Taxidermy Survey

Delbridge Museum of Natural History and Great Plains Zoo
Sioux Falls, SD

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PROJECT DIRECTORY

Project: Taxidermy Condition Survey

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The statements and opinions contained herein are for the use and information of the Client. The opinions reflect the judgments of Preservation and Taxidermy Professionals performing with the care and skill ordinarily used by other assessors and professionals, when dealing with collections. Conclusions drawn in this report are based on those conditions and surfaces accessible to the unaided visual observation of the Assessors based on a ground-level survey. No warranties or guarantees can be inferred from, or implied by, the statements or opinions contained in this report.

EXECUTIVE SUMMARY

Summary Recommendations

News of the August 2023 closing of the Delbridge Museum of Natural History at the Great Plains Zoo was picked up by local, state and national media. The stated reason for the closure was the risks associated with arsenic on the taxidermy mounts and lack of sufficient barriers to prevent touching. The shuttering resulted in an outcry from members of the local community with an emotional connection to the collection. As city owned assets, any mounts deaccessioned from the collection could not legally be transferred out of state according to South Dakota law at the time. With no ability to transfer legal title to an out-of-state non-profit interested in the collection, there was fear that the mounts, many of which are endangered or threatened species, might wind up destroyed. The resulting outcry led to the formation of the Brockhouse Collection Working Group tasked with determining the future of the collection.

It is standard for museums and institutions with cultural heritage collections to develop policies and procedures that guide collection management activities. The development of these documents should focus on how they promote the institution's mission. "The Great Plains Zoo & Delbridge Museum of Natural History's mission is dedicated to fostering a greater understanding of our natural world through education, conservation, recreation and discovery." How the GPZ advances this mission will inevitably change over time as the needs of the institution and the interests of the community evolve.

It is not the place of this project's surveyors to recommend any particular course of action. This report, along with a summary PowerPoint presentation, digital images and the data in an Airtable database, summarize the findings of a five-day on-site survey by a team of conservators and taxidermists experienced with historical taxidermy collections. The team brings together experience as naturalists, hunters, preservation, and restoration professionals to examine the condition of the Delbridge taxidermy collection and provide data to the city's Working Group. The goal of this project was to facilitate a deeper understanding of the condition, treatment options, costs and potential for the taxidermy mounts.

To this end, the project team tried to pull together a large amount of information from varied sources over time. The project database can be mined to provide information on specific mounts, groups or collections based on a variety of factors. There is no "right" or "wrong" answer on how the City of Sioux Falls (City) and the Great Plains Zoo (GPZ or Zoo) should proceed. However, there are several general observations we want to highlight for the Working Group:

- Great Plains Zoo has managerial responsibility for both the live animals and museum specimens. Just as the GPZ should not breed or hold onto animals that it cannot responsibly care for; the zoo must periodically evaluate of costs and mission-driven purpose of their living and taxidermy collection to ensure sustainable operations and due diligence to their mission. The Zoo owns their live animals however, the museum specimens are owned by the City of Sioux Falls, which adds complexity requiring the Zoo to work with the City on any changes or procedures relating to the Brockhouse collection. The

mounts donated by Vernell and Louise Johnson, and the mounts from Zoo owned animals are wholly owned by the GPZ and are not subject to City oversight.

- Inconsistencies in the ownership documentation for the Giant Panda mount were noted during the preparation for this report. The historical summary records that the specimen was given to the "Zoological Society of Sioux Falls (which operates the Great Plains Zoo and Museum)", but the mount was assigned a city asset number. Research conducted by the City in July of 2024 determined that the City of Sioux Falls is the owner of this mount.
- Most taxidermy prior to 1980 involved the use of arsenic in the preparation of mounts. Arsenic is a hazard, but when properly managed, poses little risk to the public or zoo staff. The city and GPZ should be guided to resources and information to understand how other institutions have safely managed this hazard. But the mere presence of arsenic alone should not be considered a reason to deaccession and dispose of mounts. Additional resources relating to hazardous collections has been provided as appendices to this report.
- There was a wide range of condition issues noted on the taxidermy, but the majority of the collection (67%) ranged from "Good" to "Exceptional" condition, especially considering the age of the mounts.
- The kind of damage and/or deterioration seen on the mounts is consistent with the method of preparation, age and prior use. Some undoubtedly showed damage before they were donated to the zoo. While some of the collection care over the last 40 years may have fallen short of best practices, there is no indication that the zoo was derelict in its duty. The conditions noted during the site survey clearly show that the zoo has tried to maintain the mounts and habitat displays.
- The Delbridge collection is almost entirely "trophy mounts" i.e. they were not hunted as part of a scientific expedition. Nor were they mounted with the goal of placing them in an educational setting. Nonetheless, Brockhouse was unusual in creating a large collection of full body mounts prepared by some of the best taxidermists working at the time. Almost 70% of the collection was assessed as "Good", "Excellent" or "Exceptional" in terms of artistic quality. 76% of the collection was assessed as "Good", "Excellent" or "Exceptional" for species accuracy.
- Taxidermy is "treatable". Special skill and experience is needed in working with historic and aged taxidermy but taxidermists and conservators can achieve excellent visual results in restoring specimens. The choice of materials and methods of any restoration should conform to the standard of care for museum collections and follow the Code of Ethics and Principles of Practice of the American Institute for Conservation (AIC). Written and photographic documentation of any treatment should be a standard requirement for any treatment of the collection.
- All of the specimens in the Delbridge collection *can* be treated. Even though it might be possible to treat everything, a realistic assessment of the time and costs involved in treatment is required to responsibly manage the collection.
- The GPZ's new Master Plan, unveiled in March 2024 outlined a 4,000 square foot space as a potential "'placeholder" in the plan for a possible portion of the Delbridge Collection. About 2,500 square feet could be used for diorama[s] of specific animals" (Keloland.com, March 26, 2024). The GPZ should decide what specimens to keep based on the educational and scientific goals it wants to share with visitors. This will help determine how the pieces should be displayed and factor into the choice of mounts that would be appropriate. The quality of the mount, condition and cost of restoration, the cost of new habitat exhibits,

endangered or threatened status, all can be considered in deciding how to exhibit any selection of mounts in the collection.

- Mounts that were deemed “unfit for restoration” in the survey may still serve a variety of educational and scientific purposes. GPZ staff related some of the ways they use specimens as a teaching tool (e.g. for the hoof care) of some of the living animals at the zoo. The mounts also can be used as study or education specimens to illustrate the development of taxidermy as an art form.

As professionals in the field of cultural heritage preservation, we feel heartened when there are signs that a community has a deep emotional connection to a collection or institution. We believe in the need to preserve. But we also believe that the decisions of the Working Group should be based not on visceral reactions, but on a careful assessment of how the mounts meet the institution’s present needs, and the costs involved in being responsible stewards of this collection. If placed in an appropriate context we believe that most of these mounts can provide education and enjoyment for many years to come.

HISTORY

History of the Delbridge Museum of Natural History

The Delbridge Museum of Natural History, located at the entrance to the Great Plains Zoo in Sioux Falls, South Dakota opened its doors in 1984. The purpose-built structure housing the museum was constructed by the City of Sioux Falls. While the museum's collection is owned by the city, its operations have been managed by the Zoological Society of Sioux Falls (ZSSF), now the accredited Great Plains Zoo (GPZ) since 1985. The City retains ownership of the buildings and grounds. The museum building, which is the most accessible building on the zoo campus, serves as a functional hub for the GPZ. In addition to the museum's exhibit spaces the building serves as a staff administration and operations hub with employee break and conference rooms, an educational center for camps and programming, special events spaces, a gift shop, and an indoor play space.

The core of the museum is the Henry Brockhouse Collection of taxidermy specimens. As a hunter in the big game tradition popular among sportsmen for much of the 20th century, Henry Brockhouse (1908-1978) collected these specimens over several decades (most can be dated 1956-1976) from multiple continents, including North America, Australia, Africa, and Asia. These mounts are from hunting campaigns he carried out from the American West (1940s), Canada and Alaska (1950s), Africa and the Middle East (1960s), and Australia, New Zealand, Mongolia, and India (until the 1970s). Among the animals are a number of rare species currently listed as endangered or of concern.

The Brockhouse Collection was well known and beloved by many in the local community because Brockhouse exhibited his animals, some openly and others in vitrines, at his store West Sioux Hardware. The collection received a lot of handling and visitor interaction at the store. When the store closed in 1981, the C. J. Delbridge Family purchased this collection and donated it to the City of Sioux Falls, with the condition that a museum be established for its exhibition. The City held a special election on June 15, 1982, to issue bonds of $1.8 million to fund a new home for the collection. The Delbridge Collection is listed on the city's spreadsheet as acquired on April 1, 1983. The collection was stored until The Delbridge Museum of Natural History opened in 1984. The City was granted full, true, and legal ownership of the entire collection on January 2, 1985.

Many of the mounts are the work of the Jonas family. Members of this family operated several of the most prominent North American taxidermy companies of the 20th century. They were known for the overall high level of skill and technique evidenced in their artistic output. The brothers, naturalists and artists, supplied mounts and dioramas for Natural History museums and hunters alike. Two of the Jonas brothers had immigrated to the United States from Budapest, Hungary in the first decade of the 20th century, with the other three following in subsequent years. The five would go on to form three distinct studios located in New York, Denver and Seattle and pass their trade along to the next generation. Jonas Brothers Taxidermy studio in Denver was operated by Coloman Jonas (1879-1969) and his brother John Jonas. Plaques on numerous mounts in the Delbridge collection indicate that they are work of the Jonas Brothers Taxidermy studio in Denver, Colorado, while many others are the work of the younger generations, particularly the studio of his grandson Joe Jonas Jr. in Broomfield, CO.

Characteristic of their finest mounts are an understanding of animal physiology as well as of the materials and techniques employed to produce high quality taxidermy. This is reflected in realistic poses, including some ambitious and dynamic scenes, attention to detail in sculpting and coloring of skin and features, as well as correct grooming. In the early days Jonas Brothers used paper mâché forms to sculpt their anatomically accurate mounts. As the materials of taxidermy evolved to include 20th century synthetic materials, Joe Jonas Jr.'s studio employed fiberglass forms. The family businesses served as providers and distributors of taxidermy molds and supplies to the industry. Certain of these heritage molds are still available today from the supply companies who bought out the various Jonas family businesses.

At least seven unmounted Brockhouse specimens were prepared by the studio of Joe Jonas Jr. specifically for inclusion in the new museum. These include the elephant, the hippopotamus, two zebras, one impala, one springbuck and one fallow deer.

In the museum, specimens are exhibited in regional habitat groupings on raised carpeted platforms of varying height, with railings to discourage opportunistic handling. Some of the exhibits include painted or photographic mural backgrounds. Several include foregrounds with natural and synthetic plant material and other built foreground materials.

In addition to the core Brockhouse Collection, the museum features additional taxidermy from other sources, including waterfowl, birds and mammals donated by Vernell and Louise Johnson as well as several animals raised at the Great Plains Zoo, and a Giant Panda. The Giant Panda was a gift from China, secured by Sen. Larry Pressler in honor of positive agricultural trade relations. Other non-Brockhouse specimens added to the collection over the years include a bison calf, zebra, and white-handed gibbon skeleton. There are only 4 specimens in vitrines: the Snow Leopard, the male and female turkeys and the gibbon skeleton. The remaining specimens are exhibited in the open but generally out of easy reach distance for visitors.

While the majority of the mounts in the collection are of average to good quality, a few have been deemed exceptional by assessment teams. These specimens represent the highest level of taxidermy craft for their historic period and remain in stable, exhibitable condition. Other specimens have suffered damage from light, environmental factors, insects and rodents. Many have been restored in the past with incompatible materials and no longer represent their species successfully. Most specimens could be restored. Many are replaceable while others are no longer possible to replace as 29.4% of the collection is impacted by federal/international regulations restricting transfer including Endangered Species Act, Marine Mammal Act, Lacey Act and the Migratory Bird Treaty Acts. The GPZ is working with the U.S. Fish & Wildlife Service to ensure protected specimens are handled in accordance with the law. Details about which specimens are subject to regulation are recorded in the report database based on research provided by the GPZ.

The taxidermy exhibitions at Delbridge have apparently seen a marked decrease in visitor-ship since their installation nearly 40 years ago. There are 18 distinct groupings in the museum representing wildlife habitats. There have been minor changes to the exhibits such as cosmetic updates in 1995 and in the early 2000s including new didactic panels, some of which include audio elements. As mentioned above, a few new specimens have been added over the years. Still, the static displays have reportedly failed to hold the interest of the average visitor. There remains

some vocal support surrounding these exhibits as locals recall visiting the museum as students. Further, the zoo staff continue to utilize some of the specimens as educational tools for staff training. Many of the specimens hold scientific value beyond their exhibition value. Nevertheless, the data from a cell phone tracking study showed that visitors spend very little time in these spaces. Noting that the public is not actively engaging with this collection, and as part of their Master Planning, the GPZ sought to evaluate the connection of this material to its mission and questioned if this location was the right fit for these exhibits. They seek to maximize the best use of the museum building facility, as well as all facilities and animal habitats on their 45-acre campus. The museum does not have a curator or collection manager on staff dedicated to the natural history collections (non-living collections).

In the Spring of 2023, the GPZ tested the specimens on open view for arsenic content/residue. It is well known that arsenic was routinely used in taxidermy skin preparation, for most of the 20th century. The sampling and testing methodology is discussed below in this report. The resulting data has been recorded in the Airtable database based on the data provided by the GPZ. Upon learning that 80%[1] of mounts have detectable arsenic, the City and the zoo closed the museum in August 2023 in the interest of public health, and safety of staff and visitors. This was a difficult decision because as noted in their press release at the time, “This collection has been a treasured community asset and has provided an educational experience, promoting wildlife understanding to many generations of Sioux Falls residents and visitors alike,” the zoo. “More than that, it has provided memories and enriched the quality of life for countless community members.” (Sioux Falls Business, August 17, 2023)

However, this closing, which the City and Zoo believed to be a necessary precaution, runs counter to the general practice of natural science museums and natural science conservation. These specimens can be safely exhibited, viewed by visitors, and cared for by museum professionals by following well-established guidelines and safety procedures. The Zoo may have other priorities and there may be a more fitting place and manner with which to exhibit this collection. However, a perceived risk to visitors should not be a significant factor in this decision.

The survey undertaken by conservators of A.M. Art Conservation and Taxidermists of George Dante Studios was designed to provide condition data to aid the City’s Working Group tasked with determining the future of the Delbridge Collection.

[1] Based on the data provided by the GPZ to the survey team,71.5% of the mounts tested positive for arsenic.

PAST ASSESSMENTS & HISTORICAL DOCUMENTATION

The Delbridge has had a number of assessments in the past and has hired several consultants more recently as they work to understand the needs and issues of the taxidermy collection. A brief description of the various documents is given below and how they were used in our understanding of the condition. To aid the city's working group, information relevant to the condition, history and value of the specimens was input into the project's database.

1980s Insurance Assessment

The museum's historical research document lists that "the City currently estimates the value of the mounted animals and the completed dioramas at $1.9 million. The estimate was done in the late 1980's for the City insurance policy." No further information was provided on this appraisal. It should be noted that there has been a substantial revision over the past decades in how the IRS values taxidermy that has contributed to a change in values over time.

1993 Conservation Assessment Program (CAP)

This assessment was conducted by conservator Catharine Hawks, under a grant from the Institute of Museum Services Conservation Assessment Program, which at that time was administered by the National Institute for the Conservation of Cultural Property. Hawks conducted a site visit September 9-10, 1993, to assess the non-living collections and facilities of the Great Plains Zoo. Hawks provided goals and recommendations that the museum should address in the short, medium, and long term. They include collection policy and planning recommendations. While an object-by-object survey is not within the scope of this program, the conservator made selective notes and comments about the taxidermy collection in her section on exhibitions beginning on page 21. Condition information on specific mounts was added to the Airtable database when there was reasonable confidence about the correct match between the specimen and her description. The condition information from this report demonstrates that many condition issues such as mechanical damage, fragile hair, cracks in ears, stressed seams, prior repairs, and pest damage were observed over 30 years ago.

It should be noted that the CAP program exists today in a slightly different format. The *Collections Assessment for Preservation* (CAP) program, funded by the The Foundation for Advancement in Conservation (FAIC) provides small and mid-sized museums with partial funding toward a general conservation assessment. The assessment is a study of all of the institution's collections, buildings, and building systems, as well as its policies and procedures relating to collections care. Participants who complete the program receive an assessment report with prioritized recommendations to improve collections care. CAP is often a first step for small institutions that wish to improve the condition of their collections. The museum made some strides in implementing Hawks' recommendations, but most were not implemented. Many of the suggestions on collection management and preservation still would be relevant to the maintenance of the Delbridge collection.

2022 Appraisal

In 2022 the collection was assessed by a taxidermy appraiser to determine the physical condition and value of the collection as well as the federal or international regulations regarding each species. The report, received in July 2022 listed the total fair market value as $430,000. Individual

amounts for each mount were included in the GPZ spreadsheet and were input into the survey database.

2023 Wildlife Interiors

Taxidermy Appraiser Todd E. Lowe of Wildlife Interiors visited the Delbridge on November 7, 2023 to view the collection. He then used digital images and video he took while on-site to complete his appraisal report on the collection. In Lowe's opinion, the collection falls into the category of trophy collection because the specimens were sport hunted and mounted as "souvenir[s] of the hunter Henry Brockhouse." As such, he contends that the collection does not exhibit the biodiversity worthy of a Natural History collection. With this in mind, his resulting report is what he describes as an "insurance appraisal" and his numbers are based on the cost to replace the specimen including the cost of the hunt or cost to purchase hide/specimen from a breeder depending on the availability and rarity of the animals. His assessment also considers the rare and endangered species subject to CITES appendices. He lists 15 specimens that he deems "unfit for restoration". His condition assessments do not always overlap with the opinion of this survey team. A few mounts were missing from his survey and others had some discrepancies with what the project survey team encountered. In a March 7, 2024 phone conversation with Lowe, he acknowledged the difficulty in completing his survey from photographs rather than on-site. His data has been incorporated into the Airtable database. In the opinion of the survey team, this collection has value beyond the typical trophy collection due to factors that include the quality of the taxidermy, the history of use of the collection, and the difficulty/impossibility of replacing some of the specimens today.

2023 Headhunter Trophy Care (HTC)

Wade West of HTC, described on their Facebook page as "a taxidermy cleaning and restoration company based in the Dallas/Fort Worth area." West visited the Delbridge with Todd Lowe in November 2023. He did not provide a written report or documentation of the visit, but estimated that restoring the collection of mounts would cost around 1.5 million dollars.

Prior Interventions

As per institutional information relayed to the team, Dale Selby, Wildlife Taxidermy Studio based in Nicollet, MN has been providing maintenance services for the taxidermy mounts, notably the reticulated giraffe. Fifteen visits have been recorded since 2009. The zoo does not receive written or photographic documentation of the work conducted or the materials used. Documentation of any treatment(s) should be required by the City/GPZ for any future work.

Additional Historical Information about the Collection

Historical documentation was gleaned from the 1978 publication *A True Safari Hunter…Henry Brockhouse* by Dorothy Ells and John Giegling with assistance from Terry Stone and Hope Griffith, with photographs by Joe Jonas, Jr. This book includes a brief biography of Brockhouse and recollections of his travels and hunts. Images and copies of several Rowland Ward's Records of Big Game are included.

An undated one-page write-up describing the history of the *Giant Panda Acquisition* was provided to the survey team. The document mentions that "there is at least one other mounted Giant Panda in museums in the United States (notably the Field Museum in Chicago)". The Academy of

Natural Sciences Museum, part of Drexel University in Philadelphia, PA also has a historic panda diorama. And the Carnegie Museum of Natural History has a mounted panda. The panda, which was a gift of the People's Republic of China to the Great Plains Zoo was secured by the efforts of Mr. C.J. Delbridge and Senator Pressler. As such it represents a significant diplomatic relationship, which should be valued as the future of this mount is considered.

The Historical Document of the Brockhouse collection recorded that "there are 22 mounted specimens from the Brockhouse Collection at Rolling Hills Refuge Wildlife Conservation Center, Inc., in Salina, Kansas. They are a significant part of our collection in Sioux Falls." The specimens listed include:

- Red Flanked Duiker
- Brocket Deer
- Topi
- Hunter's Hartebeest
- Vaal Rhebok
- Argali Sheep
- Fallow Deer
- Glacier Black Bear
- Fannin
- Stone Sheep
- Alaskan Brown Bear
- Chamois
- Coke's Hartebeest
- Grant's Gazelle Steenbok
- Bohor Reedbuck (2)
- Red Kangaroo
- Mule Deer
- Albino Bengal Tiger/Axis
- Fallow Deer
- Red Deer

Most of these specimens were not on exhibit at the time of the site survey. These and others were moved to the museum from off-site storage for the survey. GPZ CEO Dewitz mentioned that some of the physical damage seen on these mounts may have been sustained during shipping and/or transport when this loan was sent out or returned. That would be consistent with some of the physical damage noted on certain specimens during the survey.

In the preparation of this report the project team conducted an oral interview with taxidermist and historian John Janelli, former president of the National Taxidermists Association. John has broad familiarity with the Delbridge collection and, as a friend of the Jonas family, memories of some of the pieces being mounted at their studios. He was able to attribute a few mounts to the Jonas Brothers. He also mentioned that Larry Blomquist, owner and publisher of the taxidermy publication Breakthrough Magazine, assessed the collection in the 1980s. If deemed relevant, Blomquist could be contacted to ask if documentation exists that can be shared with the GPZ.

Ethics

Rumors have swirled around the Delbridge since the closing of the museum. Some of this has permeated the small circle of natural science collections. The GPZ CEO was clear that ethical treatment of the animals alive and dead is of the highest priority for the Zoo. We have endeavored to record information from multiple sources and documents and dispel misinformation that does not represent what we saw during the on-site survey.

The Henry Brockhouse collection has been the center of controversy regarding the ethics of how some of the animals were obtained. It has been rumored that some of the specimens were allegedly the victims of "canned hunts" and showed signs of being tethered or previously having ear tags. Our taxidermy team is familiar with the evidence to look for in these cases and have clearly identified this issue on mounts in other projects. The surveyors found no evidence of this in the Brockhouse collection.

The period during which these animals were collected predates the popularity of these unethical practices. Numerous photographs and documentation support that the hunts of these animals took place in their countries of origin, and there are no markings on the specimens that suggest anything other than natural scars and possible damage from handling in the field.

Often, especially with larger animals, ropes are tied to various appendages to move, drag, or manipulate the carcass for processing. On numerous occasions, we have seen damage incurred from this, which can easily be misinterpreted as the animal being tied up while alive.

The 1993 CAP report identifies the gaur as having damage to the ear that might be indicative of a canned hunt. During this survey the taxidermists examined the gaur and believe that this ear damage occurred during the animal's lifetime, which is typical of large wild bovine species. In contrast, when captive-reared animals with ear tags (the type used for marking livestock) are harvested by hunters, the ear tags are commonly removed while the animals are alive before they are released onto the property. What remains is a very distinct scar or round hole. We have identified these on numerous occasions, whether they have been left present in the taxidermy mount or filled and repaired.

Information on a text panel entitled *An Introduction to the Delbridge Museum of Natural History* displayed in the museum at the time of the site visit states "All the Museum specimens were legally hunted and collected by Henry Brockhouse." Information obtained by the GPZ and heard from other sources not directly connected with the museum indicate that the Eastern Gorilla in the collection may be an exception. In *A True Safari Hunter…Henry Brockhouse,* Brockhouse describes the gorilla mount as a "him". Anecdotal information shared by the museum and recalled by taxidermy historian John Janelli indicate that this specimen was a female gorilla. The legality of hunting and importing a female gorilla at that time is beyond the experience of the assessors and outside the scope of this report. We could not confirm that the sex of the specimen during the survey. The City's Working Group is advised to consult with legal counsel regarding the future or disposition of this mount.

Supporting Documentation

The following information was reviewed in the preparation of this report:

- Hawks, Catharine. Conservation Assessment Program General Conservation Assessment: Great Plains Zoo, Delbridge Museum of Natural History. September 1993.
- Ells, Dorothy, and John Giegling, with assistance from Terry Stone and Hope Griffith. A True Safari Hunter: Henry Brockhouse. Color photographs by Joe Jonas, Jr., O'Connor Printers, 1978.
- City of Sioux Falls, 2023, Delbridge Collection 9-5-2023 Council Informational [PowerPoint Slides]
- Delbridge Collection PowerPoint Presentation (branded) pdf
- Sioux Falls Zoo & Aquarium Analysis of Aquarium Visitation Potential [PowerPoint slides prepared by Canopy Strategic Partners, October 2023]
- Historical Documentation of the Henry Brockhouse Collection (Reference Source Not Stated – Unknown), 7-page pdf document
- Taxidermy Appraisal for the Taxidermy Collection of the Delbridge Museum of Natural History. Prepared by Todd E. Lowe, Wildlife Interiors, Inc. November 27, 2023
- Official Summary of Panda Acquisition
- Original architectural drawings and exhibit elevations
- GPZ Museum Specimen Donation Agreement with Vernell and Louise Johnson, 1993
- Midwest Laboratories Report of Analysis for the GPZ Delbridge Museum Taxidermy Testing, Issue Date August 1, 2023 (Report Number 23-213-4055)
- Midwest Laboratories Report of Analysis for the GPZ Delbridge Museum Taxidermy Testing, Issue Date September 08, 2023 (Report Number 23-251-4425)
- Midwest Laboratories Report of Analysis for the GPZ Delbridge Museum Taxidermy Testing, Issue Date October 03, 2023 (Report Number 23-27-4189)
- Great Plains Zoo Master Plan https://www.greatzoo.org/great-plains-zoo-unveils-master-plan/

Select Media Articles

- Associated Press – Natural history museum closes because of chemicals in taxidermy collection August 18, 2023 https://apnews.com/article/south-dakota-taxidermy-natural-history-museum-closed-chemicals-8705995a1bf8a45ceb65174e5821308a
- Sioux Falls Business – Zoo details what led up to Delbridge Museum closure, what's next by Jodi Schwan, August 21, 2023 https://siouxfalls.business/zoo-details-what-led-up-to-delbridge-museum-closure-whats-next/
- NBC News – 'Just don't lick the taxidermy': Fighting over arsenic found at South Dakota's largest zoo, Sept. 5, 2023, by The Associated Press https://www.nbcnews.com/news/us-news/just-don't-lick-taxidemy-south-dakota-fighting-arsenic-found-largest-zo-rcna103358
- By The Associated Press
- NYTimes – "Arsenic Preserved the Animals, but Killed the Museum", September 23, 2023 by Katrina Miller https://www.nytimes.com/2023/09/23/science/museums-taxidermy-arsenic.html
- The Dakota Scout – Air quality reports cast doubt on Sioux Falls closure of Delbridge Museum by Joe Sneve, March 15, 2024 https://www.thedakotascout.com/p/air-quality-reports-cast-doubt-on

- The Dakota Scout – Saga of Delbridge Museum's mounted taxidermy collection reaches South Dakota Capitol by Joe Sneve, February 07, 2024 https://www.siouxfallslive.com/news/sioux-falls/saga-of-delbridge-museums-mounted-taxidermy-collection-reaches-south-dakota-capitol
- Keloland.com – Great Plains Zoo unveils plan for new aquarium by Rae Yost, March 26, 2024 https://www.keloland.com/keloland-com-original/great-plains-zoo-unveils-plan-for-new-aquarium/

PROJECT DESCRIPTION

Assessment Goals

The primary objective of this project was to use both conservation and taxidermy experience to assess the current condition of the Delbridge taxidermy collection. It is understood that this document will be used to assess potential restoration/preservation/deaccessioning needs as appropriate to the mission of the Zoo and the City. The goal was to create information that could be shared with stakeholders and allow for transparency as the Zoo and City make decisions on the future of the collection.

Assessment Methodology

The survey was conducted over five days February 5-9, 2024 by two conservators from A.M. Art Conservation, LLC (Rachael Arenstein and Eugenie Milroy) and two taxidermists from George Dante Studios (Divya Anantharman and Scott Schoeniger). The survey data was reviewed by George Dante and a secondary review of some specimens was conducted by Fran Ritchie, Natural Sciences Conservator, and Conservation Committee Chair for the Society for the Preservation of Natural History Collections.

183 specimens were examined on-site at the Delbridge Museum of Natural History. Each specimen was examined by a conservator and taxidermist working together. Data collection was captured in a custom designed Airtable database using iPads and/or mobile phones and uploaded to the cloud-based program via the mobile app or website.

Airtable is a powerful database that allows users to customize data input, attach images and generate statistics for project management. A number of custom input forms and interfaces were created to make this database as efficient as possible for this project. Overall digital images were taken as well as additional detail photographs necessary to record specific condition issues for each mount. Numerous data points and trends have been analyzed and presented in the PowerPoint accompanying this report. The assessors have created numerous “views” in the database that we anticipate will be helpful for the stakeholder’s decision making. If other granular or comparative data is required, it can be captured in a number of graphic or spreadsheet formats as needed.

GPZ and City of Sioux Falls have been given READ ONLY access to the Airtable database with the survey data. The data can be viewed and shared in this format. This will allow the city to view the data in its current form. Any of the Airtable data can be easily exported as .CSV files. The mount images have been exported as jpeg files to accompany this final report. If the city would like to set up an Airtable account, the database can be transferred to the city’s account to allow for additional modification while the fate of the collection is being determined.

Understanding the Survey Data

Initial Delbridge Data: Prior to the survey, an Excel spreadsheet was provided by the Delbridge Museum. The spreadsheet contained the fields in the table below.

Field Name	Field Description	Notes
GPZ ID	Great Plains Zoo Identification Number	Some specimens did not have GPZ ID numbers
ASSET	City of Sioux Falls Asset Number	Some specimens are owned by the zoo and do not have ASSET numbers
DESCRIPTION	Generally this is the specimen name or species	Not all identifications were accurate.
Additional Description / Source		
LOCATION DESC		
LOCATION MEMO		
DEPARTMENT		
DATE ACQ	Date acquired	
ACQ COST	Cost at acquisition	
LTD ACCUM DEPR	City's assessment of depreciated value since acquisition	No information available
Value	Assessed value from the 2023 appraisal	No information from this appraisal was available
Endangered	Whether the species is considered endangered	
IUCN	International Union for Conservation of Nature. The IUCN Red List of Threatened Species™ is an international standard for the current status of animal populations.	
CITES	Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora. This is an international agreement between governments, and regulates how wildlife items can be sold, transferred, or moved between countries. (Appendices I, II, II or NC)	
Applicable Laws	ESA – Endangered Species Act ESA (v) – Delbridge transaction violated ESA as animal was listed at the time of sale MMPA – Marine Mammal Protection Act MBTA – Migratory Bird Treaty Act	

This information was imported into Airtable and formed the basis for each specimen record. This basic identifying information was greatly expanded upon to capture notes from prior assessments, information about the taxidermy preparation and, the main goal of this survey, the current condition issues as observed by the on-site team and proposed treatment.

A complete alphabetized table of the fields contained in the Airtable database can be found in the Appendix. The table columns are headed with **Field Name, Field Description, Field Type** and **the Field Options** that were available to the assessors. The table lists field dropdown or checklist options that could be selected during the survey.

Generally, the fields were designed to collect data in the following categories:

- Specimen Biodata - sex (if possible), life stage
- Preparation, Materials and Techniques - preparator studio, form (i.e. support material), base, pose/posture was recorded as well as the base and any foreground elements (e.g. rocks, moss, branches, natural or synthetic). Materials as well as methods and techniques evolved throughout the history of taxidermy as well as from one studio to another. The aging of materials and preparation techniques affect the current condition and treatment needs of the specimens. Maker's marks that identify the preparator or preparation studio were noted in the survey which could help to isolate condition trends.
- Materials and techniques used for specific features - i.e. ear liner material, mouth set, type of eyes, etc. When an identification could not be confirmed by visual examination it was noted in the appropriate field.
- Presence of past restoration
- Condition Issues - with specific attention given to the skin/hair/feather, appendages, mouth/nose, eyes, ears, horns/antlers
- Evaluation of specimen quality and specimen artistry
- Recommended treatment
- Additional documentation
    - 1993 CAP notes
    - Wildlife Interiors Inc field.
    - Comments by reviewer Fran Ritchie
- Other fields were added to aid in the statistical analysis or export of images.

Understanding the Condition Assessment

The current condition of each specimen was considered on both an overall level, and on a part-by-part basis. The overall condition was graded as either Poor, Fair, Good, Excellent, or Exceptional. Apart from the current condition, the assessors also graded the artistic quality and species accuracy of each mount. The percentage of specimens that fell into each category can be seen in the table below.

2022 Appraisal Condition	2024 AMArt & GDS survey	2024 AMArt & GDS survey	2024 AMArt & GDS survey
Overall Condition	**Overall Condition**	**Artistic Quality**	**Species Accuracy**
Not used by appraiser	Exceptional - 4.4%	Exceptional - 8.33%	Exceptional - 7.18%
Excellent- 55.49%	Excellent - 12.6%	Excellent - 20%	Excellent - 28.7%
Good - 29.48%	Good - 50%	Good - 41.1%	Good - 43.1%
Fair - 5.78%	Fair - 19.8%	Fair - 20%	Fair - 13.3%
Poor - 9.25%	Poor - 13.2%	Poor - 10.6%	Poor - 7.73%

Condition and Quality can also be seen in relation to each other in this table:

		Condition Overall						
		(Empty)	Exceptional	Excellent	Good	Fair	Poor	Total
Mount Quality Overall	Artistic quality - Good, Species accuracy - Good				46	7	5	58
	Not surveyed	11			1			12
	Species accuracy - Excellent			1				1
	Species accuracy - Excellent, Artistic quality - Excellent			13	17	2	2	34
	Species accuracy - Excellent, Artistic quality - Exceptional			2				2
	Species accuracy - Excellent, Artistic quality - Good			4	8	1	2	15
	Species accuracy - Exceptional, Artistic quality - Exceptional		8	3	1		1	13
	Species accuracy - Fair, Artistic quality - Fair				4	10	3	17
	Species accuracy - Fair, Artistic quality - Good					1		1
	Species accuracy - Fair, Artistic quality - Poor					3	3	6
	Species accuracy - Good, Artistic quality - Excellent				1	1		2
	Species accuracy - Good, Artistic quality - Fair				12	5		17
	Species accuracy - Good, Artistic quality - Poor				1			1
	Species accuracy - Poor, Artistic quality - Fair					1	1	2
	Species accuracy - Poor, Artistic quality - Poor					5	7	12
	Total	**11**	**8**	**23**	**91**	**36**	**24**	**193**

As necessary, anatomical features and body parts received their own section and fields for data entry. This allowed the assessors to easily note the common problems seen on historic taxidermy, which assisted greatly with generating treatment time and cost estimates.

The current state of preservation of each specimen depends on the quality of its original preparation as well as how the mount has been acted upon by agents of deterioration over the years. The primary agents of deterioration that affect museum collections and how their impacts are seen in this collection are described in an appendix of this report. Examples seen in the survey include handling damage, damage from improper storage and exhibition environment, pest damage and poor prior restorations and improper grooming.

The overall state of preservation of the skin or hide as well as fur or feathers as applicable was assessed. Structural issues such as cracks, split seams, drumming etc. and the severity of such problems were noted. These ranged from minor-moderate-major. So too with fading of fur or feathers. The extent of fading was noted using the same minor-moderate-major classification. This same method was used to assess all areas of the specimen. Cracks in ears, around eyes, on glass eyes, around nose, and in and around mouth were noted and graded for severity. Common issues seen with aged taxidermy were pre-populated, in checklist format. If any areas required further explanation, details were added in corresponding text-based notes fields. Condition issues with appendages including tails and extremities are separated out as are facial features such as eyes, mouth and nose as well as horns or antlers if present.

Understanding Treatment Recommendations

The treatment recommendations address both structural and cosmetic issues with the mounts. Some of the mounts are high quality pieces which are currently in poor condition.

All specimens require dry cleaning to remove dirt and debris as well as grooming to achieve a more satisfactory appearance. As discussed in the pollutants section of the Agents of Deterioration Appendix, such dirt is both disfiguring and also attractive to pests, while making the specimens more sensitive to environmental fluctuations. Most specimens exhibit some degree of fading. This can be treated by recoloring. The majority of specimens would also benefit from what is called “repointing” of the soft tissue as these materials when aged experience alterations in color and texture. Repointing includes painting, recoloring, re-texturing and re-surfacing these areas to achieve a naturalistic appearance (e.g. making the nose appear wet). Repointing, recoloring and grooming are not merely cosmetic issues. They are equally important to structural stabilization because they improve the anatomical accuracy of the specimen, their life-like appearance, and thus their educational value.

The care and restoration of historical/aged taxidermy can differ in critical ways from more modern mounts. We do not recommend application of “dressings”, “conditioners” or oils as part of routine cleaning or treatment. The survey team is available to advise on appropriate treatment or vendors upon request.

Understanding Costs

Treatment cost estimates include the use of conservation-grade materials. Materials that are described here as “conservation approved” have been tested for their aging properties, stability and reversibility or re-treatability. Conservation-grade materials are not generally standard for taxidermy treatments. Treatment time and cost estimates as listed in the Airtable database do not include pest remediation, transport, photo and written documentation, or project management.

Prices also do not include new habitats, habitat improvements, or temporary platforms. If the museum intends to contract for conservation/restoration services, a project proposal would be expected to take these additional costs into account. It is expected that there would be some economy of scale based on the size of the project.

The treatment costs were estimated at a rate of $200/hour (including materials). This hourly rate was considered representative for experienced taxidermists and/or conservators but rates may vary. Some of the estimated treatment time would be spent removing, redoing or reworking unsightly prior treatments. Removal of incompatible restoration materials is not always possible and if it can be accomplished, is time consuming. Extensive prior repairs using a wide range of materials were observed on some pieces. Many of these old repairs have failed or are not visually appealing. Certain treatments that might be suitable for new specimens are not appropriate for historic taxidermy such as the Brockhouse mounts.

This table shows the various costs that have been pulled from data provided by the City, and Zoo from prior reports detailed above.

Original Cost[1]	2022 Appraisal Value[2]	2023 Replacement Cost[3]	2024 Restoration Cost[4]
$1,107,883	$440,640	$1,542,130	$847,600

1. Original Cost – Original cost from GPZ spreadsheet (not adjusted for inflation)
2. Appraisal Value – From 2022 report (unknown author)
3. Replacement Cost – From Wildlife Interiors report
4. Restoration Cost – total of costs for restoration of specimens categorized as worthy of treatment as calculated by George Dante Studios as part of this survey. As detailed above, this total does not reflect other associated costs that would be required to contract treatment (e.g. pest remediation, transportation, etc.) so the total cost of restoring a large collection of mounts would be higher than listed above.

TESTING AND ANALYSIS

Summary of Prior Arsenic Testing

The GPZ carried out arsenic wipe testing with samples collected by GPZ staff and analysis provided by Midwest Laboratories in Omaha, Nebraska. Specimens were wiped using Environmental Express GhostWipe® Moist Wipe, 15 x 15 cm. Dewitz reported the wiping protocol as four passes with the wipe, fold in half and three passes, fold in half again with another three passes. Standard wipe testing protocols require measurement of the sampled area or use of a template to ensure that a consistent area is sampled on each specimen.

Generally arsenic wipe testing, when sampled over a consistent surface area is reported as a total concentration per unit measure (e.g., µg/ft^2 or µg/cm^2). Consistent sampling was not done on the taxidermy specimens and so the total area swabbed is unknown. As a result, the arsenic wipe tests

should be considered “qualitative results rather than focusing on the specific quantitative numbers.” [2]

Three analytical reports were reviewed. The reports list specimens by specimen name and GPZ ID number. The report lists “all results are reported on an AS RECEIVED basis, ppm= parts per million, ppm = mg/kg, ppm = mg/L”. Specimens measuring under the 0.50 mg/kg reporting limit were deemed not to have arsenic present.

- 39 specimens tested under the reporting limit of <0.50 mg/kg
- 138 specimens were positive for arsenic
- 16 specimens were not tested

This information was included in the GPZ spreadsheet and incorporated into the Airtable database. Dewitz also reported that air quality monitoring was conducted in the museum and arsenic was not detected. No information on this testing method or documentation of results was available.

Personal Air Monitoring

Personal monitoring was conducted on February 8 and 9, 2024 by collecting total particulate matter with filter samplers attached to the shoulder while conducting survey work which included touching, handling and moving the specimens. On the second day, activities also included vacuum cleaning specimens and the exhibit surrounds using the museum’s backpack vacuum (non-HEPA) and Swiffer duster. The surveyors interacted with the specimens similar to the manner expected of museum staff performing general exhibit maintenance. This activity was more direct than would be expected of visitors to the museum.

One surveyor from each team wore the personal air quality monitors for 7 hours of work each day producing four samples. One blank sample was included as a control.

Samples were collected on 37mm UW MCE pre-loaded filters in a polycarbonate filter holder using a GilAir3 pump at a flow rate of 2 LPM. All pumps were calibrated before and after sampling by SGS Galson; calibration before sampling was confirmed with a rotameter. Filters were sealed and returned to SGS Galson for arsenic analysis using Inductively Coupled Plasma (ICP) Spectroscopy according to a modified NIOSH 7303 protocol for metals analysis.

No arsenic was detected in any samples above the Level of Quantitation (LOQ) of 0.30 ug.

These results suggest that the collection workers were not at risk of airborne exposure to arsenic even when handling and manipulating arsenic-positive specimens.

Understanding Arsenic

Arsenic (chemical symbol As) is found in numerous forms in museum collections, particularly in natural science collections. Arsenic was commonly applied as an insecticide/herbicide/fungicide in powdered form to the inside surfaces of mammal, bird, reptile and fish skins during the preparation process. Arsenic is also frequently found on the exterior of the skins, either from

[2] Calvin J. Sterkel-Colombo, MidWest Labs, email communication February 26, 2024

migration through the skin, or contact with other treated specimens. Arsenic may be seen on the surface of specimens as a white or gray particulate.

Arsenic is a carcinogen (skin, liver, bladder, kidney and lung cancer) and endocrine disrupter. Health effects related to arsenic exposure can also cause:

- Eye and skin irritation and burns.
- Irritation of nose, throat, and respiratory tract.
- Weakness, nausea, vomiting, headache.
- Damage to the nervous system and liver.
- Birth defects and reproductive harm.

Routes of exposure to arsenic are primarily through inhalation, ingestion; however skin absorption may occur. For arsenic on taxidermy specimens there is potential inhalation risk if arsenic is made airborne during handling or cleaning. And there is a risk of skin absorption or accidental ingestion if proper personal protective equipment (PPE) such as gloves are not used and proper hygiene (e.g. hand washing) is not conducted before eating.

Understanding how a hazard can affect health will depend on a number of variables including:

- Type of arsenic: inorganic arsenic is the most likely pesticide contaminant found on taxidermy and, as a group, is more toxic than organic arsenical compounds.
- Dose- How much is absorbed by the body NOT the concentration in the air or on surfaces
- Duration of Exposure - How long were you exposed (chronic vs. acute)
- Route of Exposure - Different compounds can have different effects based on route of exposure (Inhalation, Ingestion, Absorption, Injection)
- Individual Variability – age, sex, race, genetics, past exposures, etc.

Recommendations

While arsenic is a known hazard[3] in taxidermy collections, the risk[4] can be mitigated by appropriate risk management strategies. These include[5]:

- Using disposable nitrile (or latex) gloves when handling specimens.
- Changing gloves frequently when handling specimens to prevent transfer of arsenic from one specimen to another.
- Wearing lab coats (cloth or Tyvek).
- N95 masks or respirators during close contact or work that generates mobile dust.
- Use of paper table covers that are disposed of after use.
- Vacuuming and wet-wiping down tabletops or work surfaces
- Hand washing
- Using vacuums with HEPA filtration

[3] HAZARD - Intrinsic property of a substance to cause harm. (Schrager, 2024)

[4] RISK - Probability that the hazard will cause harm and the degree to which it affects your system (Schrager, 2024)

[5] Fran Ritchie – Arsenic in Collections, September 6, 2023 - https://connectingtocollections.org/wp-content/uploads/2023/06/C2CC_Arsenic_2023.pdf

Note: The Delbridge does not currently own a HEPA vacuum that would be appropriate for the safe cleaning of the taxidermy collections. Additionally, mouse urine and droppings seen in the museum building, on and near specimens carry risk of disease. Purchase of an appropriate vacuum to maintain cleanliness is a high priority recommendation and the museum has committed to making this purchase.

Additional Resources on Arsenic in Collections

- *Health & Safety for Museum Professionals* https://www.universityproducts.com/health-and-safety-for-museumprofessionals.html
- *Old Poisons, New Problems: A museum resource for managing contaminated cultural materials*. Nancy Odegaard, Alyce Sadongei, and associates. 2005. Alta Mira Press.
- C2C Care Webinars
    - Arsenic in Collections, Presented by Fran Ritchie https://connectingtocollections.org/arsenic_in_collections/
    - Arsenic and Old Lace: Controlling Hazardous Collection Materials o Presented by Kerith Koss Schrager, Anne Kingery-Schwartz, and Kathryn A. Makos. https://connectingtocollections.org/arsenic-and-old-lace-controlling-hazardouscollection-materials/
    - C2C Care Course: Health and Safety in Collections Care https://connectingtocollections.org/health-and-safety-course/
    - Identifying and Managing Hazardous Materials in Museum Collections, Presented by Hayley Monroe. https://connectingtocollections.org/hazardous-materials/

RECOMMENDED NEXT STEPS

Should the Great Plains Zoo choose to incorporate the Brockhouse/Delbridge collection in plans for its future campus, whether in its entirety or partially, a complete reimagining of the exhibit and its purpose becomes essential. Beyond the current state of the taxidermy itself, the overall design, foregrounds, habitats, and murals are antiquated and ripe for significant enhancement. The existing floorplan fails to maximize space efficiency, calling for a smaller yet more effective redesign.

The assessors have suggested several possible options for the future of the 18 specimens deemed “not recommended for treatment.” While the project team can be a source to consult or connect with other appropriate institutions who might utilize these specimens for teaching purposes, it will be up to the stakeholders to choose among these options what will be the best for the GPZ and the collection.

Taxidermy and meticulously crafted exhibits serve as invaluable educational tools, capable of supporting a multitude of programs spanning science, art, and conservation. Historically, they stood as pioneering instruments in conservation efforts, forging connections between individuals and distant lands along with the wildlife inhabiting them. Through exhibitions, they shed light on fragile ecosystems and vanishing habitats, offering visitors an intimate communion with nature that surpasses digital experiences or even encounters with captive animals.

Looking ahead, we recommend consultations with naturalists and specialists in natural history exhibits. These experts will assist in delineating the mission of the new exhibit and determining the requisite space for its successful realization. It is within these dialogues that the narrative the GPZ wishes to convey can take shape.

At this juncture, only specimens directly aligned with this vision should be chosen, forming the foundation for a fresh design. By utilizing select specimens, species-specific displays can be crafted, rather than adhering solely to those in pristine condition or possessing specific conservation statuses. Should the decision be made to omit certain specimens, careful consideration must be given to those offering the greatest utility.

The City of Sioux Falls worked with State legislators and succeeded in changing South Dakota state law, which prevents public assets from being transported out of state. This law was originally designed to protect Native American patrimony and paleontological specimens that form part of South Dakota's heritage, however it had the unintended effect of also preventing the disposition of taxidermy mounts. House Bill HB1100 completed in early 2024 and effective July 1, 2024 secured an exemption for taxidermy which would allow the Delbridge mounts to be legally transported out of state, facilitating loan or donation to other non-profit institutions if there is not the financial ability to build a reimagined museum in the city of Sioux Falls.

Now is the time to determine whether these mounts still have a function and serve the mission of the GPZ. If a concrete plan is developed with clear display objectives, the GPZ could begin a process to identify exhibit designers, fabricators, and taxidermists/conservators tasked with restoring the specimens. With adequate funding, detailed planning and careful execution, a future exhibit could be a profound educational experience to promote wildlife understanding. If the GPZ and City together are unable to secure the resources to create a new exhibit to properly use these mounts, they are encouraged to engage with the natural history museum community to find new homes where the mounts will be used and appreciated.

APPENDICES

1. A.M. Art and George Dante Studios Experience and Prior Work Projects
2. Airtable Field List
3. Agents of Deterioration
4. Hazardous materials information
    a. Quiet Dangers in Collections: Staff Health & Toxic Collections - A.M. Art handout
    b. *Why Can't you Just Tell me if it's 'safe'? Industrial Hygiene Considerations for Handling Arsenic-Containing Collections* by Kerith Koss Schrager presented at the American Institute for Conservation Annual Meeting, 2024
    c. *Arsenic in Collections,* by Fran Ritchie, Connecting to Collections Care webinar *https://connectingtocollections.org/wp-content/uploads/2023/06/C2CC_Arsenic_2023.pdf*
5. GPZ Taxidermy Condition Assessment Summary - PowerPoint