Foreword
The Breadth of Natural History Research

by Michael A. Mares

Talking God and Father Peyote:
Religious Pluralism and Contemporary Diné (Navajo) Art

by Daniel C. Swan and Dakota H. Stevens

Preliminary Quantification of Curator Success in Life Science Natural History Collections

by Jessa L. Watters and Cameron D. Siler

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FOREWORD

The Breadth of Natural History Research

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University natural history museums, like Oklahoma’s Sam Noble Museum, have a broad mandate that is driven by the great breadth of the museum’s collections (from dinosaur fossils to tissues; from study specimens of living species from throughout the world to Native American art, artifacts, and languages). Indeed, more than 120 countries are represented in the 10 million objects and specimens that make up the museum’s many collection areas.

In some respects, a large natural history museum is like a university, where research and education cover an enormous range of topics. Unlike most universities, however, university museums, while being research institutions where cutting edge research takes place, educate not only undergraduate and graduate students, but also K-12 students and non students, from the youngest children to the most senior citizens. Museums are a place where society can gather for accurate information on science and culture—information supported with real objects and real specimens.

There are not many research organizations that deal with the complexity of life in all of its forms, past and present, and in the complex interweaving of the cultures that make up our humanity. Each object, organism, and concept illustrated through publications, exhibits, and programs, can not only be appreciated, but can be understood within the tapestry of life past and present. Museums educate and entertain while at the same time helping us understand our place in the world. In a sense, they give us hope that we are part of a continuum of life and living that traces its roots to the first life forms, and that will go on into a future that we can only dimly discern. Our ability to peer across time into the future in a limited manner is enhanced by the stories and the research of the curators and their students as they interpret the collections.

My friend, the late Stephen Jay Gould, used to tell a story about the importance of the primacy of objects in museums, where having the real object imbues those specimens and artifacts with almost talismanic status. He was working with blind people in an attempt
to make their visits to the Air and Space Museum more meaningful. You need to know that in Air and Space, most of the aircraft are hanging from a very high ceiling, perhaps 40 feet above the visitor’s head. How does one make such objects meaningful to visitors who lack sight?

As a test, the museum produced a miniature copy of the Wright Flyer, the first ever airplane, and the one that lead to the marvelous array of airships and rockets and spaceships that we have today after the Wright brothers sailed over the Kill Devil Hills and into history in 1903. A blind person testing the model noted that the model was excellent and gave him a good feel for the airplane, but he said it only had meaning if it were placed exactly below, and in the exact same position, as the original Wright Flyer hanging from the ceiling. At that point the model became a real reflection of the plane and the visitor was able to experience the “real” Wright Flyer. Such is the power of the real object.

Museums separate themselves from other organizations in that museums are all about the original objects. In the Sam Noble Museum, these may range from the largest ceratopsian dinosaur (Pentaceratops, pictured above) to the oldest and smallest ceratopsian, Aquilops, which was described only this December. Both are in the museum’s collection and are shown above. These specimens are the real reflection of dinosaur evolution over a 60 million year span of time and are unique.

The Sam Noble Museum also has extensive collections of Native American materials, whether archeological artifacts from the Caddoan culture of Oklahoma that reach back in time almost 1,000 years, to art produced today by the people of the Caddo Nation and many other tribes. Artists working today are seeking new forms for their art through well-established cultural memes. These artists are producing the art that graces the museum’s Native art collection.

In “Talking God and Father Peyote, Religious Pluralism and Contemporary Diné (Navajo) Art,” Dr. Daniel Swan (Curator of Ethnology) and Dakota Stevens of the Sam Noble Museum examine how the interactions of the Native American Church and traditional Navajo religious practices have been responsible for imbuing modern art both within and beyond traditional limits. The work of two living Navajo painters is examined in detail and their remarkable paintings, which are part of the Sam Noble Museum’s Native art collection, are examined in detail. The article is the type of analysis that permits a greater understanding of the artists and their art and will enrich visitors to the museum who wish to understand the factors that may influence an outstanding work of art. The authors note that this work “provides a great example of the role of the individual in the interpretation of mythic stories and oral histories… in the creative moment.”

The second article, “Preliminary Quantification of Curator Success in Life Science Natural History Collections,” by Dr. Cameron Siler (Curator of Herpetology) and Jessa Watters, both of the Sam Noble Museum, examines and discusses the value of museum collections and the contributions of museum scientists in university affiliated and standalone museum environments. These Sam Noble Museum scientists surveyed curators across a large number of natural history museums in 11 countries to determine what the academic, intellectual, educational, and overall value of a museum curator is to a university and to a museum. They found that museum curators, especially those at university-affiliated museums, are highly productive across all their duties, including receiving grant support for their research, publishing, teaching, and serving students and the community.

University natural history museums not only have a broad scope, as illustrated by the two articles in this issue of the CLS Journal of Museum Studies, but also have curators and professional staff whose duties span the intellectual, educational, and scientific limits of natural science. It is no simple task for museum professionals to spread themselves thinly across the spectrum of museum operations and programs, but they do so willingly and even remarkably. They are able to contribute to a betterment of science and society. Their work across the disciplines and collections of museums has always shone a light into the darkness of ignorance.
Abstract: This paper examines the visual expression of religious pluralism in contemporary Navajo society. We focus on artistic works that are influenced by the intersection of the Native American Church and traditional Navajo religious practice. We use this theme as a means to explore the work of two contemporary painters from the Navajo Nation, Sammie Largo and Garrett Etsitty. At interest here is an opportunity to discuss current themes associated with art, religion, and identity in the Navajo Nation.

The role of art in Navajo society and culture has received considerable attention from academics with an intense focus on the relationships between art, language, philosophy and worldview (Hatcher 1974; Mills 1983; Witherspoon 1977). In contrast, individual and community motivations for artistic production are largely absent in this literature. In this article we explore the intersection of traditional Navajo religion and the Native American Church through examples of contemporary Navajo arts. We propose that religious themes and symbolism have long been important elements in Navajo fine arts and that syncretic works comprise an important genre of contemporary Navajo art. Our intention is to situate the works of Sammie Largo and Garrett Etsitty within broad historical and social contexts. We gain direction in our analysis from the work of a cohort of young Navajo scholars anxious to counter the dominant narratives and reclaim intellectual sovereignty over the discussion of Navajo identity construction in the twenty-first century.

The presentation and assessment of actual art works including statements from the artist who create them are largely absent in scholarly discourse on Navajo art. The one area in which we do have a comprehensive history and social contextualization of painting in Navajo society is Nancy Parezo’s comprehensive treatment of dry paintings in ritual contexts and the translation of the genre into a major tourist product (Parezo 1983). The literature also includes extensive discussion of the incorporation of design elements from ritual dry paintings in Navajo textiles and comments on the motivations of the weavers to incorporate these designs (Kaufman and Selser 1985, Parrish et. al. 1983). The limited scope of most scholarship on the relationship between Navajo art and religion is evidenced in the following assessment of the motivations of contemporary Navajo artists and their misguided attitudes toward their own works (Farnsted 1982:213):
People who have only tenuous connections with traditional religion and knowledge have turned these to commercial use. This is particularly true of Navajo artists. The most obvious example is probably the sale of “sand paintings.” Most other artistic media are less obviously derived from the practice of traditional religion, and the content of their art is not so completely based in tradition. The works of young Navajo painters, however, are concerned with subjects which imply religious significance in works where none may exist (except in the minds of the artist).

We take considerable exception to this statement regarding the role of traditional religion in Navajo art and the marginal status assigned to artists with respect to their knowledge and participation in Navajo religion. The narrow definition of “tradition,” a problematic if not a false concept, obscures the enduring nature and dynamic qualities of Navajo society and its evolving expressive culture.

We intend to address these themes through the works and words of two contemporary Diné artists, Sammie Largo and Garrett Etsitty. Our goal is to provide scholarly context for their comments and to use their work as a means to address religious pluralism and identity construction in the modern Navajo Nation. The relationship between traditional religious practice and Navajo art can be readily addressed through the examination of representative works from the Brown Collection of Native American Art at the Sam Noble Museum, University of Oklahoma.

**NAVAJO PAINTING**

The history of easel painting in the Southwest, in general and among the Navajo, is long and storied, both in a literal and figurative sense. Literally, painting by Native Americans in the Southwest began with young Navajo painters, however, are concerned with subjects which imply religious significance in works where none may exist (except in the minds of the artist).

Increased access to manufactured goods, the transition from trading to a cash economy and the advent of tourism heavily impacted the history of Native American painting in the Southwest. The role of the full time artist was solidified in the Southwest in the late 1800s and the early 1900s, as more and more tourists traveled to the area looking for souvenirs. The Indian artists rose to the challenge and began making curios for the tourists to carry home as mementoes of their adventure. Painters were not separated from this development as there was a market for works made on paper and as such “easel painting in the Southwest was born in earnest” (Van Ness Seymour 1988:19).

In the 1920s US Indian policy on education began to shift from strictly assimilationist agendas to one of social reform and Native rights (Bernstein 1995:3). This shift in policy allowed for the formation of what could be called the single most important force in the development of Southwest Indian painting; the establishment of the Studio run by Dorothy Dunn at the Santa Fe Indian School in 1932 (Silberman 1978:19). Dunn and those who supported her, such as Kenneth Chapman, thought the establishment of an original style would allow Indian artists to produce art that consisted of real worth in contrast to Indian curios sold for pennies on the dollar. (Bernstein 1995:3).

From 1932 to 1937, Dunn served as director of the Studio where she mentored many of the early great talents in Southwestern Native painting. Particularly, great Navajo artists, such as Harrison Begay who attended from 1934-1939, Andy Tishnahjinnie who graduated from the school in 1936, and Jimmy Toddy to name but a few (Tanner 1973). The classes Dunn taught were so successful that through them Navajo easel painting was pushed out of the shadows and began to develop a mainstream following with many artists becoming recognizable in Native communities, as well as the general public.
In her classes, Dunn wanted her students, whose ages ranged from early adolescence to their early twenties, to develop their own styles to show themselves on the paper, not to mimic broader trends in the art world, and she intended to be a guide to her students not a teacher (Bernstein 1995, Rushing 1995). In doing this, Dunn once again sought to subvert the influences the traders in the region were exerting on Native arts and allow artists to create an art form more true to their experiences and circumstances. Dunn believed there was an authentic style of Native American painting present in the Southwest and she found it in wall paintings and rock art. She found this naturalistic style, consisting of a flat, dimensionless, albeit narrative style to accurately depict a subject, to be the authentic Indian painting (Bernstein 1995:15). Dunn's desire to promote and encourage a “true” Native American style of painting also included her preference for narrative genre scenes, preferably of ceremonials and other community gatherings. The fact that these scenes are so disconnected from the community circumstances in the 1920s-40s is significant. It is important to remember that Dunn's primary objective was to bring economic opportunity to the Native communities of the Southwest through the production of high quality works in the fine arts.

One of the best-known Navajo artists from the Studio School is Harrison Begay (1917-2012). He was the son of a woman from the Red Forehead Clan and his father adopted the Zuni Deer Clan (Tanner 1973:301). He attended the Santa Fe Indian School and was taught by Dorothy Dunn from 1934-1939. During his formative years, Begay said that he was influenced by Navajo sand paintings made by medicine men. He has implied that it is these designs he sought to reproduce in much of his art (Tanner 1973:303). Working under Dunn, Harrison Begay developed his own style, (Fig. 2) which went on to influence Native artists and especially Navajo painters for years to come, this is true even today as he is considered one of the greats. Throughout his career, Begay focused on ceremonial figures, including stylized Yeibechei figures ((Fig. 3) and other scenes from the ritual traditions of the Navajo people. Here, the ritual foot race that is a part of Kinalda (Frisbe 1993), the girls coming of age ceremony ((Fig. 4).

A second foundational artist important to name here, Andy Tishnahjinnie (1918-2000) graduated from the Santa Fe Indian School in 1936. He is known to have gone through many moods as a painter (Fig. 5), each time seeming to reinvent himself,
creating a concrete style before turning away to something new and entirely different (Tanner 1973:314) Originality is a trademark of Tsihnahjinnie, especially as one examines the horses he painted in every conceivable size, shape, and color.

Lastly, we consider the influence of Jimmy Tooddy, also known as Beatien Yazz (1928–2013). Tooddy also spent some time in Santa Fe at the Indian School under the direction of Dorothy Dunn. While Tooddy was growing up, there were no professional Navajo artists, no Navajos made a good living making and selling pictures, and easel painting was virtually unknown among them at the time (Brody 1983:27). He is an outlier when it comes to Navajo painting; creating works that are not related to traditional Navajo ritual art, but not really falling into other art categories either. It was not until after 1950 that his painting (Fig. 6) came to fall in line with the rest of the pan-Indian Illustrative style (Brody 1983:28). Tooddy took what he observed and filtered it through his experiences, and then painted from a new and different perspective, all the while still being connected to his heritage as a Navajo.

By the 1960s, the nostalgic style taught at the Studio could not withstand the disconnect with the social contexts in which Native artists worked and lived. This school of Native American painting was seen as ethnocentric, limiting an art form to an imposed set of standards and preferences of settler colonialism. A critical development was the founding of the Institute of American Indian Arts (IAIA) in 1962. IAIA immediately sought to reject “Native American painting as it had developed and emphasize a contemporary approach using American and European styles…the school introduced social commentary, protest and activist stands” (Silberman 1978: 21). Led by its Trustees and faculty the IAIA promoted a break from the naturalistic style Dunn had taught for years, which was seen as stifling the creative individuality of the artists. Individualism was promoted at the school in “direct contrast to the communal nature of many Native American societies” (Bernstein 1999:66).
This shift to a new attitude and perspective on Native American painting in the late twentieth century brought a broader range of forms and methods to the situation in which Native artists felt freer to innovate and experiment. Despite these changes, religious imagery remains important in Navajo painting as illustrated in the works of Elriggs Allen (Diné) and Jackie Black (Diné). These artists bring two very different approaches to a similar theme in their respective works that feature Yei figures (Figs. 7-8).

The Navajo art and artists included in this study are highly selective, bounded by our desire to utilize works in the collections of the Sam Noble Museum and influenced by Swan’s on-going efforts to document Peyote arts in the Navajo community. At the risk of omitting important figures in this history, we feel compelled to offer this incomplete list of Navajo painters to provide a preliminary sense of scale and impact. A partial list would include: Elriggs Allen, Narcisco Platero Abeyta, Tony Abeya, Stanley Battese, Arthur C. Begay Sr., Shonto Begay, Larry Benally, Vernon Bigman, Jackie Black, Beverly Blacksheep, Clifford Brycelea, Naniba Chacon, Mitchell Chee, Robert Chee, Lorenzo Clayton, Fred Cleveland, James Cody, Grey Cohoe, Jason E. David, Adee Dodge, Robert D. Draper, William B. Franklin, Carl Gorman, R. C. Gorman, Charlie Johnson, James B. Joe, David Johns, Elroy Kaye, Randlett Keedah, Jerry Lee, Big Left Hand, Roger Abel Lewis, Gerald Nailor Sr., Sevier Nelson, David Paladin, Andrew Pete, Nelson Dodge Shirley, Ryan Singer, Quincy Tahoma, Klah Tso, Bruce Watchman, Hosteen Wez, Bahe Whitethorne Jr., Bahe Whitethorne Sr., Emmi Whithorse, Charles Yazzie, Melanie Yazzie and Peterson Yazzie, Tso Yazzie.

PEYOTISM AND TRADITIONAL NAVAJO RELIGION
The Navajo were first exposed to the modern Peyote Religion in the 1920s and 1930s through Ute communities in Southwestern Colorado (Aberle and Stewart 1957:27). Initial centers for Navajo Peyotism developed in the Northern Frontier of the Navajo Nation in Southeastern Utah (Aberle and Stewart 1957:41-42). Peyotism subsequently diffused southward to various Navajo communities between Shiprock and Gallup, New Mexico. In the 1940s the Peyote Religion spread to the western districts of the Navajo Nation (Aberle and Stewart 1957: 192- 193; Aberle 1982: 109; Wagner 1974: 156-172). Additional introduction of Peyotism in the Navajo Nation came through a number of missionaries from Oklahoma in the 1930s-50s (Aberle and Stewart 1957: 5, 6, 56-58; Stewart 1987: 296, 298). The history of Peyotism among the Navajo is complex in both scale and chronology and much work remains to fully address the growth and development of Peyotism among the Navajo.

The Peyote Religion was illegal on the Navajo Nation, and early members were often arrested for violating the 1940 Tribal ban on peyote (Stewart 1987: 294-297). Subsequent State and Federal legislation and the incorporation of the Native American Church in New Mexico in 1945, and Arizona in 1946, provided limited protection for the religious rights of Navajo Peyotists (Stewart 1987:299-300).

Despite continued persecution and the regular arrest of Peyotists on the Navajo Nation, the religion and its membership persevered.
The guarantee of religious freedom for Peyotists did not receive official support from the Navajo National Council until 1967 when it sanctioned the Native American Church of Navajoland (Helms 2005). The initial resistance to Peyotism was based on the claims that it was not traditional, that it involved drug usage and intoxication and the behavior of Peyotists was anti-social and divisive (Aberle 1982:221).

Today the Navajo constitute the largest tribal participation in the Peyote Religion and its associated Native American Church organizations. Navajo Peyotists maintain memberships in a range of formal organizations including Azeé Bee Nahagha (formerly Native American Church of Navajoland), the Native American Church of North America, State NAC organizations (Arizona, New Mexico and Utah) and numerous local chapters. The 2010 US Census reported 332,129 self-identified Navajo people (US Census Bureau 2012) and recent estimates suggest that 60-70% of the Navajo population is active in Peyotism (Moore 2003: 68). This formula would indicate that it is highly probable that today there may be more than 250,00 Navajo who identify with the Native American Church and there is no indication that the popularity and growth of Navajo Peyotism has peaked.

**TRADITIONAL NAVAJO PHILOSOPHY AND RELIGION**

In her book “Reclaiming Diné History” Navajo scholar Jennifer Nez Denetdale (2007:10) provides a clear and succinct interpretation of the basic elements of creation according to traditional Navajo philosophy:

> The Holy People created the world as we know it today. From the Holy People the Diné received knowledge, material gifts, and rituals and ceremonies for a proper life. The Holy People also provided knowledge on proper relationships between the world and all beings.

This worldview is based on the philosophical tenets of Hozho and Sa’ah Naagha Bik’ech Hozhoon (SNBH), concepts that encapsulate the essence of being a Navajo person. Accordingly, Navajo people should strive to bring harmony and balance to their lives (Lee 2006: 80-81). Another scholar from the Navajo Nation, Lloyd Lee (2014: 5-6) reminds us that SNBH is not a thing; it is not a rigid set of rules but is instead a learning process that spans an individual’s entire life:
SNBH is a person’s life journey. A person’s life is his or her own to live, but a person is connected to family and community. SNBH is spiritually multi-dimensional and comprehensive. It is part of the identity of a person and a people.

The concepts of SNBH and Hozho also represent a four part learning process that incorporates thinking, planning, living, and assurance. These concepts and principles are intertwined and assist individuals and the community to teach, learn, live and reflect. This planning and learning process is central to the Diné approach to life and is focused on setting and attaining objectives and goals (Lee 2014: 6). These four aspects of Diné philosophy have been characterized as “the cognitive (mental) physiological (physical), psychological (emotional) and intuitive (spiritual) aspects of human development and growth – or holistic living and learning” (Werito 2014: 27). Lee (2006: 88-89, 91-92) provides an important reminder that Navajo Peyotists and artists represent an incredibly diverse set of individuals who define their identity as a Navajo in a myriad of manners. His comparison of the generalized syntheses of academic anthropology to more recent, individualized case studies conducted by members of the Diné Nation contrast in significant ways, reminding us that a world view is only actualized through the life experiences of its adherents. These self-actualized events then contribute to theories of identity and definitions of community.

A central focus of Navajo religion (Reichard 1977, Wyman 1970, Zolbrod 1984) is to invoke supernatural intervention to restore balance on the continuum between good and evil. A variety of ceremonials, or chantways, are used by the Navajo to restore this balance and harmony. There are three major forms of Chant ways: Holy Way (restoration of good), Evil Way (combating ghosts and witchcraft) and Life Ways to deal with accidents (Frisbe 1992: 460-62). The number of actual ceremonies or “ways” is difficult to estimate but it is clear that the important ceremonies are five to nine days in duration. They are extremely difficult to learn and complex in their organization and conduct. A complete ceremony might involve hundreds of songs and recitations, complex dry paintings and logistical and economic considerations that may involve hundreds of people (Bergman 1973: 221).

Although often presented as a rigid and static system of great temporal duration, Navajo Religion has adapted over time to the circumstances in which it is practiced. Change in traditional Navajo
religion is well documented in the nineteenth century. Contact with external communities in the 1830s and 40s introduced new religious practices, including the adoption of hand trembling from the Apache and the incorporation of masked dancers from Pueblo traditions (Frisbe 1992:463-4). Internment at Ft. Sumner in the 1860s brought Navajo people who had lived in great isolation in their tribal territory into close and regular contact with one another, a situation that fostered exchange and branching with respect to religious ritual. Other rituals appear to have fallen out of use in this period. In the 1920s and 30s a range of religions gained entrée and adoption on the Navajo Nation, including the Native American Church and a range of Christian denominations (Frisbe 1992: 486).

The relationship between the NAC and traditional Navajo religion is aptly summarized by Leland Wyman, who spent his career documenting traditional Navajo religious practices (1983:536):

When the Peyote Religion of the Native American Church first appeared among the Navajo it was opposed by many medicine men (although Peyotists were never antagonistic to traditional Navajo Religion), and until the 1960s it seemed to some observers that its influences might cause a decline in the traditional ceremonial system. However, this did not happen. By the 1970s the Native American Church was seen by most Navajo people as simply another chantway, 'æze’jì, or Medicine Way. Members of the NAS were active in traditional ceremonialism, and a good number of traditional Navajo medicine men had also become Roadmen in the Native American Church.

It is increasingly clear that the Native American Church and traditional medicine ways were never in any real conflict, and, in a form of inclusive syncretism, Peyotism became yet another new medicine way. This syncretism expressed itself in many traditions, including the appearance of Peyote ritual objects in Blessingway and the development of joint Peyote meetings (Frisbe 1992: 488). Based on his work to document the development of Peyotism in the western districts of the Navajo Nation, Wagner (1975:163) identifies an interesting element in the evolving syncretism between the Native American Church and traditional religious practices on the Navajo Reservation in that both forms of worship have long established propensities to not only tolerate change and adaptation but to inspire and demand it. Wyman (1983) was only able to document variant forms and classifications of Navajo chant ways as compared to the idealized versions collected by his predecessors.

Syncretism involves complex series of social and religious negotiations and subsumes a range of relationships and levels of integration. The distinction between syncretism in individual belief and integrative ceremonial structures are very different situations. At one end of the syncretic spectrum between Peyotism and traditional Navajo religion, is the double meeting where the standard Peyote service incorporates a range of elements from traditional Navajo religious practice and belief. The double meeting was reported in earlier ethnographic research and was fully documented by Wagner.
(1975) in the mid 1970s. There is clear indication that the Shiprock, Santosee and Red Rock areas of the Navajo Nation were central in the early development of this form of religious syncretism (Aberle 1982: 168, Wagner 1975:179).

In the version documented by Wagner, the Roadman (leader of the Peyote ceremony) was also a traditional singer with knowledge of five chant ways. The crescent moon altar common to Peyotism is replaced by a dry painting of a large black star with multi-colored fringe at its points. Four large soil mounds of different colors, additional painted features, a runway and five large natural crystals placed between the points of the star complete the ceremonial setting. In this ceremony, a fairly regular form of Little Moon Peyote service takes place until midnight when the usual water ceremony is replaced by an abbreviated form of the Evil Way chant, usually a five-day ceremony. In this variant, the healing power is concentrated in the crystals and then transferred to the patient. Following a one-hour performance of the condensed Evil Way chant, the regular Peyote service resumed (1975: 166-169).

Aberle (1982:168) documented an additional syncretic form, a “Water Way” meeting in which the usual fire and crescent mound of Peyotism are replaced by a v-shaped altar constructed from coals and ashes. In this ceremony the Roadman uses bowls of water and pollen to identify the sin, and Christ is invoked to heal it. It is possible that this “way” only requires the participation of the practitioner and the patient. Aberle also recorded the mention of a number of additional syncretic Peyote Ways including Eagle Way, Star Way and Pollen Way (1982: 157, 168).

Various forms and levels of syncretism between traditional Navajo religion and Peyotism continue to be practiced on the Navajo Nation and predictions of increased occurrence of the double meeting have come to fruition in other regions of the Reservation. Syncretism has remained in check with a lack of complete blending. Wagner (1975: 178-79) attributes this to the desire to maintain the units of both religions in an intact manner with syncretism characterized as additive enhancements as opposed to complete replacements.

**NAVAJO PEYOTE ARTS**

A vibrant expressive culture, comprised of traditional, folk and fine arts, complex musical repertoires and diverse ritual performances, has developed in association with the Peyote Religion. Throughout the twentieth century Peyote arts were responsible for the continuation of traditional styles and techniques and also fostered the development of innovative approaches and contemporary styles.

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Looking back on this history from the early twenty-first century, Swan (1999:99) asserts that the Peyote Religion has inspired one of the most vibrant and widespread genres of contemporary Native American art. In this manner, Peyote arts provide a means for the continued expression of community standards and preferences with opportunities for individual creativity and interpretation.

The Navajo people have a distinguished tradition of excellence in the arts with a demonstrated capacity to quickly adopt foreign materials and techniques into their repertoire. The Navajo also have a demonstrated capacity to consistently take these tools and materials to create a wide range of innovative and vibrant art forms, as best known through weaving and silversmithing. Navajo Peyote arts are no exception to this legacy (Swan 2008).

What we find most exciting is the tremendous innovation that Navajo artists have brought to this important genre of Native American art. The energy and creativity exhibited in contemporary Navajo Peyote arts are a testament to traditional Navajo philosophy and the tremendous growth of Navajo Peyotism over the past three decades. Today there are literally thousands of artists (and perhaps more than 10,000 artists) producing works in the Peyote genre on the Navajo Nation (Swan 2008:47).

Fig. 9. Textile, Unknown artist, Diné (Navajo). Wool, aniline dye. Sam Nobel Museum E/2012.1.7. Brown Acquisition Fund.

Fig. 10. Bracelet, Unknown artist, Diné (Navajo). Sterling silver, turquoise. Sam Noble Museum E/2013.3.9. Brown Acquisition Fund.
The intersection of traditional Navajo religion and Peyotism is well evidenced in Navajo art. The emergence of Native American Church themes and symbols rendered in traditional forms and media is a basic form of aesthetic syncretism. This can be seen in works produced in “traditional” Navajo forms including the iconic Navajo media of silverwork and weaving, both historic innovations in Navajo repertoires (Figs. 9-10). Considerable artistic syncretism has developed in recent years in the creation of the ritual instruments used in the conduct of the Peyote religious ceremony. This includes a core inventory of a ritual staff, rattle, fan and drum kit. Among the Navajo these ritual instruments provide an arena for the expression of a range of innovations and localized preferences (Figs. 11-13) including the incorporation of sterling silver ornaments, set stones, Yeibichei figures and rug designs in beadwork, and the adherence to a traditional Navajo color palette (Moore 2005, Swan 2008, 2014).

**THE ARTISTS AND THEIR WORKS**

Samme Largo was born in 1962 and was raised in Wide Ridge, a small community near Crown Point New Mexico. Today he makes his home on a ranch near Mentmore, NM. Largo is employed in the Division of Behavioral Services with the Navajo Nation, is a Champion bull rider who continues to compete on the senior rodeo circuit, a talented artist in multiple visual mediums, a composer and recording artist of Peyote music and a ceremonial leader in both the Native American Church and traditional Navajo ceremonies. Largo was born into a family that practiced both traditional Navajo religion and Peyotism. His maternal grandparents possessed
medicine bags or Jish (Frisbe 1987), and were traditional healers. His paternal grandfather possessed the Big Star Way ceremony and his paternal grandmother was a Hand Trembler, “ways” that he has learned and now practices (Largo 2004, 2013).

Largo is a self-trained artist and has established a strong reputation in multiple media, creating a range of ceremonial objects used in Peyotism, including fans, smoke sticks, and water buckets (Fig. 14). He is also anxious to explore new media and forms, most recently creating sculpted ceramic tiles and lamp bases that incorporate a range of traditional Navajo and Native American Church symbolism. His primary forms are painting and drawing with several of his Native American Church inspired paintings (Fig. 15) adopted as CD covers. Largo also works at larger scales, completing a mural at the Crown Point Technical College campus.

In this painting (Fig. 16) Largo created an image rendered in mineral pigments that he collected, ground and mixed. This ability draws from his experience as a youth when he produced dry pigments that his paternal grandfather used in traditional healing rituals. He eventually learned to create 72 different colors based on a palette of seven basic colors (Largo 2004:1A). Largo (2013) related that it is increasingly difficult to gather mineral pigments on the Navajo reservation due to the increased drought conditions in the Southwest. Wind blown soils are covering mineral deposits on the reservation at a raid rate. He relies on a mental map to visit known locations where it is now necessary to dig for the pigments. Largo created four paintings using this technique, one for himself, one for his father, one for his brother and one for the public—the piece in the collection of the Sam Noble Museum. An additional feature of this method is that the composition needs to be completed in a single session, a requirement of the physical constraints of the medium and what we believe to be adherence to the process used in traditional Navajo dry paintings (Largo 2013:1A).

The composition contains a mix of images drawn from traditional Navajo religion and from the Native American Church. Largo related the purpose of his works in the following comments (2013:1A):

Talking God is in the middle and there is a crystal with the medicine inside and underneath there is a water bird. Water bird, Anhinga, in our story they use that in the Lighting Way ceremony. That Anhinga makes the connection with the lightning people so he's the one that makes that sound to bring those lightning strikes down to earth. So that's why there is a water bird right underneath that crystal that I drew. You might think it's a tipi- a lot of people think it's a teepee, but it is a reflection from the crystal. On this side you can barely see a little Talking God —on the right side is a male and on the left side is a female talking god- this one has twelve feathers and the other has seven feathers. Also there is a mound in there. When you go to get some medicine you go to the highest peak and make offerings and pray. You won't see anything until you make offerings then the medicine will start coming up from the ground itself. So, that is some of the things that I have.

The use of the light rays seen through the crystal to suggest the poles of a tipi, the regular place of worship wherever the Peyote Religion is practiced, is a clever device that speaks to the ambiguity that is often inherent in syncretic compositions. The color of the rays that the diagnostician sees through the crystal is an important predictor of the prognosis for the patient, with certain colors suggesting a cure and recovery while others are less positive in their outcome. The white rays in this painting suggest a complete cure (Wyman 1936:245).

Largo continues his narrative on this painting with mention of the purpose or intent in the art that he creates. Like many Native artists working in diverse media and with religious themes, there is a sense of responsibility in the manner in which these sacred elements and symbols are deployed. A majority share the belief that their works will have an impact after they leave the control of the artist:

Overall it’s the color green, there’s a lot of green- green is a good color because it’s a healing color. It will heal just by looking at that painting. It will heal somebody and the story is going to be attached, information that will be attached to it just by reading the story and looking at the painting and looking at the colors. That will make it a healing to the person who is observing it. That is how I put that together.

Largo places great emphasis on healing through his art. He has previously (2004: 1A) stated that there must be a story behind the art, a teaching in order for it to be effective in its healing mission. An additional element in the painting is reference to the Northern Flicker (Colaptes auratus,) a small woodpecker, sitting on the tip of a Golden Eagle feather. The central Talking God figure is also holding a single tail feather from a red Flicker. In Oklahoma the tail feathers of the Flicker are associated with religious doctoring, and fans constructed from these feathers are highly revered. Largo (2013: 1A) shares his thoughts on this bird:

In the reflection from the crystal there is a Red Flicker on the bottom that represents the whole creation of birds they say and he’s the one that brought fire from inside the earth to the top of the
earth. He’s the one that made that first. Now when people come to your home they knock on the door (knocking noise) he’s the one that did that first and he brought fire on top of the earth. He came to homes and he used his beak to knock on the door and they said who’s so and then, to find out, it was him. So he’s the one who brought the fire back into the hogan setting and the home setting so once he opened his tail there was a fire inside so he set it down right in midst of the home and he flapped his wings four times and the fire lit back up. That is why all the inside of his feathers is orange color and his tail the other sides brown and his tails black so that’s where he set. When somebody knock or tap on your door you always remember the story so I always have the fire lit all the time so maybe my spirit come to you for a good blessing to protect you. That is why I have that Red Flicker right there on the bottom on that painting.

It is interesting to note that a number of compositional elements that at first consideration might be viewed as representing themes and beliefs from the Native American Church, including the Water bird and Flicker. As we can see from Largo’s comments, these are also important figures in Navajo myths and in the practice of traditional Navajo religion. This represents the duality of interpretation that is often at the core of syncretism and its visual representation.

Garrett Etsitty was born in 1985 and was raised in Chinle and Tucson, Arizona. He spent his early years watching his uncles paint and draw, and at an early age he began working with colors. By the time he entered school, he had a growing interest in the creative arts. Pursuing art training in high school, he later earned an Associates of Arts degree from Diné College, Tsaiie, Arizona and a Bachelors of Arts degree from Fort Lewis College, Durango, Colorado. Throughout his education he was often at odds with

Fig. 16. Untitled, ca. 2000, Sammie Largo, Diné (Navajo), Mentmore, NM. Mineral paint on canvas. Sam Noble Museum A/2013.2.4. Brown Acquisition Fund.
his instructors who kept pushing him into forms that did not fit his emerging style and approach. Etsitty has exhibited his works in exhibitions at Diné College Juried Student Exhibits, Tsaile, Arizona, the Fort Lewis College Art Gallery, Durango, Colorado, the Heard Museum, Phoenix, Arizona, the Sam Noble Museum, University of Oklahoma, Norman, Oklahoma, the Navajo Nation Art Show, Windowrock, Arizona, and in numerous galleries and live art shows in New Mexico, Arizona and California. Today Etsitty continues his formal training in the Masters of Fine Arts program at Arizona State University (Etsitty 2013).

Etsitty's family has a long relationship with the Native American Church, and members of the family have served the Church in leadership capacities. In 2001 he began to attend Native American Church ceremonies and learned the songs that comprise a large part of the all night ceremony, learning Navajo, Kiowa, Comanche and Cheyenne songs with an emphasis on older styles. At the same time he began to attend traditional Navajo ceremonies and learned some of the chants associated with Navajo healing ways (Etsitty 2013).

Etsitty resides in Phoenix, Arizona where for over a decade he has worked in community arts programs for youth through a variety of socially engaged, interdisciplinary projects. He currently works as an arts mentor at Circle of Healing Inc., in Phoenix. Etsitty, aka KRNG1N3, has established a solid reputation as a significant graffiti artist in the Phoenix area. His approach to painting represents a synthesis of narrative and abstract styles with a heavy influence from his experiences as a graffiti artist. He continues his career as a fine artist and participates in community art performances, live paints and art battles. In addition to these pursuits Etsitty also creates a range of works in popular media and forms (Fig. 17). His current projects include an original comic book based on the traditional Navajo story of the Twin Warriors and acquisition of the skills needed to produce traditional style ribbon work (Etsitty 2013).

In Soaking the Sun (Fig. 18) Etsitty provides a strong example of his compositional style, blending representational realism with abstract backgrounds. While his color selections often reflect his activity as a graffiti artist, this work is relatively muted. Etsitty’s (2013) interpretation of this painting begins with a discussion of the role of religion in his motivation and intent for the piece:

In the back you see the orange and the flicker was grabbing the staff and fan and everything. That is a protection piece for a family home, for a family that takes medicine or a family that’s prays together, sings together. I think that anybody who purchased those pieces they will help them out in that way—they can stay protected. So what I aim for right there is that the male and female—that’s why you see them together most of the time—to restore that balance and I always do that.

Etsitty echoes the sentiment provided by Largo that the creative process behind paintings, or any works of art, include certain obligations or requirements- they must invoke a story, and they should have a healing process at the core of their creation. In this case the artist invokes the concept of balance and the ritual efforts...
undertaken to maintain and restore it through protective means. The presence of balance is symbolized in this piece through the mated pair of the male and female flickers, a bird that figures prominently in Native American ceremonialism, including Peyotism, and also in the works discussed in this article.

In the diptych True Self, Etsitty (Figure 19) exhibits his abstract style with strict color control derived from a limited palette of highly saturated primary and secondary colors. This painting also acknowledges the influence of his work as a graffiti artist including the strength of line, bold color contrasts and the symbolic drip lines that signal his activities in other media. His interpretation of this piece expands his discussion of the traditional role of the flicker in Navajo society:

They said that the orange flicker represents the male and yellow hammer, yellow flicker represents the female. I was told that when you have a certain individual that’s sick and not feeling too good, if it is a male or female you have to use that certain flicker. So for a male you use the orange flicker and a female use the yellow flicker to do prayers for her. It’s like learning about true identity, about self true self and about the creation stories. I guess woodpecker was really shy during that creation story when the world was on fire and then it was flooded and these birds were up there. Everybody was looking around and they said we need fire to take care of ourselves and keep ourselves warm. They wondered who would go down there and save fire. They asked eagle and he was all mighty and said no, “I’m too big I can’t go down there.” They were looking around and they asked hawk and hawk said, “No I can’t do it and they asked what about that guy, woodpecker? He was really shy and bashful, just looking around. They said “Hey, what about you? Can you go down there to save it?”
He was like “Oh yeah, I could do that I could go down there. If I go down there though I want you guys to remember me when I go down there and grab fire. I want to be a bird that could heal people. Be a bird that could help you guys in a way, you know. When things go bad about illness I want to be that bird that can fight against anything that’s negative.” The other birds were like sure go ahead. So he went down there and he grabbed fire and the fire kind of got up to his tail and that’s why his tail is orange. And he went up and he saved fire and the birds were happy and he was kind of exhausted and female woodpecker was like nurturing and took care of him. I was taught that through stories here on the reservation. That’s the whole thing that came about with the flickers—the male flickers and the female flickers. And that’s why I created the male side and the female side in this painting.

This lengthy narrative reflects the influences of several lines of traditional Navajo mythology regarding the creation of this, the fifth world and the creatures that inhabit it. Etsitty accesses the rich oral tradition that he experienced throughout his life and uses it to make sense of his feelings and attitudes as expressed in the painting. This story also looks back to the time of creation in which the world undergoes a series of transformations to bring affairs to the present condition. It is in one of these intermediary states that flicker receives its healing powers— the ability to contradict negativity as a reward for his service in the harnessing of fire.

He does this in a manner described by Denetdale (2014: 73) as a process through which creation myths inform peoples impressions regarding the present and the future- helping to place people, things and places into logical relationships. In this instance, the reinforcement of gender roles can be seen in the mutually

supportive roles that the male and female flicker assume to create a nurturing and healing relationship. The causative factor for the different colored tail feathers of the red and yellow flickers is not interpreted as a morphological marker of gender but rather a gender based distinction in the proper type of flicker used to treat male and female patients.

**DISCUSSION**

Our limited examination of contemporary Navajo painting is sufficient to introduce a number of refinements and enhancements to the current literature on the topic. In particular, we take exception to the view that Navajo artists only invoke religious symbolism in their works to enhance their appeal to a largely non-native marketplace. While this may be true for certain individuals and specific genres of touristic products, it is our experience that Navajo artists access a deep inventory of images drawn from and inspired by religious participation. Swan’s specific intent is to explore the expressive culture of Navajo Peyotism and here reports on the increased appearance of visual elements inspired by traditional Navajo philosophy and religious practice in traditional and fine art works executed in Peyote genres.

The appearance of designs, motifs and narrative vignettes associated with the Native American Church in pre-Peyote media and techniques, particularly weaving and silversmithing, quickly developed after the introduction of the religion in the Navajo Nation. This is common wherever the religion has been adopted throughout its history. These works are overwhelmingly produced for a local, Navajo audience. This is in keeping with the fact that contemporary Peyote arts have never developed a significant market that extends beyond Church members and their families. The majority of Peyote arts available on and near the Navajo Nation today are evenly divided between trade or barter and purchase through retail outlets, flea markets and art shows (Swan in press).

Sammie Largo and Garrett Etsitty represent the diversity and individuality that is largely absent in the scholarly literature on Navajo identity and worldview. These studies emphasize normative behaviors that rarely, if ever, materialize in real world contexts. Largo and Etsitty are from successive generations, both born in the second half of the twentieth century and possessing different levels of formal education, studio training, language proficiency, familial situation, career tracks, and life experiences. Despite the tremendous divergence of style and approach in their respective works, Largo and Etsitty access a similar set of stories regarding the flicker as motivation for the paintings featured in this article. Largo’s piece is narrative in style and provides a more literal representation of the syncretism between traditional Navajo religion and the Native American Church. Largo’s work incorporates a strong adherence to clean lines and a complimentary color palette. In his work, the subject of the painting is in harmony with the background; neither detracting from the other, but both enhancing and allowing the other to be seen.

Etsitty’s style is abstract and largely interpretive, using bold color symbolism and fine-line detail to render highly symbolic works. As a graffiti artist Etsitty demonstrates a great talent for movement and flow. In his diptych, True Self, the flow of the lines brings to mind the symbolic aspects of the male and female flickers. In each instance, Etsitty puts motion into his pieces along with strong symbolic elements that do not compete with each other, but work together to create clear compositions.

While both artists access a similar oral tradition as inspiration for their works, they incorporate differing levels of visual and ritual syncretism. This situation provides a great example of the role of the individual in the interpretation of mythic stories and oral histories, often a matter of emphasis and personal circumstance in the creative moment. In this case Largo is focused on the home setting, the Hogan as a place of security and family while Etsitty uses the story to emphasize the reciprocal nature of gender roles in Navajo society. The artists we discuss in this article, Sammie Largo and Garret Etsitty, tell stories about themselves and their people through their artwork. Both emphasize the healing properties of their paintings, refuting the claim that such incorporation is superficial with little foundation in traditional culture and belief. While easel paintings certainly lack the ritual context and process involved in Navajo dry painting, the sentiment behind the works is sincere in both underpinning belief and explicit intent. The power of visual stimuli and positive thought should not be underestimated in traditional Navajo healing practices. Largo’s painting takes this relationship to another level through his use of hand prepared mineral pigments, selecting healing colors from the Navajo color spectrum (Largo 2013).

It is clear that a trajectory of continued religious pluralism and increased syncretism between traditional Navajo religion and the Native American Church will undoubtedly gain visual expression in the traditional and fine arts produced by Navajo people. These works provide important arenas for continued exploration of the intersection of art, religion and identity for individuals and communities in the Navajo Nation.

**ACKNOWLEDGEMENTS**

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Preliminary Quantification of Curator Success in Life Science Natural History Collections

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Abstract: In an era when budgets are tight for families, businesses, universities, and governments, it is sometimes difficult to see the value in museums and their curators. Museums provide a necessary service to scientists and the public by housing specimens in a long-term stable environment, providing specimens and data for research, training new generations of scientists, bridging the gap between research, education, and public outreach, and working to develop new technologies to track speciation, biodiversity, and environmental change, just to name a few. The curators who conduct research in museums are integral to our overall understanding of the life sciences, yet their livelihood is being challenged. In an effort to quantify the incredible resource represented by a museum curator, we conducted a survey, sent to email list-serves and online groups, asking natural history curators to respond with details on museum and university affiliation, time in position, collections overseen, grant and publication success, teaching breadth, and student mentoring involvement. Our research indicates that curators have a great deal of scientific and monetary value to add to museums, affiliated universities, and our general education system through contributions from research publications, grants, and teaching, and student mentorship.

In addition to their myriad scientific contributions, museum personnel are integral to educating the public about scientific concepts (Allmon 1994, Ashby 2012,Tunnicliffe 2002), as well as training the next generation of scientists (Humphrey 1991, Krishtalka and Humphrey 2000, Pickering 1997, Soubiran 2010). Natural history museums are particularly necessary as centers for teaching the scientific process through inquiry and hands-on activities (Ramey-Gassert et al. 1994). Museum resources can also be made available to educational institutions around the world due to current digitization efforts (Cook et al. 2014). In many cases, these educational opportunities are provided to schools and educators free of charge. Informal education through museums can provide the necessary link between science research and the general public, making important discoveries available and understandable to everyone (Selvakumar and Storksdieck 2013).

Even with the recognized contributions of natural history collections to research and science education (Cook et al. 2014), budget cuts and economic hardships have taken their toll on these amazing resources. As a result, many natural history museums have begun to lay off curators, research staff, and other personnel, or ask individuals to seek early retirement (American Alliance of Museums 2012, Evans 2012, Foderaro 2013, Gillers 2013, Hathaway 2012, Pitz 2013, Stetz 2010). Some museums even have reduced personnel to a “skeleton crew” only just to keep their doors open (Green 2013, Phillips 2013), while in others museum staff have resigned due to concerns over budget loss and proposed restructuring of the museum away from research activities (Nelson 2014). Curators at museums have expressed concerns about the loss to scientific discoveries and educational opportunities for the public due to recent challenges (Baldwin-Corriveau 2014, Shen 2012, Zlatos 2013). In many cases, university-based museums are the hardest hit as funds are reallocated for other needs (Ashby 2012, Mares 2009, Raath 1990). Recently, non-museum based scientists have even challenged the validity of continuing to collect new voucher specimens (Minteer et al. 2014a), which has sparked a furious international debate amongst museum and non-museum scientists (Krell and Wheeler 2014, Minteer et al. 2014b, Rocha et al. 2014).

These museum personnel losses are even occurring at a time when museum usage in scientific research is actually on the rise due to new advances in technology. Both historical and modern museum specimens are now being used for stable isotope studies (Wei et al. 2012) and genetic research (Stuart et al. 2006, Wandeler et al. 2007). Specimens and tissues can also be used for tracking emerging zoonotic diseases such as Chagas disease (Pinto et al. 2010) and Hantavirus (Yates et al. 2002) or historical diseases like the black plague and leprosy (Tsangaras and Greenwood 2012). Scientists also are taking an active role in documenting the global spread of chytrid fungus (*Batrachochytrium dendrobatidis*) in amphibians though preserved and fresh skin samples (Cheng et al. 2011, Puschendorf et al. 2006, Shaw et al. 2013, Swei et al. 2011, Vredenburg et al. 2010, Weldon et al. 2004). Many museums are now going through a process of modernization to make data and digital representations of specimens available in an electronic format, which can be readily shared with other researchers, students, and the general public via a wide variety of thematic bioinformatics websites (Beam and Cellinese 2012, Blagoderov et al. 2012, Cook et al. 2014, Flemons et al. 2007, Graham et al. 2004, van den Elzen 2002). This process allows researchers to track changes in species diversity (Shaffer et al. 1998), range shifts (Frey 2009), or the effects of climate change (Johnson et al. 2011, Suarez and Tsutsui 2004).

It is with these new developments that museum collections and the curators that oversee them are most needed to maintain continuity in scientific research and education. It has become necessary for museum personnel to directly champion for the importance of museums and curators, particularly to non-curatorial scientists, the general public, and administrators at university-based museums (Baldwin-Corriveau 2014, EDIT and SYNTHESYS 2009, Gippoliti 2005, McAlpine 1986, Viscardi 2013). At one university-based museum, alumni are seeking donations and signing petitions in order to prevent pending lay-offs (McCann 2014). The Field Museum in Chicago has restructured its several internal research departments to create one large department called Science and Education, which reflects their new goals (Gillers 2013).

This study attempts to quantify preliminary data on the scientific, educational, and monetary value of life science curators to their museums (and associated institutions), in terms of success in grant funding, number of publications, number and types of courses taught, and number of students mentored.

**METHODS**

An anonymous survey entitled “Quantifying Curator Success in Life Science Natural History Collections” was created via the online program Survey Monkey (www.surveymonkey.com; Appendix I). The survey and accompanying letter (Appendix II) was administered on December 2, 2013 via two email list-serves, MUSEUM-L, NHCOLL-L and three programmatic sites housed on FacebookTM: VertNet (https://www.facebook.com/VertNet), the Society for the Preservation of Natural History Collections (https://www.facebook.com/www.spnhc.org), and an independent Natural History Collections group (https://www.facebook.com/groups/232785306782255/). Individual requests were made to curators and museum staff, who were asked to take the survey, as well as share the announcement with their own colleagues and discipline-based email list-serves. Participants in the study were self-selecting, based on their interpretation of the criteria described in the accompanying letter (Appendix II). The survey link remained active on Survey Monkey from December 2, 2013 to January 2, 2014. The University of Oklahoma’s Internal Review Board approved the survey on November 26, 2013 (IRB Approval No.: 3703).
RESULTS

There were a total of 179 participants that accessed the survey, but only 107 agreed to fully participate by accepting the terms of the survey and answering all questions. Survey respondents spanned 11 countries (Argentina, Australia, Canada, England, Germany, Jamaica, New Zealand, Panama, South Africa, Spain, and the United States), 32 states within the US, and a total of 73 museums.

Survey participants covered a wide variety of sizes and types of collection. The size of the collections ranged from 2300 specimens to 30 million, with an average size of 2.26 million. Survey respondents curated single collections (47.7%), multiple collections (28%), or entire museums (24.3%). For those respondents who curated single collections, Entomology represented the largest number of participants (23.5%), followed by Ornithology (15.7%), Botany (13.2%), Herpetology and Ichthyology (both 9.8%), Mammalogy (7.8%), plus Invertebrates and Tissues/Blood (both 5.9%). Mycology, Paleobotany, and Invertebrate Paleontology were each curated by less than 4% of single collection participants. No respondents indicate that they curated only a Vertebrate Paleontology collection. Over 80% of the survey participants received grants to cover the cost of collection management and/or research. The total amount of grant funds received ranged in size from $1800 to $12 million, with an average of $1.54 million in total funding. These grants came from a wide variety of internal museum/university funds, other museums and affiliates (i.e. American Museum of Natural History, Global Biodiversity Information Facility, Smithsonian Institution), private/non-profit institutions (i.e. American Society of Mammalogists, Audubon Society, Conservation Center for Art and Historic Artifacts, Conservation International, Council on Library and Information Resources, Earthwatch, Encyclopedia of Life, Freshwater Mollusk Conservation Society, Genetic Resources Conservation Program, MacArthur Foundation, Mellon Foundation, National Geographic, Slosson Research Endowment, Stanley Smith Horticultural Trust, The Nature Conservancy, Turtle Conservation Fund), and state and government agencies (i.e. Institute of Museum and Library Services, Environmental Protection Agency, Mexican Biodiversity Agency, National Aeronautics and Space Administration, National Oceanic and Atmospheric Association, National Park Service, National Science Foundation, Science Research Investment Fund, US Dept. of Agriculture, US Dept. of Defense, US Fish and Wildlife Service, US Forest Service, US Geological Survey). Nearly 93% of survey participants indicated that they have completed one or more publications, with a maximum of 465 publications and an average of roughly 49 publications. For a further analysis of grants and publications by tenure as curator, see Table 1 and Figure 1.

Table 1. Summary of survey responses for focal categories of interest. Values given as range; median over (mean ± standard deviation).

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<th>1–2 Years</th>
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<th>6–10 Years</th>
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<td>(1,263,196 ± 916,129) (2,590,520 ± 3,499,207) (2,116,574 ± 2,854,401</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. publications</td>
<td>0–465; 19</td>
<td>7–310; 40</td>
<td>2–333; 66</td>
</tr>
<tr>
<td>(51 ± 108)</td>
<td>(67 ± 75)</td>
<td>(90 ± 79)</td>
<td></td>
</tr>
<tr>
<td>No. courses taught</td>
<td>0–12; 3</td>
<td>0–6; 2</td>
<td>0–16; 1.5</td>
</tr>
<tr>
<td>(4 ± 4)</td>
<td>(2 ± 2)</td>
<td>(4 ± 5)</td>
<td></td>
</tr>
<tr>
<td>No. undergraduate students</td>
<td>0–20; 20</td>
<td>0–20; 8</td>
<td>0–20; 10</td>
</tr>
<tr>
<td>(13 ± 9)</td>
<td>(8 ± 7)</td>
<td>(11 ± 8)</td>
<td></td>
</tr>
<tr>
<td>No. graduate students</td>
<td>0–20; 5</td>
<td>0–20; 8</td>
<td>0–20; 1.5</td>
</tr>
<tr>
<td>(8 ± 6)</td>
<td>(9 ± 8)</td>
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<td></td>
</tr>
<tr>
<td>No. postdoctoral researchers</td>
<td>0–4; 0</td>
<td>0–7; 0</td>
<td>0–20; 1.5</td>
</tr>
<tr>
<td>(1 ± 1)</td>
<td>(2 ± 2)</td>
<td>(3 ± 4)</td>
<td></td>
</tr>
</tbody>
</table>

1As the original survey set the maximum number of students at 20, the maximum values for many student categories are likely underestimates.
Grant funding ranges are included only for those who received grants. When asked about the types of courses taught, only 27 participants responded with none or not required. For those 80 participants who did teach courses, the total breadth of courses taught ranged in number from one to 21, with an average of 2.99 types of courses. These courses ranged in style from discipline-specific courses (i.e., Herpetology, Mammalogy, etc.) to General Biology or Human Anatomy for non-majors. Many participants indicated that they have taught survey courses and seminars to both undergraduates and graduates, in addition to museum studies or field trip-based courses. Nearly 85% of survey participants indicated they had served as a mentor to an undergraduate student, graduate student or postdoctoral researcher. The average number of people mentored as undergraduates, graduates, and postdocs was 9.82, 6.21, 1.59, respectively. For a further analysis of courses taught and students mentored per years in position, see Table 1 and Figure 1.

The survey also showed marked differences in respondents who worked in university-affiliated museums vs. those who did not. Seventy-eight participants worked for university or college based museums, whereas the remaining 29 worked for private or government museums. The average number and total average funding of grants from university-affiliated curators was 11.67 grants worth $1.53 million, whereas, non-university affiliated curators collected 6.48 grants worth $1.56 million. Average publication rates were similar between university and non-university affiliated curators with 49.78 and 48.31, respectively. The differences between the two types of curators are most apparent when looking at the breadth of courses taught and the number of students mentored. Of the 27 participants who did not teach any university courses, 18 worked for non-university affiliated museums and 9 worked for university-affiliated museums. University affiliated curators taught an average of 3.8 types of courses and non-university affiliated curators who may not have had teaching requirements still taught an average of 0.69 types of courses. The average number of people mentored as undergraduates, graduates, and postdocs by university-affiliated curators was 11.50, 6.85, 1.29, respectively. These numbers decrease for non-university affiliated curators mentoring undergraduate (5.31) and graduate (4.52) students, but post-doc mentorship actually increases (2.38). For a further analysis of grants, publications, courses, and mentees by tenure as curator for both university and non-university affiliates, see Table 2 and Figure 2.

Fig. 1. Bar plots summarizing grant and publication success, and student and postdoc mentoring involvement across the six focal time intervals of the survey. Plots display mean values calculated for all data. To provide the amount of funding support on the same scale, each funding unit represents $100,000.
DISCUSSION

The high cost of maintaining a museum is visible in any institution’s annual budget, yet can be difficult to parse out into individual departments, collecting events, or specimens (Blackmore et al. 1997, Bradley et al. 2012, Kovačić 2009). Any net gain in outside funding provides necessary support for additional research or specimen curation and can assist the housing institution in the form of overhead costs. Our data suggest that curators rise to rapid productivity in their first few years in a curatorial position, with average grant funds of over half a million dollars in their first two years, often from a single grant. By the time curators are in their positions for 11–15 years, they have received an average of one million dollars in funding from eight grants, which increases to over two million dollars from 17 grants by 16–20 years and 19 grants by 20+ years in the position. The maximum amount of grant funding received was higher for university affiliated vs. non-university affiliated museums across all years present in position.
These data indicate that the amount of money that curators provide to their affiliated museums and universities is substantial, and cannot be ignored. Although this survey did not allow us to determine how funds were allocated, whether for research, education, or curatorial activities, nor the exact timing of the grant allocations, it is clear that on average, curators have a documented history of securing millions of dollars for their museums and associated university institutions.

According to recent survey of museum curators in the United States by the American Alliance of Museums, the median salary of curators ranges from $53,000 to $56,150, depending on the ranking of the curator, however only 7.1% of respondents were affiliated with natural history museums (American Alliance of Museums 2012). According to our research, the average breadth of courses taught is fairly consistent, regardless of number of years on average, curators have a documented history of securing millions of dollars for their museums and associated university institutions.

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These salaries seem a small investment in a museum's future that can lead to a big pay-off in grant funding.

The number of publications increases linearly as time spent in the position increases. Again, the maximum number of publications per category is nearly always higher in university affiliated museums vs. non-university affiliated ones, though it is unclear why this distinction occurred and may be an artifact of the survey itself. This survey strictly asked for the number of publications during the curator’s time at their current museum, which we assumed to be peer-reviewed journal articles, although many respondents did not clarify their types of publications. Future research should delve into the other possible written works of curators, including books or textbook, popular science articles, educational materials, exhibit displays, and online contributions, many of which are difficult to quantify as part of an individual's success rate (McDade et al. 2011).

Mentorship and courses taught are one of the most important ways that curators can contribute to their museum and local universities. According to recent survey of museum curators in the United States by the American Alliance of Museums, the median salary of curators ranges from $53,000 to $56,150, depending on the ranking of the curator, however only 7.1% of respondents were affiliated with natural history museums (American Alliance of Museums 2012).

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Mentorship and courses taught are one of the most important ways that curators can contribute to their museum and local universities (Humphrey 1991). According to our research, the average breadth of courses taught is fairly consistent, regardless of number of years in the position. This likely indicates that course loads for curators quickly become established within their academic community and then remain constant until retirement. It is important to note that many curators at museums not directly affiliated with a university...
International field team during a 2014 biodiversity survey of vertebrate species of northern Samar Island, Philippines. Collaborative expedition led by researchers from the University of Oklahoma’s Sam Noble Museum and the University of Kansas. The eight-week expedition was funded by the National Science Foundation. Photo by Cameron D. Siler (kneeling in front row, far right).

are still teaching a handful of classes, perhaps as adjunct instructors/professors, or volunteers, at regional colleges or universities. Additional research on curator success should further elucidate the forms of teaching being completed by curators.

Undergraduate students supervised increases linearly until the 16−20 and 20+ year categories in which there is actually a decrease. Graduate student mentorship, however, increases consistently. The number of postdoctoral researchers supervised remains fairly constant across all categories, with an average of one to two postdocs. University-affiliated curators follow the same trend for all three mentorship categories; however, the non-university affiliated curators are distinct. Very few undergraduate students were mentored, whereas the number of graduate students and postdocs mentored were higher than in university-affiliated museums. Traditionally, private or governmental natural history institutions would not have had teaching requirements for their curators, but that trend is changing (i.e. American Museum of Natural History’s Master of Arts in Teaching program). Regardless of affiliation, curators who work with students, either formally or informally, provide the backbone in educating new scientists and museum personnel. They also shape the nature of the university departments they work with based on the type of courses they offer (Humphrey 1991). Providing a broad base of scientific disciplines to the greater university should be a goal of all museum curators. Natural history as its own field of science is rapidly declining (Schmidly 2005, Tewksbury et al. 2014) and natural history museums remain a key training ground for this discipline (Krishthalka and Humphrey 2000), therefore it is vital that curators and their considerable role are supported in education at all levels.

In 2012, an analysis of scientific literacy standardized test scores was conducted by the Program for International Student Assessment. Out of approximately 510,000 15-year-olds in 65 countries or regions, the United States ranked 27th with average scores four points below the international average (Kelly et al. 2013). A recent survey conducted via phone by the Smithsonian Magazine indicates that adults feel that American students scored even lower on standardized tests, yet have difficulty with scientific literacy questions themselves (Pew Research Center 2013). One mission of natural history and science museums is to fill in the gaps between what is taught in school and what the public should know about science, in order to make educated decisions (Allmon 1994, Ashby 2012, Selvakumar and Storksdieck 2013, Tunnunciliffe 2002). Bridging this gap would be extremely difficult without active curators advising the education and exhibits departments of museums, yet very little advocacy is occurring to promote this aspect of museum and curator importance (Baldwin-Corrievue 2014, Viscardi 2013). Museums are now reaching the public through social media and crowd sourcing, and curators should accept an active role as experts, in order to maintain scientific quality control (Proctor 2010).

The collection of reptiles and amphibians (mostly fluid preserved) of the Sam Noble Museum. This collection of more than 50,000 specimens has been foundational for research and teaching at the University of Oklahoma for a century, with several hundred scientific articles and dozens of theses being based on specimens in the collection.

Several aspects of our survey design limited the number of inferences that could be drawn from the results. First, many of the answers were difficult to quantify, particularly the collection(s) supervised and courses taught. Second, this study did not break down productivity by years in the position. For example, for curators that supervised a total of five students or received a total of $2 million in grant funding at some point in their 20+ years of service, we are unable to determine at what point in their career these events occurred. Third, for several questions in our survey, definitions for key terminology may have standardized responses.
more appropriately. Examples include: (1) Question #4, defining a collection quantitatively would have aided participants in their description of collection size and breadth; (2) Question #5, the first time category for number of years in the curator’s current position should have started at 0 years rather than 1. Although we feel many participants accurately inferred the meaning of this first category (1–2 years) as the earliest time period in a curator’s career, future surveys should start the earliest time period at zero years for curators in their first year of a new position; (3) Questions #6, 8, definitions and more detailed descriptions for the terms “grants” and “publications,” respectively, would have improved the comparative power of this preliminary dataset. Possible changes might include defining publications as peer-reviewed research articles, or dividing the category into multiple questions pertaining to quantities of different, specific types of publications; (4) Question #9, a more detailed and precise description of the term “taught” would have clarified responses received throughout the survey. Future surveys may wish to better define specific courses and types of teaching in order to tease apart curator involvement in higher education courses, whole degree programs, single lectures, and workshops, among many others; and (5) Question #10, providing a precise definition of the term “advised” would have allowed for a more robust comparison of mentorship within well-defined advising categories.

Improvements and additions to such surveys in the future should also include questions that deal with other measures of success as well, including metrics that quantify collection growth during curator tenure, biodiversity metrics such as numbers of new species identified, or quantifying ancillary data developed in association with specimens (i.e. sequences added to GenBank: https://www.ncbi.nlm.nih.gov/genbank/). One additional broader comparison that cannot be made at this time pertains to university professors in the same fields, who are, and are not, affiliated with museum life science collections. In light of the trend of decreases in support for museum curator positions (Gillers 2013, Nelson 2014, Pitz 2013), it would be interesting to quantify the similarities and differences between curator and full-time, university only faculty success.

Whether used to classify the life on our planet, support research in all fields (i.e. agriculture, health, medicine, crime, etc.), educate students and the public, or simply provide a local and regional identity, museum collections and their associated curators play a critical role in numerous facets of our global environment (NatSCA 2005). When considering educational utility, teaching breadth, or research output, or simply a cost-benefit analysis, the continued support of curators is an incredibly sound investment.

ACKNOWLEDGMENTS
The authors would like to thank all the survey respondents for participating, especially those who forwarded the email and survey link to their colleagues and list-serves. The email list-serves and Facebook™ groups who allowed us to post the survey also deserve our thanks. Special thanks go to Dr. Janet K. Braun for reading early versions of this manuscript and to the two anonymous reviewers at CLS Journal of Museum Studies.

REFERENCES


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**APPENDIX I: SURVEY**

1. **Project Title:** Quantifying Curator Success in Life Science Natural History Collections

   Principal Investigator: Dr. Cameron D. Siler

   Department: Sam Noble Oklahoma Museum of Natural History & Department of Biology, University of Oklahoma

   You are being asked to volunteer for this research study. This study is being conducted online. You were selected as a possible participant because you are a curator of a life sciences natural history collection. Please read this information sheet and contact me to ask any questions that you may have before agreeing to take part in this study.

   **PURPOSE OF THE RESEARCH STUDY**

   This survey is intended to accumulate baseline data highlighting the success and diverse utility of curator positions for natural history collections in the life sciences. The data will be kept anonymous, with information received being used for summarizing the breadth of success for curator positions with no ties to the individual researcher.

   **The project was designed to achieve two goals:**

   1) To provide the Department of Biology at the University of Oklahoma with a data-driven proposal supporting the approval of future curator hires at the Sam Noble Oklahoma Museum of Natural History.

   2) To publish a study summarizing the general merits of such positions globally, particularly at a time when many natural history museums are losing funding.

   **NUMBER OF PARTICIPANTS**

   We hope to receive anonymous survey results from a maximum of 100 participants who may take part in this study. All participants would be professional curators of natural history collections in the life sciences.

   **PROCEDURES**

   If you agree to be in this study, you will be asked to briefly fill out a 10-question survey about curator productivity in research, funding and teaching. You will not be asked to provide your name or title and the data will be summarized as a group with no direct ties to your program.

   **LENGTH OF PARTICIPATION**

   The survey is expected to take roughly 5–10 minutes.

   **RISKS AND BENEFITS**

   There are no risks and no benefits from being in this study.
CONFIDENTIALITY
In published reports, there will be no information included that will make it possible to identify you. Research records will be stored securely and only approved researchers will have access to the records. There are organizations that may inspect and/or copy your research records for quality assurance and data analysis. These organizations include the OU Institutional Review Board.

VOLUNTARY NATURE OF THE STUDY
Participation in this study is voluntary. If you withdraw or decline participation, you will not be penalized or lose benefits or services unrelated to the study. If you decide to participate, you may decline to answer any question and may choose to withdraw at any time.

CONTACTS AND QUESTIONS
If you have concerns or complaints about the research, the researcher(s) conducting this study can be contacted at
University of Oklahoma
2401 Chautauqua Ave.
Norman, OK 73072-7029
Phone: (405) 325-3718
Fax: (405) 325-7699
email: camsiler@ou.edu
website: www.cameronsiler.com

Contact the researcher(s) if you have questions or if you have experienced a research related injury. If you have any questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than individuals on the research team or if you cannot reach the research team, you may contact the University of Oklahoma – Norman Campus Institutional Review Board (OU- NC IRB) at 405-325-8110 or irb@ou.edu.

This study has been approved by the University of Oklahoma, Norman Campus IRB.
IRB Number: 3703 Approval date: 11/26/13

Please keep this information sheet for your records. By providing information to the researcher(s), I am agreeing to participate in this study.
☐ I agree to participate
☐ I decline

2. Name of Institution. Please include University/College name, if affiliated.

3. Type of specimens in collection (choose all that apply).
   Botany
   Entomology
   Herpetology
   Ichthyology
   Mammalogy
   Mycology
   Ornithology
   Tissues/Blood
   Invertebrates
   Vertebrates
   Invertebrate Paleontology
   Vertebrate Paleontology
   Paleobotany
   Other (please specify)

4. Size of collection.

5. Number of years in current position.
   1-2 Years
   3-5 Years
   6-10 Years
   11-15 Years
   16-20 Years
   20+ Years

6. Number and amount of grants received while in your current position.

7. Optional: List your sources of funding described in the previous question.

8. Number of publications while in your current position.

9. List and describe the university/college courses you have taught while in your current position. If you have not taught courses, please state so.

10. Number of students advised while in your current position.
    Undergraduate Students
    Graduate Students
    Postdocs

APPENDIX II: SURVEY LETTER
Dear Colleagues and Natural History Collections,
If you are a Curator of a Life Science collection (or a Director who actively manages Life Science collections) in a Natural History Museum or Science Center, please consider taking the anonymous survey below. The brief survey is intended to accumulate baseline data highlighting the success and diverse utility of curator positions for natural history collections in the life sciences. The data will be kept anonymous, with information received being used for summarizing the breadth of success for curator positions with no ties to the individual researcher.
While these data will be used internally, we hope that a publication will also arise, provided we collect a good sample size. Please feel free to also forward this email on to other colleagues, both in the US and abroad.

It is our hope that this data can be used as data-driven evidence in direct support of collections-based research programs. We expect this survey will take 5–10 minutes of your time. It is anonymous and completely voluntary. Participation by curators in full or split positions that meet the criteria of this survey (Natural History Collections in Life Sciences) would be greatly appreciated.

If you agree to be in this study, you will be asked to briefly fill out a 10-question survey about curator productivity in research, funding and teaching. You will not be asked to provide your name or title and the data will be summarized as a group with no direct ties to your program.

To access the anonymous survey, please use the following link by December 20.
https://www.surveymonkey.com/s/SNOMNH

This study has been approved by the University of Oklahoma, Norman Campus IRB.
IRB Number: 3703 Approval date: 11/26/13

The University of Oklahoma is an equal opportunity institution.

Thank you for your assistance and time!

Sincerely,
Cameron Siler