

On The Record

History of Native American land and natural resource policy in the United States: impacts on the field of paleontology

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Abstract.—We highlight the historical and contemporary policies that govern paleontological research on federally recognized Native American lands. The United States has a long history of fossil dispossession from Indigenous Peoples, and federal policies surrounding the management of Native American lands (i.e., reservations), and the geological resources therein, have changed through time. These changes reflect shifting popular and political ideologies regarding Native American nations' sovereignty and self-governance. As of 2022, the United States has a government-to-government relationship with federally recognized Tribal entities, but that has not always been the case. Historians have divided post-contact Native American federal policy into distinct eras: Colonial Times to 1820, Native American Removal and Reservation (1820–1887), Allotments and Attempted Assimilation (1887–1934), Reorganization and Preservation (1934–1953), Termination and Relocation (1953–1968), and Tribal Self-Determination (1968–present). Documentation of how the federal policies from each of these eras continue to impact current paleontological research is limited. We summarize major legislative actions, court cases, and historical events that have affected paleontological resource management in Native American territory. We use this historical context to identify federal policy gaps and highlight legal nuances associated with fossil collection and ownership, particularly given the importance of fossils to some Native Americans' cultural patrimony. Finally, we explore how these gaps affect scientific research and highlight best practices for conducting paleontological research on vertebrate, invertebrate, and paleobotanical body and trace fossils using the CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) Principles for Indigenous Data Governance (<https://www.gida-global.org/care>).

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Accepted: 15 November 2022

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Introduction

Paleontology has long relied on the extraction of fossils to further our understanding of the history of life. Within the contiguous United States, paleontological resources are often preserved on federal, state, and Native American reservation land, each with its own rules governing the collection of fossil material. Therefore, understanding the rights, privileges, rules, and restrictions of scientific collecting on

any given parcel of land is a necessary component of conducting geological and paleontological field research. Field collection is further complicated by the lack of ethical consideration and proper redress regarding research on reservation land. Whereas paleontologists have recently begun to acknowledge historical and contemporary injustices within our field, including the theft of fossils from Native American lands (Bradley 2014) and foreign countries (Sokol 2019; Cisneros et al. 2022;

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0094-8373/23

This article has been updated on 1 May 2023.



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Raja et al. 2022), much work remains to address these issues. Reflection and reciprocal learning about problems of injustice can help foster equitable paleontological research (Ali et al. 2021; Monarrez et al. 2021), but a general lack of knowledge among paleontologists regarding the legal history of dispossession from Indigenous Peoples' lands hinders our ability to create ethical collection rules and laws and foster stronger research partnerships among paleontologists and Indigenous citizens. We expand on these topics by providing a summary of policies surrounding Native American paleontological resource management over time and provide a path forward to create ethical and equitable collection guidelines for paleontological resources, including paleobotanical and ichnological resources. In this article, we use the term "Native American" to represent the many diverse, unique, and dynamic Indigenous entities who first inhabited the contiguous United States and continue to do so today (<https://americanindian.si.edu/nk360/informational/impact-words-tips>). The scope of this article is limited, in that we focus only on policies pertaining to Native American Tribes and nations that are federally recognized by the U.S. government.

Native American lands, many of which exist in geological areas of interest, both academic and commercial, are governed by a complex and varied set of rules at the Native American nation, state, and federal levels (Rolnick 2014; Reese 2021). We aim to disentangle relevant federal rules, regulations, and legal cases that have accrued through history and provide information on fossil dispossession in the United States in an effort to:

1. provide paleontologists with historical context to inform their research and plans for engagement with Indigenous citizens and the broader community;
2. identify policy gaps and ambiguities surrounding fossil collection on Native American lands; and
3. provide guidance on the collection of paleontological resources for consideration by Native American nations, federal lawmakers, and paleontologists.

We consider different types of policies and law, including federal statutory laws (i.e., laws enacted by Congress and signed by the president), federal regulatory laws (i.e., laws created by federal agencies), treaties with Native American nations, and case law (i.e., court decisions that have interpreted the other bodies of law). Case law from the past often sets "precedent" for contemporary legal matters. Precedent can emanate from a series of legal decisions or can stem from a single case when derived from the same or a higher appellate court (Schauer 1987).

This work serves as an introduction to an understudied area of federal policy: paleontological resource collection on federally recognized Native American lands. Whereas we cannot cover all federal policies relevant to this topic, we seek to provide sufficient context to understand the legal and ethical frameworks influencing paleontological research on Native American lands. We argue that overall, even as recent federal ideologies have shifted toward increasing Native American nations' self-governance and sovereignty, significant gaps still exist regarding the safeguarding of paleontological resources on Native American lands. These gaps, we believe, ultimately hinder both Native American nations' ability to manage their paleontological resources as well as scientific research. Too often, implemented policies have failed to serve either Native Peoples or science. Therefore, we offer questions for lawmakers, Tribal governments, and the scientific community to consider and address collectively. Moreover, we conclude with a discussion of contemporary policies, legal disputes, and data collection on Native American lands and provide practical guidance for informative and respectful paleontological research based on the CARE Principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility, Ethics; <https://www.gida-global.org/care>). Importantly, dispossession of fossil resources from Indigenous Peoples is not limited to the contiguous United States (<https://www.unesco.org/en/articles/french-customs-return-998-stolen-fossils-unesco-global-geopark-brazil>; Mayor 2007), and CARE Principles should hold in contexts beyond reservations.

Historical Federal Policies and Native American Lands: Late 1700s to the 1960s

Establishment of the Federal Role: 1778 to 1820.—Following the historical framework defined by Canby (2015), in 1778, the newly formed U.S. government established its role in Native American affairs when it ratified the Constitution, which granted Congress the power to “regulate Commerce with the Indian Tribes” and the president, with the consent of the Senate, the power to form treaties with Tribes (U.S. Const. art. I, § 8, cl. 3; art. II, § 2, cl. 2). During this time period, Congress passed a number of trade-related acts establishing Native American entities as distinct nations, largely separated from the United States in rules and regulations, and drew boundaries between Native American and non-Native American lands. Finally, the federal government established that trade between colonists and Native American entities was subject to federal control (Canby 2015).

Native American Removal and Reservation: 1820–1887.—From 1820 to 1887, settlers’ demands for more land led to further conflict with Native Americans. Therefore, federal leaders, including U.S. presidents James Monroe, John Quincy Adams, and Andrew Jackson, agreed that federal policies should forcibly remove Native Americans to the west of the Mississippi (Canby 2015). At the same time, the Supreme Court, under the leadership of Chief Justice John Marshall, began to establish the legal doctrine that would inform the role of the U.S. federal government in Native American affairs for years to come. This period included the first lawsuit of the “Marshall Trilogy,” a set of three Supreme Court cases that established the case law basis for the federal government’s approach to Native American nations’ self-governance of land (Deloria and Lytle 1983; Fletcher 2014; Canby 2015). The first case of the trilogy, *Johnson v. M’Intosh*, 21 U.S. 543 (1823) held that Native Americans lacked inherent rights to own land. This is largely based on a common, yet flawed, colonial view that land titles belong to the “discoverer” (i.e., the settler) (Paul 2014). The case also established that Tribes or Native American individuals could not sell their land

to non-government entities and deemed all previous land purchases void. Instead, only the federal government had the right to purchase Native American lands. The first of the Marshall Trilogy cases actively limited Native American nations’ rights to manage land and resources (Sorenson 2017) and set the stage for future exploitation of natural resources on Native American lands, including fossils.

Federal statutes, such as the Indian Removal Act, 25 U.S.C. § 174 (1830) sought to remove Eastern Tribes from their territory and force them westward, often ending in the death of Native American individuals due to extremely harsh conditions and disease (Rauch 1950; Foreman 1974; Deloria and Lytle 1983). Furthermore, in 1831, the second of the Marshall cases, *Cherokee Nation v. Georgia*, 30 U.S. 1 (1831), was decided. In this case, Chief Justice Marshall ruled that Tribes are “domestic dependent nations,” not completely sovereign entities. This ruling would be contradicted the next year by the third and final case of the Marshall Trilogy, *Worcester v. Georgia*, 31 U.S. 515 (1832), which established that “Tribes are under the protection of the federal government and in this condition lack sufficient sovereignty to claim political independence; tribes possess, however, sufficient powers of sovereignty to shield themselves from any intrusion by the States and it is the federal government’s responsibility to ensure that this sovereignty is preserved” (Deloria and Lytle 1983: p. 33). In all, the Marshall Trilogy established that, under U.S. law, (1) Tribes are inherently sovereign entities, and (2) the federal government has a “federal trust responsibility” to Tribal nations (Report of the Secretary of the Interior 2000). The latter doctrine requires the federal government to “protect” Native American lands and support Native Peoples by providing services that promote sovereignty and Tribal citizens’ well-being; however, this resulted in a complex relationship between the federal government and Native American nations and often led to further marginalization of Native American interests (Wood 2003; Mills 2017; Rey-Bear and Fletcher 2017).

Despite this newly established Marshall-era trust framework, the federal government failed to protect Native Americans’ right to

self-govern natural resources, including fossils, on Native American lands (Bradley 2014). The mid-nineteenth century included myriad instances of fossil dispossession from Native American lands, particularly in the Great Plains, often irrespective of treaty rights between the federal government and Tribal nations (Bradley 2014). With regard to the dispossession of paleontological resources from Indigenous lands of the Great Plains, a “fossil rush” was started in the mid-1800s by fur traders’ reports and subsequent government-sponsored land surveys (Bradley 2014). In 1846, Dr. Hiram Prout of St. Louis described a fossil found by a trapper of the St. Louis Fur Trading Company, who was conducting operations along the White River of the Badlands in Sioux territory, as a “*Palaeotherium*” maxillary bone (Prout 1846). Prout’s act of scientifically describing a fossil on Native American lands set the stage for a proliferation of exploration on behalf of Western science and an unfortunate history of paleontology resource dispossession from the Sioux Tribes (Bradley 2014).

Additionally, in 1849, land surveyor John Evans was given authority and funding by the U.S. Congress to explore a geographic area that included the Mauvaises Terres, also known as the Badlands (Owen 1852). Evans was a subagent of the U.S. geologist David Dale Owen and likely was instructed to collect fossils in Native American lands in this region (Bradley 2014). Evans devised a map of the fossiliferous Badlands, included descriptive notes on geological beds and formations, and also secured a large amount of invertebrate and vertebrate fossils for an official report by Owen. This published locality information made it feasible for any trained paleontologist to find and collect fossils located on Sioux lands without permission from the Tribe(s). Noted paleontologist Dr. Joseph Leidy of the Philadelphia Academy of Natural Sciences described and classified Owen’s fossil specimens (Leidy 1865). It can be argued that Leidy’s career and reputation were advanced by his studies of paleontological resources collected from Native American lands.

Research by additional well-known paleontologists, including Edward Drinker Cope (1840–1897) and Othniel Charles Marsh

(1831–1899), depended on fossils taken from Native American lands. Marsh and Cope were storied rivals and competed during the era known as the “Bone Wars,” during which Sioux Tribes’ paleontology resources were plundered (Bradley 2014). Cope traversed many parts of Sioux Country during his career and collected important dinosaurian fossils from the Standing Rock Reservation (Osborn 1931). Contemporaneously, Professor Marsh of the Yale Peabody Museum repeatedly took fossil-collecting expeditions, many of which included students, into the southern portion of Sioux lands of the Dakota and Nebraska Territories (Schuchert and LeVene 1940). Many specimens that later became holotype fossils were collected by Marsh teams across the Great Sioux Reservation that encompassed the western half of South Dakota. During this period of rampant fossil collecting from these, and likely other, Native American lands, many museum and university collections were built upon a foundation of expropriated fossils (Bradley 2014).

The continued quest for fossils, as well as rapid economic and technological development of the United States, expansion of railroads, and the exploitation of gold and mineral resources led white settlers to move farther westward. Therefore, the relocation of Native Americans to the Great Plains as a federal policy, aimed at keeping Native Peoples separate from settlers, began to fail. By 1871, Congress stopped making treaties with Tribes and no longer recognized them as independent nations (Deloria and Lytle 1983). By the 1880s, colonial removal and reservation tactics were insufficient to avoid contact, leading President Chester Arthur to propose in 1881 an allotment system as a federal policy “to introduce among the Indians the customs and pursuits of civilized life and gradually to absorb them into the mass of our citizens” (Deloria and Lytle 1983: p. 8). This set the stage for the next era of federal Native American policy: allotments and attempted assimilation (Canby 2015).

Allotments and Attempted Assimilation: 1887–1934.—From 1887 to 1934, U.S. policies sought to forcibly assimilate Native Americans into the European settler population (Canby 2015). A critical piece of legislation during this period

was the General Allotment Act, 25 U.S.C. § 348 (1887), also known as the Dawes Act. This act gave the president the power to allot reservation lands to Native American individuals. This resulted in the division of reservation lands, which were historically communally owned, among Native American individuals, with any “surplus land” sold to white settlers (Canby 2015). The Dawes Act also put all allotted lands into a 25-year trust with the United States. After the 25-year trust ended, that land transitioned to “fee simple” (i.e., privately owned land title) and would therefore be transferable, leading to further loss of Native American lands. Under this process, after the 25-year period, Native American landowners became citizens and fell under the jurisdiction of the state in which they lived. However, the secretary of the interior still had broad power over these areas, and Native American lands were reduced from 138 million acres in 1887 to 48 million acres in 1934. Of the 48 million acres, approximately 20 million were unsuitable for farming (Deloria and Lytle 1983). An amendment to the original Dawes Act, the Curtis Act, 30 Stat. 494 (1898), extended the Dawes Act provisions to the Eastern Tribes, who were initially exempt from the Dawes Act due to treaty provisions. In addition to subjecting more Native Americans to allotment, it also disestablished Tribal court systems and governments. A later amendment, the Burke Act, 25 U.S.C. § 349 (1906), furthered the Dawes Act by giving the secretary of the interior the power to deny individual Native Americans fee simple land at the end of the 25-year trust period. Additionally, multiple court cases during this time limited Native American rights to manage natural resources and increased the power of Congress. For example, in *Cherokee Nation v. Hitchcock*, 187 U.S. 294 (1902), the Supreme Court ruled that Congress had the authority to overrule treaties, further limiting Native American control of their lands and resources therein.

In 1906, the Antiquities Act, 16 U.S.C. § 431-433 (1906), gave the federal government the power to investigate and penalize people for excavating “objects of antiquity” and “objects of scientific interest” from federal and Native American lands after affording due process. While fossils are not explicitly identified in

this piece of legislation, the language is notably vague. Further, this act gave the president of the United States the power to declare national monuments to protect cultural resources and the federal government the ability to grant citizens access to collect or excavate on public lands for “the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions.” While the Antiquities Act is lauded as the government’s first attempt to preserve cultural resources for all U.S. peoples (McManamon 2000), this seminal piece of legislation failed to include Native Americans’ input in the legislative process or determine what ultimately happens to cultural resources found on federal lands (Watkins 2005). The failure of Congress and the president to recognize and include Native Americans’ interest in public land and resource preservation is reflective of the underlying urge to erase Indigenous culture and identity in the United States popular during that time. In recent years, the Antiquities Act has been utilized to create national monuments and manage these spaces in concert with Tribal nations, such as the work being accomplished through the Grand Canyon Trust and Bears Ears National Monument (Riggs 2022; <https://narf.org/cases/bears-ears>).

Reorganization and Preservation: 1934–1953.— From 1934 to 1953, two noteworthy laws were passed regarding land and natural resource management: the Indian Reorganization Act, 25 U.S.C., § 5101 (1934), and the Indian Mineral Leasing Act, 25 U.S.C., § 396 (1938). After World War I, the Indian Reorganization Act aimed to reestablish Tribal governments’ control over resources on reservations and to preserve Native American cultures. This act halted future allotment of communal land to individuals, provided for the return of surplus lands to Native Americans, and encouraged Native American self-governance through the drafting of independent Tribal constitutions. In addition, the Indian Mineral Leasing Act was passed, which allowed Tribes to profit from the mineral resources on reservation lands. These actions, however, required oversight and approval by the secretary of the interior, thus fundamentally limiting Tribes’ complete sovereignty (Canby 2015).

Termination and Relocation: 1953–1968.—In 1953, Congress officially adopted a federal policy to “as rapidly as possible ... make the Indians within the territorial limits of the United States subject to the same laws and entitled to the same privileges and responsibilities as are applicable to other citizens of the United States” (H.R. Cons. Res. 108, 1953). During this time frame, the government disbanded several reservations and attempted to relocate Native Americans into urban areas by offering grants to those who would seek work outside reservations (Burt 1986). The goal of this policy was to end the federal government’s responsibilities to Tribes, and large tracts of Native American lands were converted into private ownership and sold (Canby 2015). Finally, in 1953, Congress passed Public Law 280 (without the consent of Tribes), a statute that extended *state* civil and criminal jurisdiction to Native American lands in California, Nebraska, Minnesota (except Red Lake reservation), Oregon, Wisconsin, and Alaska. This law appears directly contrary to *Worcester v. Georgia*, 31 U.S. 515 (1832), which declared that Tribes have “sufficient powers of sovereignty to shield themselves from any intrusion by the States.” Public Law 280 continues to limit Tribal sovereignty by giving states criminal jurisdiction and giving non-Native police authority within reservation boundaries (Goldburg and Valdez Singleton 2005). These rules could have important legal implications for charging people for fossil theft from Native American lands.

Contemporary Policies and Paleontological Resources

Tribal Self-Determination: 1968–Present.—Since the advent of the “Self-Determination” era in 1961, numerous pieces of legislation and court cases have impacted geological resources, ranging from mineral development, tax laws, lease obligations, zoning and land rights, energy, and fossil collection and ownership (Canby 2015). Although many of these laws and initiatives have increased Native American self-governance, ambiguities remain that we believe fundamentally limit Tribal sovereignty and hinder more productive partnerships in paleontological research.

Legislation during the Tribal Self-Determination era has established protections of Native American history and religious sites, including those encountered on non-reservation lands. For example, the American Indian Religious Freedom Act, 42 U.S.C. § 1996 (1978), guarantees Native Americans the right to access sacred sites and possess sacred objects. Interestingly, while not explicitly included in legislation, fossils have been, and continue to be, considered sacred by many Indigenous entities (Mayor 2005; Santucci et al. 2021). Additionally, the Archaeological Resource Protection Act (ARPA), 16 U.S.C. 1B (1979), regulates the excavation and collection of archaeological resources, defined as “material remains of past human life or activities ... [such as] pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items.... No item shall be treated as an archaeological resource under regulations under this paragraph unless such item is at least 100 years of age.” This law applies to both federal and Tribal lands and partly addresses weaknesses of the Antiquities Act, which was worded too vaguely for criminal prosecutions to be consistently pursued. Therefore, ARPA requires that, if found, archaeological resources must be left in place unless the collector has permits from the appropriate federal land management agency. Further, ARPA specifically states that “non-fossilized and fossilized paleontological specimens, or any portion or piece thereof, shall not be considered archaeological resources, under the regulations under this paragraph, unless found in an archaeological context.” This broad definition complicates our interpretation of “paleontological” versus “archaeological” resources. Further, as fossils have been incorporated into many Native Americans’ cosmologies and cultural histories for millennia (Mayor 2005), it raises questions regarding the breadth at which ARPA could be applied.

During the 1990s, the Native American Graves Protection and Repatriation Act (NAG-PRA), 25 U.S.C. 32 (1990), was designed to protect and repatriate (return) “human remains,

funerary objects, sacred objects, objects of cultural patrimony” currently in museums to Native American people. This legislation regulates the collection of archaeological resources on federal lands and Native American reservations (not private or state lands). The law states that in order to excavate archaeological resources, researchers must first acquire a federal permit and have a detailed plan in place to return objects to the appropriate Tribe within 90 days (<https://www.nps.gov/subjects/nagpra/on-federal-or-tribal-lands.htm>). As stated previously, many paleontological resources exist within an archaeological context (Mayor 2005, 2007; Santucci et al. 2021), thus suggesting NAGPRA can apply to paleontological resources. For example, fossils placed within burial sites hold ceremonial value to Indigenous Peoples of the American Southwest (Santucci et al. 2021), and shell mounds cultivated by Central Californian Native Peoples also served as burial sites, as well as spaces of refuge and connection to homelands, even at the height of colonial exploitation (Schneider 2022). Fossils (both vertebrate and invertebrate) have been important aspects of Native American nations’ culture across North America for millennia (Mayor 2005). These complexities raise the question: could some paleontological resources be protected (and even repatriated) via statutes such as NAGPRA and ARPA?

The 2000s brought additional laws and cases related to fossils on Native American lands, including the Omnibus Public Lands Act, 16 U.S.C § 1 (2009), a comprehensive piece of legislation that includes the Paleontological Resource Protection Act (PRPA), 16 U.S.C. 1C (<https://irma.nps.gov/DataStore/Reference/Profile/2274127>). The PRPA outlines in detail the federal legal definition of a fossil and how fossils are to be protected on federal public lands. Notably, the protections defined in this piece of legislation do not, as of 2022, apply to reservations. Among the paleontological community, the PRPA was met with mixed opinions. For example, in 2016, the Paleontological Society supported the intention of the PRPA, but there was concern among some of its members about the specific language used in the document. Some members argued that the law was overly broad

and could overly restrict professional paleontologists’ ability to conduct scientific research, teaching, and public service. Regulations for implementing the PRPA differ among federal agencies, leading to additional confusion among paleontologists wishing to comply with the law. The Society for Vertebrate Paleontology (SVP) largely supported the PRPA of 2009, although opinions were also variable within the community.

The SVP has been outspoken concerning the importance of publishing precise locality data, stating it “should be recorded to the greatest accuracy possible ... and should be repositied along with stratigraphic and other metadata, detailed maps, measured sections, field notes, photographs, and other associated documents” (<https://vertpaleo.org/wp-content/uploads/2021/01/SVP-PRPA-Comments-1.pdf>). It is important to note, particularly given the importance of fossils to some Native American nations’ cultural patrimony (Mayor 2005), that it would *not* be appropriate to publish locations of fossils found in the field when found on reservation lands unless granted clear, written permission by the Native American nation with whom you are working. Furthermore, some Tribal citizens have been taught to leave fossils undisturbed for spiritual reasons, a fact that paleontologists have historically either taken advantage of or not recognized (Bradley 2014; A. Mayor personal communication 2021). This stricture concerning publication of fossil locations can pose an issue for paleontologists and geoscientists, as it could hinder scientific reproducibility. Understanding this logistical challenge is a key issue to consider before engaging with Tribal nations to conduct paleontological research.

Historically, it was common practice for North American museums and universities to omit information about where paleontological specimens were found when they were collected on Native American lands. Many times, an identification tag would only list the county of a fossil’s origin, in order to hide the fact that the expropriated fossil was collected from a reservation (Bradley 2014). We suggest that museums adopt a policy going forward that does not identify exact fossil localities

without written approval of the Native American entity. Yet, to increase transparency and acknowledge the past, museums and universities should update their historical records to reflect that the said fossils were collected, or potentially expropriated, from Indigenous lands (Das and Lowe 2018; Vawda 2019).

In addition to PRPA, several lawsuits have been filed in recent decades relating to vertebrate paleontological resources. The famous excavation of “Sue” the *Tyrannosaurus rex* led to a series of both civil and criminal legal battles regarding paleontological resource ownership (Jones 2019), which eventually established that paleontological resources on Native American trust lands are trust resources. Another relevant case is *United States of America v. One Tyrannosaurus bataar Skeleton*, 12 Civ. 4760 (PKC) (S.D.N.Y. Sep. 7, 2012), in which Eric Prokopi was charged in a New York federal district court for illegally importing a *Tyrannosaurus bataar* skeleton collected in Mongolia to England, and then transporting it from England to the United States under false pretenses, claiming that the fossil originated in England (Jacobs 2013). The Mongolian constitution dictates that fossils are culturally significant and part of their cultural heritage, and their export must be approved by the government. Therefore, the fossil was returned to Mongolia. Interestingly, in the United States, NAGPRA states that cultural items with religious meaning and/or “sacred” objects are protected under law, and Tribes are able to request them for repatriation. Specifically, an “object of cultural patrimony means an object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself.” This raises the question: if Mongolia, a sovereign nation, was able to repatriate a culturally significant fossil, then could Native American Tribes under NAGPRA have the same ability? Does the challenge come from the problematic status of Tribes as “dependent nations,” or the burden of proving that a fossil is of cultural significance? Under NAGPRA, repositories are required by law to consult with Tribes to determine when remains are owned by Tribes, suggesting that the process of repatriation is a mutual effort. However, if museums are reluctant to initiate

conversations regarding fossil repatriation, or purposely deny a qualified researcher the ability to document and photograph fossils collected from historic Native American lands, the burden of legal proof may lie with Native American nations.

In 2017 the Bureau of Land Management (BLM) issued a permit for the excavation of an Eocene mammal site to be reposed in the New Mexico Museum of Natural History and Science. The BLM and Pueblo of San Felipe met for government–government consultations about the excavation of the fossil site. The Tribal nation stated that cultural resources existed throughout that area, yet a survey conducted by the BLM in response to the claim reportedly found no cultural items (<https://www.oha.doi.gov/IBLA/Ibladecisions/191IBLA/191IBLA053.pdf>). The BLM therefore issued the permit, and the Tribe asserted that the fossils themselves are examples of cultural patrimony and are protected under NAGPRA. This issue went to the U.S. Department of the Interior Office of Hearings and Appeals when the Tribe sued for violations of the BLM’s obligations for government consultation. The court decided that fossils are protected under NAGPRA only if there is “sufficient evidence” that the fossils were “owned” by the Tribe or had a cultural affiliation to the Tribe. Because the Tribe could not, according to the court, adequately demonstrate this, the appeal was rejected (<https://www.oha.doi.gov/IBLA/Ibladecisions/191IBLA/191IBLA053.pdf>). This raises an important question: can oral histories, which take place in numerous forms, including songs, stories, and other forms of art, serve as sufficient legal evidence for paleontological cultural affinity? The issue of excluding oral evidence, due to what is referred to as “the hearsay rule,” or Rule 801 from the U.S. Federal Rules of Evidence, is common in Native American jurisprudence. The rule favors contemporaneous written documentation as evidence, while rejecting oral representations passed down over time. Because many Native American cultural histories are oral, the rule fundamentally limits the ability of Native Peoples to prove cultural patrimony in federal courts (Babcock 2012; Katner 2019).

Despite a lack of court cases concerning the repatriation of invertebrate and plant fossils to Native American entities, these specimens also may be considered sacred and worthy of protection and/or repatriation in the future. The National Park Service demonstrated that both human-modified and unmodified brachiopods, ammonites and other mollusks, crinoids, petrified wood, leaf fossils, and seeds have been found in culturally significant areas for *multiple* Native American entities, particularly in the American Southwest (Kenworthy and Santucci 2006; Santucci et al. 2021). Fossil invertebrates and paleobotanical specimens have been used by Native American Peoples for millennia for myriad purposes. Fossils rediscovered in archeological sites demonstrate their importance in trade and manufacturing of tools and weapons, as funerary objects, and for ceremonial purposes (Santucci et al. 2021). Therefore, paleontologists studying these taxa must also be cognizant of the regulations and ethical complexities surrounding fossils and their historical and contemporary collection from Native American lands.

In all, it appears that if fossils are documented components of a Tribal entity's cultural patrimony, they could be repatriated (at least partially). For many colonized Indigenous Peoples, repatriation of cultural items can serve to restore and renew spiritual and cultural identity and can offer means to facilitate healing from colonial traumas and give power back to Tribes (Flynn and Laderman 1994; Harding 1996; Simpson 2009). A case relevant to repatriation and its complexities involves the Willamette Meteorite, or *Tomanowos* in the Clackamas Tribe's ancestral language (a dialect of Upper Chinook) (Weiser 2000). The Confederated Tribes of the Grand Ronde Community sought the repatriation of *Tomanowos* from the American Museum of Natural History based on the historical use of the meteorite in ceremonies. However, in *American Museum of Natural History v. the Confederated Tribes of the Grand Ronde Community of Oregon*, No. CV-1509 (S.D.N.Y. Feb. 28, 2000), a Federal District Court in New York ruled that the meteorite was "a natural feature of the landscape, rather than a specific ceremonial object." Eventually, the Tribe and museum settled on an agreement

that the museum would house the meteorite and display it as long as they publicly acknowledged the spiritual and sacred meaning of the meteorite to the Confederated Tribes of the Grand Ronde Community. In exchange, the Tribe would stop NAGPRA repatriation efforts (Weiser 2000). In the future, it is possible that specific fossils or other geological specimens could be documented as culturally significant and repatriated. What that documentation would look like is unclear, but (at this stage) it would likely have to be written (not oral). For example, if there is a mandate or clause in a specific Tribe's constitution pertaining to fossils and cultural heritage (see Standing Rock Sioux Tribe Res. 355-07, 2007), we suspect that may suffice as evidence in non-Tribal courts.

Given the complexities highlighted throughout this section, we pose questions for collective consideration by lawmakers, Tribal governments, and paleontologists regarding field collection of fossils.

1. What are the rights of Native American landholders on trust lands (specifically those who are neither commercial nor professional collectors) to collect fossil resources for their own cultural use?
2. Should a standardized Bureau of Indian Affairs (BIA) fossil collection permitting process that explicitly requires written approval from Tribal governments be established? Could the National Park Service permitting process be adapted for fossil collecting on reservations?
3. Are there, or should there be, separate permitting processes for vertebrate fossils, invertebrate fossils, microfossils, and plant fossils?
4. If Tribal governments form their own laws regarding fossil collection and protection, can they charge non-Tribal citizens in their courts for failing to follow Tribal laws? How would Public Law 280 affect this?

Further, numerous ambiguities regarding fossil ownership and repatriation exist.

1. Could oral histories ever "prove" cultural patrimony in federal courts? If not, what

steps can be taken to change U.S. jurisprudence to consider oral histories legitimate forms of evidence?

2. Could fossils currently in museums that were collected illegally or inappropriately in the past be repatriated if proven to be culturally significant to a Tribal entity?

Acknowledging the Past and Looking to the Future

We believe it is possible, and potentially valuable to both parties, for non-Native scientists to work collaboratively with Native American entities and citizens to conduct paleontological research on Native American lands. However, doing so requires non-Native scientists to actively learn about historical and contemporary policies surrounding collecting/collections on Indigenous lands and proactive and thoughtful relationship-building centered on trust and reciprocity (Dzombak 2020; Lazrus et al. 2022). As described earlier, federal policies of the postcolonial United States have dramatically affected how Native American nations interact with and manage land and natural resources, including fossils. However, despite colonial challenges, Native American citizens continue to connect with and honor their diverse histories via paleontological resources (Mayor 2005, 2007; Santucci et al. 2021). Many different types of fossils can serve as a form of cultural patrimony and heritage, and therefore have significant intrinsic value outside their value to Western science (Mayor 2005, 2007; Santucci et al. 2016). Given the unfortunate history of fossil dispossession from Native American lands, many of which were then deposited in prominent museums and universities (Mayor 2007; Bradley 2014), it is critical to learn about and understand the rights, rules, regulations, and ethical complexities involved in fossil collection on Native American lands today. Fossil collection on Native American lands is guided by a complex collection of federal, local, and Tribal laws, all of which scientists should familiarize themselves with before designing a research project on these lands. In addition to seeking federal permits from the BIA, paleontologists must proactively coordinate with the specific Native

American entity on whose land they will work and learn about and then follow both federal and Tribal laws and guidelines. In compliance with federal BIA policy, collectors must obtain written consent from the Tribal government for tribally owned land, arrange for the return or disposition of fossils recovered, and obtain funds to cover the cost for full restoration of any area damaged by the excavation (<https://www.bia.gov/sites/default/files/dup/assets/public/raca/manual/pdf/idc-017700.pdf>).

Best paleontological practices involve following the CARE Principles for Indigenous Data Governance. The CARE Principles were formed by the Research Data Alliance International Indigenous Data Sovereignty Interest Group in September 2019 (Fig. 1; <https://www.gida-global.org/care>). They ensure that data collected on Indigenous lands will ultimately benefit the peoples of those lands and be collected in a manner that is not harmful to their communities. The CARE Principles provide the ethical framework for collecting and sharing Indigenous data. In line with CARE, non-Native paleontologists pursuing Native citizen



FIGURE 1. The CARE Principles for Indigenous Data Governance. Developed by the Research Data Alliance International Indigenous Data Sovereignty Interest Group in September 2019 (<https://www.gida-global.org/care>).

involvement should do so respectfully and proactively; work with the full knowledge and approval of the Native American entity that owns, manages, and understands the land; and include Native American citizens in research development and implementation. Given the history of myriad colonial harms inflicted on Indigenous Peoples, including fossil dispossession (Bradley 2014) and active displacement of Native Americans from their lands to residential schools (Blakemore 2021), it is understandable if Native American citizens and governments are apprehensive about trusting Western scientists. Therefore, non-Native scientists must be patient and thoughtful in their engagement plans and must follow through on promises of reciprocal outcomes (Gewin 2021).

Taking the time and energy to achieve these goals will not only create a more equitable and inclusive field of study, but will ultimately advance paleontology by introducing new ideas and perspectives from historically excluded groups through the mutual study of fossils. Paleontologists will benefit by being proactive about engaging with and learning from Indigenous communities about their fossils. There are numerous methods for doing so, all of which take time, effort, funding, and thoughtful collaborations with honest intentions. To accomplish this task, paleontologists can research existing programming involving both Western scientists and Tribal entities to guide their planning. For example, the program *Nimiipuu'newit: Lifeways of Our Homelands* provides opportunities for Nez Perce Tribal citizens to work with Tribal governments, local natural resources managers, and academic institutions to collectively address protection of homelands in Washington, Oregon, Idaho, Montana, and Wyoming (Greene 2020).

Furthermore, paleontologists in academia should actively work to improve learning conditions and educational outcomes for Indigenous students, who have been historically excluded in classrooms and research programs (Sasso 2006; Makani Nicholas 2020; Smythe et al. 2020; Gewin 2021; Jin 2021). Indigenous students in university settings often struggle with numerous challenges, including but not limited to being forced to mask their identities,

and struggle with home communities' concerns regarding their decision to participate in academia (Dzombak 2020; Gewin 2021). These difficulties can be partly alleviated by including discussions of valuable Indigenous knowledge in Earth science curricula in a manner that uplifts Indigenous Peoples, refuting the idea that Western science is inherently superior, and offering various opportunities for research engagement, including externships that do not require students to leave their home communities, such as fossil-collecting expeditions (Makani Nicholas 2020; Smythe et al. 2020; Jin 2021; Smythe and Peele 2021; Lazrus et al. 2022). These actions, among others, can increase Indigenous students' sense of identity, value, and belonging in paleontological research.

In all, we believe it is possible for mutually beneficial paleontological research to be accomplished on Native American territory. For this to happen, though, there must be collective understanding of the history of federal Native American policies and contemporary ambiguities. Additionally, scientists must defer to Native American nations' unique, individualized regulations and needs, and offer meaningful opportunities for Indigenous citizens to interact with and benefit from the scientific process. These goals can be accomplished through various means, including collaborative programming, reworking of existing curricula, and creating academic spaces that increase representation of Indigenous Peoples in the discipline of paleontology on their terms.

Acknowledgments

We are grateful for the Paleontological Society and American Geosciences Institute for funding H.L.H. and H.C.O. to pursue this research during a geoscience policy internship in the summer of 2021. We wish to thank A. Mayor, J. Arthur, D. Applegate, R. Kempf, A. Olson, and A. Gardiner for their thoughtful discussions and feedback on these topics. We also thank S. LuBeau, J. Plumage, C. Bearing, Deputy Director of Northern Arapaho Tribal Historic Preservation Office, E. Toombs, Cherokee Nation Tribal Historic Preservation Officer, and the Bureau of Indian Affairs Great Plains,

Rocky Mountain and Southern Plains regional offices for their guidance and recommendations. We are also thankful for reviews by P. Marenco, V. Santucci, and one anonymous reviewer, all of which enhanced this article.

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