontology, the Mesozoic, and occasional distractions

Sunday, July 5, 2020

Fossil Marine Reptiles of the National Park Service

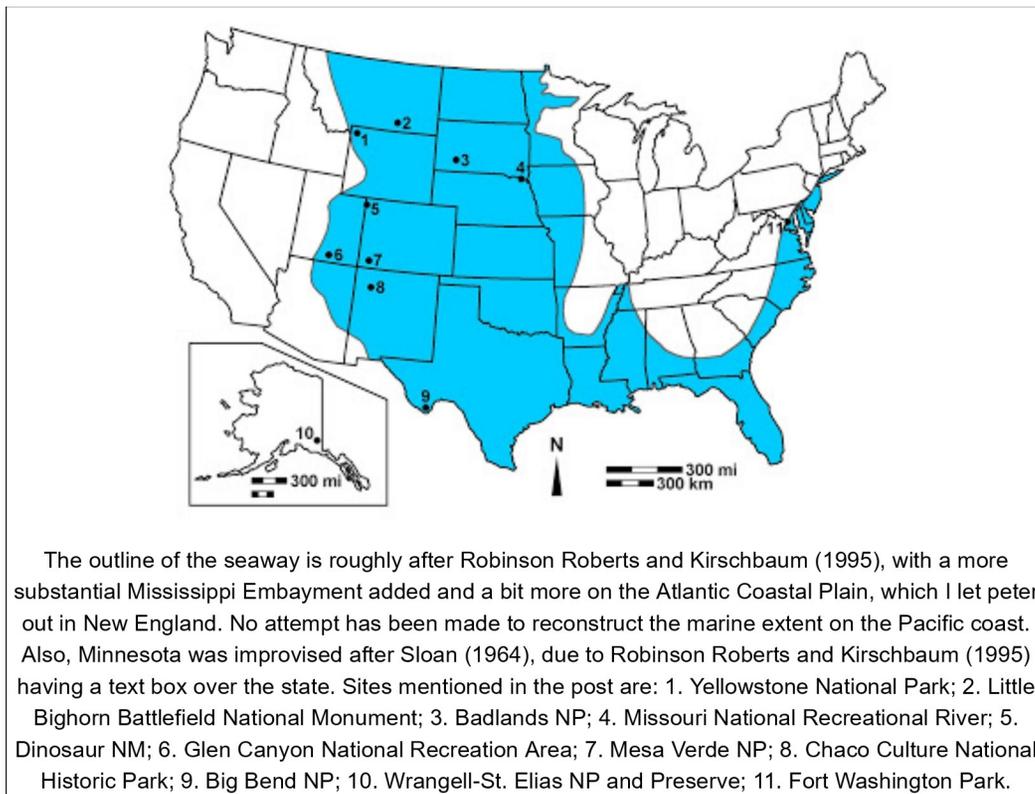
For my annual post summarizing a type of fossils from National Park Service lands, this time around we're going with Mesozoic marine reptiles: ichthyosaurs, plesiosaurs, and mosasaurs. As you might guess, most of the examples come from the rocks of the [Western Interior Seaway](#). This time around, we're only dealing with eleven parks, so there's space for going into more detail. We'll start off with the traditional map, which includes a lovely blue overlay to give you an idea of the extent of shallow seas at their Cretaceous peak:

Equatorial Minnesota



The Compact *Thescelosaurus*

A regularly updated, searchable, and sortable directory of basic information on published species of nonavian



(Also, if you're interested in cave fossils, check out our recently finalized [paleontological inventory](#) for [Carlsbad Caverns NP!](#))

Ichthyosaurs

We start out with the ichthyosaurs, which are known from the fewest reports so far. In fact, there is only one definite record of ichthyosaurs from an NPS unit: specimens from the Upper Triassic Nizina Limestone in [Wrangell-St. Elias NP and Preserve](#). Ichthyosaurian fossils here were first noted by USGS geologist David Whistler in 1963, who collected a tooth-bearing jaw fragment. The site was relocated by Pat Druckenmiller and Mike Loso in 2017, who observed many additional pieces of bones (Rozell 2017). Otherwise, the only other thing to mention is the discovery of fossils pertaining to *Ophthalmosaurus*-like ichthyosaurs in the Redwater Member of the Jurassic Stump Formation near [Dinosaur NM](#) (Chure 1993).

dinosaurs, pterosaurs, choristoderes, placodonts, basal sauropterygians, plesiosaurs, and ichthyosaurs (separate sheets). Other groups to be added over time.

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Plesiosaurs

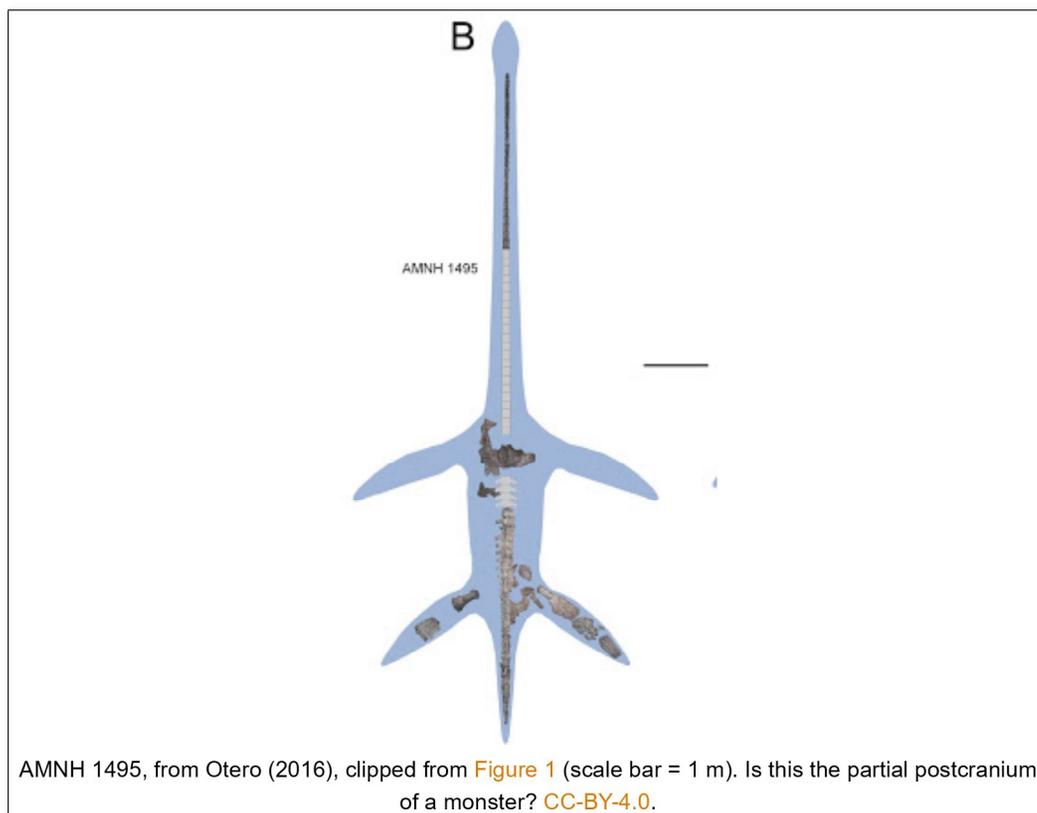
The plesiosaur record of the NPS is currently limited to Upper Cretaceous rocks. By far the best record comes from the Tropic Shale of [Glen Canyon NRA](#), which is notable for the diversity of short-necked plesiosaurs it has produced: the polycotyloid plesiosaurs *Dolichorhynchops tropicensis*, *Eopolycotylus rankini*, and *Trinacromerum ?bentonianum*, and the late-surviving pliosaurid plesiosaur *Brachauchenius lucasi* (Albright et al. 2007a, 2007b; McKean 2012). Another polycotyloid, *Palmulasaurus quadratus*, was also found in the vicinity (Albright et al. 2007a; originally named *Palmula*, which was preoccupied). *D. tropicensis* and *E. rankini* were named from specimens found in the recreation area. The *D. tropicensis* type has also been reported for its gastroliths (Schmeisser and Gillette 2009). In addition to the short-necked plesiosaurs, the recreation area has produced fossils of several other marine reptiles, including a few vertebrae of a juvenile long-necked plesiosaur (Schmeisser McKean 2013), a partial skull and vertebrae of a basal mosasauroid (Albright et al. 2012), and, as a bonus, specimens potentially representing the early protostegid marine turtle *Desmatochelys* (Albright et al. 2007a).

With GLCA staking a claim to short-necked plesiosaurs, [Missouri National Recreational River](#) specializes in long-necked plesiosaurs. Like our old friend [MNRRA](#), Missouri National Recreational River is a partnership park, so most of the land within its boundaries is owned by other stakeholders. Two or three long-necked plesiosaur specimens have been documented in print from this park. The most recent is the easiest to deal with: an elasmosaur (UNSM 123606) found in the Graneros Shale at Ponca State Park (Matson et al. 2002), at the southeast end of Missouri National Recreational River (see also Pabian and Lawton 1984 and 1987 for more on the geology of this park). The others are a bit trickier, and may be the same thing. The better-documented is AMNH 1495, a.k.a. the holotype of Edward Drinker Cope's *Elasmosaurus serpentinus*, later renamed *Hydralmosaurus* and most recently considered indeterminate within *Styxosaurus* (Otero 2016). Cope's locality information reads, in total, "This fossil was discovered in the blue shale of Cretaceous No. 3, in a bluff in Nebraska, on the southwest side of the Missouri, between Sioux City, Iowa, and Yankton, Dakota" (Cope 1877:583). This is essentially a description of the eastern section of Missouri National Recreational River.

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Now we let the plot thicken. As Matson et al. (2002) noted, there is a second plesiosaur known from the Ponca State Park area, the "Ponca Monster" of 1873. It turns out there is a detailed description of the circumstances of its discovery in a history of Dixon County, Nebraska (Huse 1896). This specimen was found by a resident of Dixon County known familiarly as "Old Joe Brewer", who "was a man whose study was nature and whose unfaltering enthusiasm and expectation led him to see wonders in every hill and to expect valuable minerals in the rocks and slopes of every ravine. His land, which extended to the river a fearful array of bluffs and gorges, was in his belief the place where mound builders many ages ago had lived" (Huse 1896:94). (This seems about par for the course when your protagonist is known as "Old" anything.) The description of his discovery goes on for a page of text, so rather than quote the whole thing, let me summarize the highlights. In the spring of 1873, Mr. Brewer found the skeleton of a plesiosaur eroding at the base of

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the Missouri River bluff, and undertook to excavate it with his sons. None of them being versed in the art of fossil excavation, they did a great deal of damage to the bones, but they sold the specimen to outside parties who brought it to Sioux City and glued the pieces back together. It was exhibited in Sioux City, then brought to Chicago and sold to a museum. Huse (1896) reported that the specimen belonged to an animal 80 feet long, which would be the longest plesiosaur known by **quite a bit**, but of course these things shrink in the wash (and, I suppose, there could have been other things mixed in, either due to multiple plesiosaurs at the site or exhibitors wanting a more impressive display). The specimen was also mentioned obliquely in Todd (1908), from which we learn that "In the vicinity of Ponca Ferry it [Graneros Shale] is represented by about 65 feet of beds. Few fossils are found in this formation. Some bones of large reptiles, among them those of a plesiosaur, were obtained years ago from the Missouri River bank near Limekiln Ravine, about a mile above Ponca Ferry" (Todd 1908:2).

The general geography of the Ponca Monster fits Cope's report, which certainly reads like a third-hand description, and the type of specimen and the time are also consistent. What doesn't fit, however, is the stratigraphy: AMNH 1495 is usually reported as coming from the Niobrara or the Pierre Shale, but these formations are not found within Ponca State Park, and in fact their nearest outcrops are 45 km away (28 miles) (Matson et al. 2002). Meanwhile, the "Ponca Monster" as noted came from the significantly older Graneros Shale. This leaves us with two basic options: these are indeed two different specimens, or AMNH 1495 is the "Ponca Monster" and the stratigraphy has just been reported incorrectly, which could certainly have come about with a third-hand description. So, if anyone here reading this is familiar with AMNH 1495, and it strikes you that it looks like it was excavated by someone called "Old Joe Brewer" with crowbar and pickaxe, maybe we've got something. If nothing else, it would put the question of identifying *Hydralmosaurus* with *Styxosaurus* in a different light, given AMNH 1495 would be **Cenomanian in age instead of Campanian**.

Little Bighorn Battlefield NM has one of the more unusual records, to date primarily documented in internal NPS reports. This unit is partially over the Upper Cretaceous Bearpaw Formation, and during routine work in Custer National Cemetery in 1977, a worker came across unexpected bones: the partial skeleton of a polycotyliid, identified as *Dolichorhynchops osborni*. This specimen, now

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catalogued as USNM PAL 419645, consists of the vertebrae, ribs, and limb girdles, and is complete enough that for a couple of decades it was exhibited at the Smithsonian with the addition of a skull and flippers (it was withdrawn during the recent redesign).



The Little Bighorn NB specimen of *Dolichorhynchops*, plus head and flippers, as it was on display at the Smithsonian. Found on [Wikimedia Commons](#), originally taken by Ryan Somma. CC-BY-2.0.

The other records are not quite as impressive. [Chaco Culture NHP](#) (Varela et al. 2019) and [Mesa Verde NP](#) (Harrison et al. 2017) have yielded plesiosaur pieces-parts from the Cliff House Sandstone, and possible plesiosaur remains have been reported in a general way from localities in the Mowry Shale including at Dinosaur NM (Stewart et al. 1994). Finally, I included [Yellowstone NP](#) on the map because of a previous report of a plesiosaur specimen from the Telegraph Creek Formation (Santucci 1998). This specimen has since been reinterpreted as an indeterminate reptile per internal NPS reports (which doesn't rule out a plesiosaur identity, but doesn't rule out a lot of other things either).

Mosasaurus

The best park for mosasaurs in the NPS is [Big Bend NP](#). Mosasaurs have been reported here since Maxwell et al. (1967) (San Vicente Member of the Boquillas

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Formation). Several taxa are present in the Ernst Member of the Boquillas Formation, representing basal mosasauroids, rüsselosaurines, and potentially mosasaurines (Bell et al. 2012; supersedes Bell 1995 and Bell and VonLoh 1998).

Missouri National Recreational River again takes second place, this time with its entry "*Mosasaurus missouriensis* from Niobrara State Park". The specimen was found in 1987 by Nebraska Game and Park Commission horticulturalists Jon Morgensen and Steve Brey in the Mobridge Member of the Pierre Shale, in a road cut following road construction (Bailey and Diffendal 1997) and measures an impressive 10 m long (33 ft) (Johnsgard et al. 2007). In this case, I'm not entirely satisfied whether the find was made within the area where Niobrara State Park and Missouri National Recreational River overlap, but if it wasn't, it was within about 30 m (100 ft) of the line. Unlike the retired *Dolichorhynchops*, this one is one display at the University of Nebraska State Museum in Lincoln, Nebraska, complete with [unhealed bite marks on the jaw](#).



Which you can see in this photo on the lower jaw.

As with the plesiosaurs, most of the other reports are much more minor. Mosasaur bones are known from the Fox Hills Formation of [Badlands NP](#) (Landman et al. 2013), and there is an internal report of a possible mosasaur bone from the Severn Formation of [Fort Washington Park](#). Pieces-parts of mosasaurs are known from the Cliff House Sandstone of Mesa Verde NP (Harrison et al. 2017) and the Cliff House Sandstone, Lewis Shale, and possibly the Pictured Cliffs Sandstone of Chaco

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Culture NHP (Varela et al. 2019); one of the Chaco Cliff House specimens has been identified to *Prognathodon overtoni*. Finally, as mentioned, the Glen Canyon record consists of a partial skull and vertebrae of a basal mosasauroid (Albright et al. 2012).

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About Me



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I am a researcher and writer who has been helping to inventory and catalog the fossil resources of the National Park Service.

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