

CONSERVATION ASSESSMENT OF THE  
The [REDACTED] Museum, [REDACTED]

**Executive Summary**  
July 2014

“...A conservation assessment is a broad study of the ...policies, practices, and conditions that have an impact on the care and preservation of ...collections....[It] identifies and describes the problems that affect the preservation of collections, analyzes the causes of these problems, and suggests a plan of action.... ”<sup>1</sup>

The Conservation Assessment was requested by [REDACTED] faculty and staff as a means to gain more information about the care and preservation of the [REDACTED] Museum collection, increase staff knowledge of collections care, and to develop long range preservation plans for the [REDACTED] Museum collection. [REDACTED]

[REDACTED], completed the on-site visit on June 26 and 27, 2014 with [REDACTED], Curator and Assistant Professor of Biology.

The [REDACTED] Museum collection includes important biological, cultural, and historical materials that comprise an important educational, research, and community resource for the University. The Museum has a dedicated, knowledgeable manager in [REDACTED]. The assessor has carefully studied The [REDACTED] Museum, its collections, and efforts to preserve and curate the artifacts and specimens. Many recommendations have been made in the accompanying report in the hope that they will help the University better care for, preserve, and benefit from its collection resources. The following items have been selected as higher priorities for the long-term protection and preservation collections.

After evaluating the information gained from the pre-visit questionnaire and the onsite visit, the assessor feels that the following are the highest priority recommendations to insure the preservation of The [REDACTED] Museum collection at [REDACTED].

1. Relative humidity conditions within the [REDACTED] Museum collection spaces should be controlled to prevent deterioration of the collection through environmental fluctuations and attack by mold and insects.

---

<sup>1</sup> *The Conservation Assessment: A Tool for Planning, Implementing, and Fundraising*, The National Institute for the Conservation of Cultural Property and The Getty Conservation Institute, Sara Wolf Green, editor, 1990, page 2.

2. The natural history and ethnographic items of organic material should be tested for the presence of toxic pesticide compounds such as arsenic. These compounds have been used historically to preserve biological materials. Testing is important to assure safe use of the collection for research, study, and display.
3. Complete the inventory, cataloguing, and photo documentation of the collection so that the Museum knows the scope and depth of its holdings. Share inventory, catalog, and photographic information through the Internet with research communities and the public as soon as possible to increase access to the collection as a research and teaching resource.
4. Include existing policies and procedures and develop new policies and procedures to include in a Collections Management Manual to govern the use and management of the [REDACTED] Museum collection. Most central to this is the development of a written scope of collection and collecting policy.

The following recommendations in the attached assessment report are not intended to overwhelm or discourage the faculty, staff, and students of the Museum and University, but rather as a prioritized reference or tool for the Museum and University to use in long-term planning for The [REDACTED] Museum. It was a pleasure to meet and work with [REDACTED] administrative staff, faculty, board members, and steering committee members of the Museum and University and the Provost and President of the University. Interest of this depth and level in the Museum is an indicator of its importance and potential for the University and its students. I look forward to helping, however I can, in future endeavors to preserve the [REDACTED] Museum collections and the heritage of [REDACTED]

CONSERVATION ASSESSMENT OF THE  
The Museum,  
Missouri

Consulting Conservator and Executive Director of the  
Nebraska  
Summer 2014

"...A conservation assessment is a broad study of the ... policies, practices, and conditions that have an impact on the care and preservation of ...collections. A conservation assessment identifies and describes the problems that affect the preservation of collections, analyzes the causes of these problems, and suggests a plan of action...."<sup>2</sup>

### Introduction

---

The Conservation Assessment of the [REDACTED] Museum was requested by faculty and staff of [REDACTED] and is funded by the Institute of Museum and Museum Services through Heritage Preservation, Inc. as a technical assistant award of the Conservation Assessment Program.

The assessment was conducted as a means to improve collections care, increase staff awareness and knowledge of collections care, increase institutional commitment to the collections, improve environmental conditions, to develop long term preservation goals, and to be used as a tool for obtaining funding for collection care. [REDACTED], Consulting Conservator and Executive Director of the [REDACTED] in [REDACTED] Nebraska completed the on-site visit on June 26 and 27, 2014 with [REDACTED] and others.

### General Museum Overview

---

The [REDACTED] Museum was established in 1875 and was originally housed on the campus of [REDACTED] University in [REDACTED] Hall but was moved to its current location in [REDACTED] Hall in 1896. [REDACTED] Hall is located on the campus of the [REDACTED] University in [REDACTED] Missouri. The [REDACTED] Museum collection is housed in a classroom building and is managed as a separate collection within the University structure. It is open limited hours as posted and by appointment for use by faculty and students for research and teaching purposes. The mission statement of the Museum is as follows:

"The [REDACTED] Museum promotes the study and appreciation of nature, Missouri history and cultures, [REDACTED] University, and the [REDACTED] in [REDACTED]

---

<sup>2</sup> *The Conservation Assessment: A Tool for Planning, Implementing, and Fundraising*, The National Institute for the Conservation of Cultural Property and The Getty Conservation Institute, Sara Wolf Green, editor, 1990, page 2.

Missouri. The Museum serves the general public, [REDACTED] University, and the [REDACTED] in Missouri. The Museum serves as an educational resource that enhances instruction and provides learning opportunities for students in museum techniques, curation, and principles in a scientific framework. With no other natural history museum or zoo in the region, The [REDACTED] Museum provides a unique opportunity for community and school groups to visualize the wealth of biodiversity in the state.”<sup>3</sup>

The mission statement of the [REDACTED] Museum clearly states the intention to preserve the collections of the [REDACTED] Museum. The request for a conservation assessment indicates an interest in establishing the conservation needs and priorities for the collection, providing collections care that meets current professional best practices, and in preparing a long-range preservation plan. The completed conservation assessment report should provide the basis for formulation of long-term plans for the collection.

A budget allocation of about \$500 per year has been allotted to the [REDACTED] Museum for care of the collections. This covers the phone charges, office supplies, exhibit and display supplies, printing, brochures, signage, security system batteries, and other items not necessarily related to the care and management of the collections. This seems fairly small for a collection of the size of the Museum. Recommendations in this assessment report will indicate needs for collections exhibit, housing, and display investments that will suggest need for a higher budgeted allocation for the Museum.

After the assessment has been reviewed, we recommend that the Museum Curator develop a long-range conservation and preservation plan incorporating the recommendations of this assessment and the long-range priorities of the [REDACTED] Museum and [REDACTED] University.

#### General Museum Recommendations:

- An annual budget for [REDACTED] Museum collections care should be developed based on the recommendations in this report. It should include routine collections care supplies and equipment as well as supplies for exhibition, teaching, and outreach use of the collection.
- A long-range preservation and conservation plan should be developed based on the recommendations in this report.

<sup>3</sup> [REDACTED] University Mission Statement from the CAP Pre-Visit Site questionnaire, page 2

## Staffing

---

The responsibility of the [REDACTED] Museum is the collateral duty of one full time paid employee. The Museum Curator, [REDACTED], is the full time paid employee, although the portion of her duties allocated to the [REDACTED] Museum is smaller than that allocated to teaching and research. She and her three part time paid student workers along with one part time volunteer are responsible for all aspects of collection care, museum interpretation, and public interface. They are very dedicated to the preservation of the collection and put in many hours to operate and improve the Museum and Collections. The [REDACTED] University Plant Operations Department is responsible for building maintenance and HVAC control.

One of the most significant problems for special collections in university settings is that they are often run by dedicated staff from non-museum disciplines and relatively untrained students. A professional body of knowledge and practice has been established for the museum field. It is recommended that the Museum staff and volunteers participate in national, state, and local professional museum and archive organizations to enhance the opportunity to access this body of knowledge and experience. Membership in the American Association of Museums (AAM) or the Society for the Preservation of Natural History Collections (SPNCH), as examples, would give the Museum access to necessary collections management forms, other documents, and a great deal of other information about professional museum and archival practices and procedures. Much information is also accessible online and through discussion groups and online training opportunities.

[REDACTED] Museum staff and volunteers should take advantage of the training and consulting opportunities made available through Missouri state resources and nearby museums and collecting institutions. The staff could look into arranging consultations with a local museum/archival professionals to get advice on issues pertaining to their collection such as numbering systems, collections, cataloguing, collections care, exhibit practices, and ethical concerns. The Museum staff will find that there are more grant-based resources available to museums and research collections that espouse professional museum standards including federal, state, and local grant programs and funding from corporate and private donors.

### Staffing Recommendations:

- The [REDACTED] Museum staff and students should become more involved with professional museum associations to increase their knowledge of collections management and care and to provide more capacity for collections care expertise within the University.
- The [REDACTED] Museum staff should look into consulting with nearby colleagues for advice about professional museum collection practices.

## **General Building and Facilities**

---

The [REDACTED] University campus is in [REDACTED] Missouri and the Museum is housed in the [REDACTED] Hall built in 1896. The approximately 3,600 square foot [REDACTED] Museum is located in east wing of the first floor second floor. The building is constructed of brick exterior walls with finished plaster and drywall interior walls and concrete and wood floors. The roof is asphalt shingle. The building architecture is of the Italianate style.

The building is structurally sound and is in good condition. The heating and cooling system runs off of centralized hot water (steam?) and chilled water plants and is supplemented by local heat and cool air exchange units beneath windows in the various rooms. Large windows in the exhibit rooms of the Museum are fitted with room darkening roll shades, which are kept down to exclude outside light.

Much discussion took place during the site visit regarding the renovation of the Science Building on campus, [REDACTED] Hall. It is currently proposed that the [REDACTED] Museum will move to occupy centralized spaces in the renovated [REDACTED] hall. This will bring the collections to closer proximity to science classrooms, laboratories, and faculty offices and would present the opportunity to have more visible and integral displays of collection objects and specimens in a more traveled location on campus. Discussion includes the potential for a discovery area/laboratory/classroom in which the collections would be used to better engage students and visitors.

### **Climate Control and Environment**

Climate control and environment comprise a number of separate, but related, components that combine to form the total conditions surrounding and affecting the long-term preservation of Museum collections. These elements include temperature and relative humidity, pollutants and particulates, lighting and illumination, pest control, and housekeeping. All of these elements will be discussed separately in the following sections. Addressing the recommendations in these sections forms the basis of preventive conservation programs, and constitutes the most efficient and cost effective way to preserve collections for the future.

#### **Temperature and Relative Humidity**

The storage and exhibition environment best suited for the long-term survival of materials in the [REDACTED] Museum collection is one in which the relative humidity is as stable as possible and the temperature is as low as practically and comfortably possible. Relative humidity levels in the range of 55% to 35% are thought to be best for general collections; however, it is actually the stability of the relative humidity that is

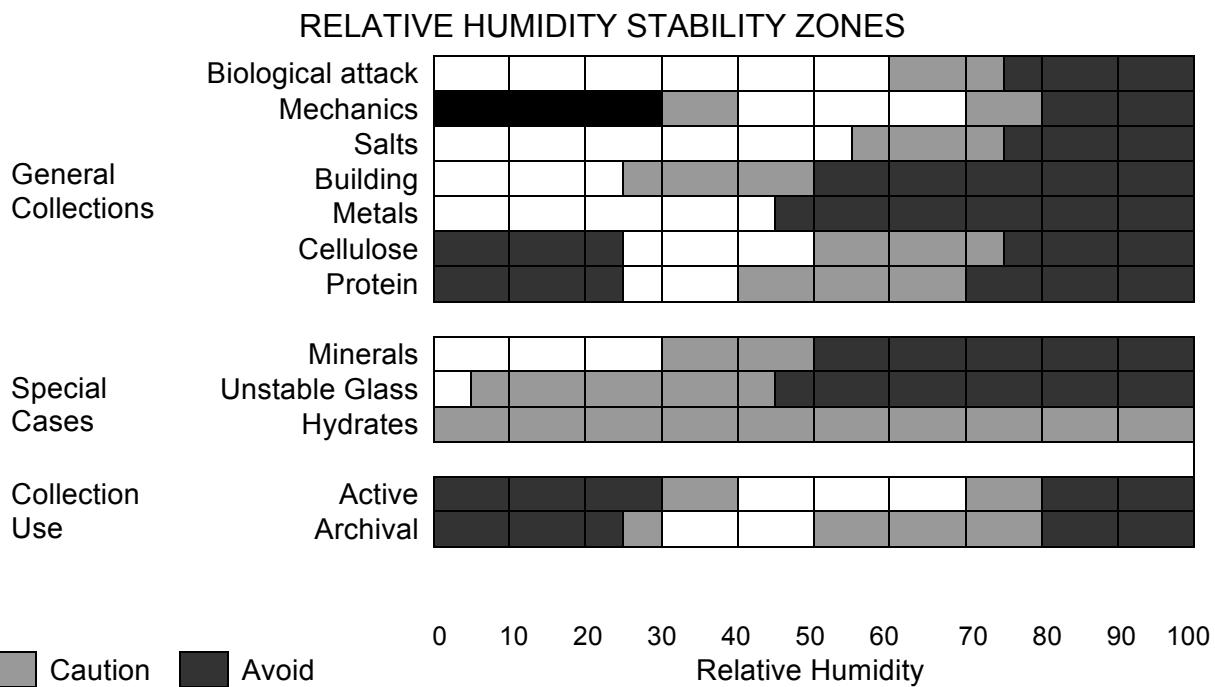
paramount rather than the actual value. Temperatures that fall in a range below 72° F and above freezing are acceptable provided the relative humidity is controlled.

Each degree the temperature is lowered (under stable relative humidity conditions) will slow the rate of deterioration of collection materials. The conservation profession recommends conditions that provide a stable relative humidity in a range falling below 50% and above 25% and a temperature in a range falling below 72° F and above freezing. Above 50% RH, mold and mildew can form, and below 25% RH serious dehydration of organic materials will occur. Above 72° F, some materials begin to soften and flow, and near 32° F, materials containing water begin to freeze and expand. Although most may think museums require a rigid RH of 50%  $\pm$  5% for their collections, the Stephens Museum collections would be safe at other RH levels as long as they are between 55 and 35% and are as stable as possible. In order to provide consistency and a minimum of fluctuation, some lenders may still require an RH of 50%  $\pm$  5%.

Clearly established environmental conditions should be selected by the University's staff as targets for environmental control. It is recommended that a set of summer and winter temperature and relative humidity ranges be selected that are realistically achievable with existing equipment. Potential problems with the building envelope should be taken into consideration when setting the temperature and relative humidity levels. It is important that fluctuations within the established ranges should be as gradual as possible to prevent damage or deterioration to the building or the collections. Statistics from local weather bureaus or airports will make selecting environmental goals for institutions more reasonable. These standards should be used to adjust and maintain environmental controls. The following table may be useful in determining RH levels that are suitable for the [REDACTED] Museum.

Often institutions operate their HVAC systems at a different set of conditions for the overnight hours than for the daytime hours or cut back heating or cooling during summer and break periods. This practice of cutting back on heating and cooling during the night or off seasons is seen as a means to reduce energy consumption costs. This practice can create an additional daily fluctuation in the relative humidity that can be as much as thirty percent over a six-hour period. These drastic daily swings in relative humidity are extremely harmful to the collection materials, particularly those that are organic in origin. Seasonal cutbacks in HVAC systems can cause dangerous conditions for the survival of collection materials. These cutbacks should be reconsidered for collection exhibit, use, and storage areas.

According to the pre-survey questionnaire, the staff does not believe the HVAC systems for the Museum building are working properly. Current mold problems and readings taken during the site visit confirm this belief. The main air conditioning and air handling systems for the Hall are in cutback mode for the summer. This makes it impossible to maintain adequate environmental conditions within the Museum spaces.



From: Erhardt, David and Marion Mecklenburg. "Relative Humidity Re-Examined." *Preventive Conservation: Practice, Theory and Research*. Edited by Ashok Roy and Perry Smith. London: International Institute for Conservation of Historic and Artistic Works, 1994.

An attempt has been made to use a portable room dehumidifier in the most affected room, but with no way to remove water from the dehumidifier reservoir overnight, the staff has to turn the unit off except for the few times each week that the Museum is open and or occupied. This valiant effort has possibly exacerbated the situation. Mold and delamination remain a serious threat to parts of the collections.

There is a VAV HVAC system for the building. The assessor was told that the system is operated with 100% outside air intake, which, if true, means that no conditioned inside air is re-conditioned and re-circulated and that 100% hot, humid outside air is being conditioned by the marginal HVAC system for this building that has been placed in a cutback mode for the summer.

Because of the configuration of the HVAC system for [REDACTED] Hall, either the air conditioning (cooling) system is on or the heating system is on, never both at the same time. So, if dehumidification is needed in the winter months or if humidification is ever needed in the summer months, the system cannot provide it.

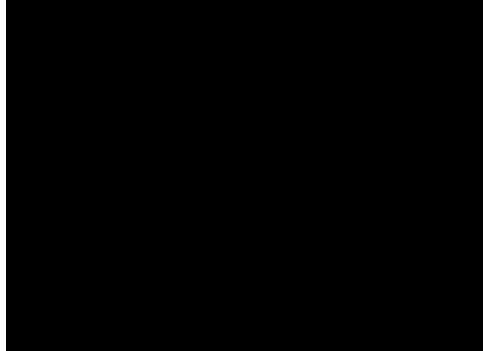
There is no humidity control other than the dehumidification provided by the air conditioning system in the summer months. Currently, the building is in cutback mode so the only conditioning for the interior air in the [REDACTED] Museum is provided by the dehumidification provided by room units when they are turned on during occupancy and the individual room units mounted beneath the windows. Condensation on the chill



water lines in these units is apparently reintroducing water vapor into the chilled air before it is returned to the Museum spaces raising the relative humidity to dangerous levels that have encouraged the growth of active mold on the mounted specimens and is contributing to the de-lamination of portions of the mounts, particularly the antlers on several specimens. There is no humidification in the winter months. The system is controlled by an Andover Controls electronic facilities management

system with full in-house programming and data acquisition capabilities. It is not clear when the sensors that control the system were last calibrated for accuracy and functionality.

[REDACTED] indicated that the environmental conditions needed for the Museum collection could not be reasonably achieved in the current location.



During the site visit temperature readings throughout the Museum ranged from 71 to 75 degrees Fahrenheit. The Relative Humidity ranged from 59% to 68%, well over recommended levels for all materials. If the collection will remain in this location, it is recommended that a year's worth of temperature and relative humidity data be collected through the use of in-room recording devices so that the trends in the actual ambient environmental conditions for the [REDACTED] Museum collections can be charted over all four seasons. Based on the information gained from this study, recommendations could be made to improve environmental conditions for permanent use of this space.

If the potential to move the collection to a newly renovated location comes to fruition, the new systems for the new location should be designed to provide the recommended environmental conditions for the collection. If this is the case, efforts to stabilize the Relative Humidity in the current location should be pursued as a temporary measure as soon as possible. [REDACTED] have indicated that they could facilitate drainage for the dehumidifier in the Museum by running a drain line from the unit to nearby plumbing that would allow it to remain on all of the time. Additional dehumidifiers could be purchased for the other rooms and, if possible, the summer set backs on the HVAC system for [REDACTED] Hall could be relaxed as a temporary measure to protect the collection.

As discussed above, regular environmental monitoring should be performed throughout all the spaces in the buildings where collections are held. Trend logs should be created for the period of at least one year and consultants should be engaged after this time to evaluate the environmental data collected and recommend actions to remediate any problems.

#### Temperature and Relative Humidity Recommendations:

- Purchase recording environmental equipment and monitor the temperature and relative humidity in the [REDACTED] Museum for a period of one year unless it is determined that this is a temporary location for the Museum and collection.
- Investigate and select methods to bring the [REDACTED] Museum environmental conditions into line with recommended temperature and relative humidity levels for collection preservation in the current location if it will be the location for the Museum and collection for any length of time or permanently.
- Design the HVAC systems for the potential new location for the museum to provide proper environmental conditions for the collections.
- Calibrate the sensors that drive the HVAC system at least once a year with an independent monitoring device.

#### Pollutants and Particulates

Pollutants can have a significant effect on certain collection materials. For example, sulfurous gases from combustion of fossil fuels are the primary cause of tarnish on silver and are also attributed to the onset of red rot in book leathers. Other gases that can harm collections include nitrogen dioxide, ozone, and chlorine gases. Cigarette smoke and car and bus exhaust can be a significant source of several of these gasses.

Dust inside the Museum is also an air-borne particulate that may be a problem for collections that are not covered or routinely dusted. Dust attracts moisture and pests, and as a result can contribute to the corrosion and deterioration of the collection.

Objects in storage should be covered whenever possible with cloth dust covers while objects on exhibit should be dusted regularly.

Interior pollution can be caused by the use of materials such as rubber-based floor pads, plywood, new carpet, paint, and cleaning materials. Before any modifications or new construction is planned, give careful thought to pollutants produced by case and interior construction materials. Potential hazards for archival collections associated with construction materials are discussed in more detail in the sections on storage and exhibition.

#### Pollutants and Particulate Recommendations:

- We recommend all objects in storage be covered whenever possible to prevent dust accumulation.
- Before any more new furniture or modifications to old furniture or new construction is planned, give careful thought to pollutants produced by case and interior construction materials such as plywood, oak, and glues and paints.

#### Lighting and Illumination

Exposure to visible and ultraviolet illumination is a significant factor in the survival of museum and archival collections. All wavelengths of radiation provide energy for deterioration reactions that degrade materials. Damage from visible and ultraviolet radiation is cumulative; it cannot be reversed or repaired through periods of reduced exposure. It is important to limit the **levels** (foot-candles or lux), **types** (visible or ultraviolet), and **length of exposure** (minutes/days of illumination) to visible and ultraviolet radiation.

Studies show the healthy human eye requires only 2 foot-candles of illumination to discern color. This indicates that one requires less light to accurately see artifacts than believed. There are many alternative methods that may be used to produce the effect of increased illumination without actually increasing the foot-candles. For example, when entryways are more dimly lit than the adjacent gallery areas, the galleries are perceived as being more brightly lit. When artifacts are illuminated on darker walls or backgrounds, they are perceived as being more dramatically lighted, without the need for additional illumination. The levels of illumination in surrounding spaces have an impact on those areas where artifacts are exhibited.

The generally accepted levels of visible illumination for historic and artistic collections ranges from 2-5 foot-candles (20-50 lux) for light sensitive materials to 30-50 foot-candles (300-500 lux) for materials not so light sensitive. Very few materials should be exposed to levels of illumination about 50-60 foot-candles (500-600 lux). Because ultraviolet light is the most damaging to works of art and is not required to see objects, it should be reduced to the lowest extent possible. Ultraviolet light levels should be kept below 75 microwatts per lumen ( $\mu\text{w/l}$ ) of visible light and  $20\text{mW/M}^2$ .

Illumination in storage areas should always be occupant activated. Where incandescent light fixtures are used, they should be of the lowest wattage possible and should be well ventilated to carry away the excessive heat they generate. All lighting in storage that produces ultraviolet light (daylight, fluorescent tubes, incandescent bulbs, etc.) should be filtered for ultraviolet emissions. The emission spectrum is available from the manufacturer of each lamp used. The spectrum indicates the amount of light emitted in each wavelength range (UV, IR, visible) for the bulb in question. This information will help in selecting lower wattage lamps for display cases. Illumination from windows should be blocked out in all storage areas.

In exhibit spaces, a variety of lighting fixtures are available. Many produce both visible and ultraviolet radiation, as well as heat. They should be filtered for ultraviolet emissions, vented for heat dissipation, and used at the lowest visible light levels possible. The use of passive methods or the reduction of light exposure is recommended where possible, as well as the use of moderated light transitions and contrasts to reduce the appearance of dark and light areas.



The primary light source for the [REDACTED] Museum space is fluorescent light. The lights inside the rooms are turned on during hours when the [REDACTED] Museum is open and only when people are present.

During the site visit, light levels were randomly checked throughout the Stephens Museum with a Littlemore Scientific ELSEC 764 light meter. UV light readings varied from 8 to 0  $\mu\text{w/l}$ , indicating that the UV filtration covers on the fluorescent tubes are successfully filtering the UV light. The roller shades on the windows are also successfully blocking out the UV radiation from natural sunlight. Visible light readings varied from 40 to just over 60 foot-candles, slightly over the recommended levels for stable materials and well over the recommended levels for sensitive materials.

#### Lighting and Illumination Recommendations:

- The [REDACTED] Museum should borrow a full spectrum light meter to monitor light levels. Regular monitoring of both visible and UV light levels should be performed on a quarterly or biannual basis.
- The [REDACTED] Museum spaces are illuminated with excessive levels of visible light. Efforts should be made to reduce the ambient visible light levels in these spaces and to reduce the time period of exposure. Levels can be reduced by

reducing the number of lighting fixtures used and by reducing the output of the lamps and tubes used or filtering illumination from the lamp bulbs or tubes.

## Pest Control

One of the significant threats to a collection is pest infestation. To prevent pest infestation, each institution should adopt a standard Integrated Pest Management program (IPM). An IPM program involves the use of passive methods to control pest infestation. This method of pest control was developed after many people realized that years of toxic pesticides around the perimeter of rooms were not *actually* controlling pest problems. A staff member coordinates the IPM program with an outside pest control firm, contracted by the institution. The goal of an IPM program is to control the sources of pest attraction in order to prevent the presence of pests rather than using pesticides to try and eradicate the problem. An IPM program includes four basic steps: prevent, monitor, identify, and control.

### *Prevent*

The single and most important step to any IPM program is **prevention**. The goal is to minimize and eliminate the sources that pests need to live. In order to prevent pests from entering your building and collection you must eliminate what is drawing them to the area. The first task is to block all entry routes into the area. Examine the exterior and interior of the building looking for cracks and/or holes in the building structure, and gaps around windows and doors. When located, these areas should be filled to prevent pests from entering the building. Do not overlook the building's plumbing or drains, especially drains rarely or never used. Pests are able to enter structures through basement drains and little used plumbing. Also take notice of water sources around the exterior; identify leaks and/or condensation around plumbing, windows, or climate control equipment; and dispose of unnecessary vegetation and trash from around the exterior and inside the building. Removing trash and debris on a regular basis helps to reduce the resources pests need for nesting.

If your institution has acquired a new item for your collection be sure to isolate it before making a permanent home for it in storage. When isolating the object be sure to look for ongoing pest infestations or evidence of previous infestations. If an infestation is noticed, take the accepted steps in eradicating the problem.

### *Monitor*

The cheapest and easiest way to monitor for pest infestations is to simply look. A regular and systematic monitoring system should be created to protect our cultural heritage. By regularly and diligently looking for pests, an individual trained to recognize signs of pests will recognize out-of-place matter such as termite wings, frass, fresh exit holes, the cast skins of dermestid beetles, rodents, cockroaches, and insect bodies or body parts.

In addition to looking for pest infestation, you should select a type of trap for your IPM program. The most common trap used today in pest control is the “sticky” trap. Sticky traps are inexpensive and easy to conceal. The sticky glue is capable of immobilizing any flying or crawling bug that touches them. Use a map of your building to choose locations throughout to place the traps. Traps should be placed in each corner of every room and more should be placed within large spaces. Do not forget to place traps in attics, basements, and any other area that may attract pest activity. Once the trap locations have been determined, number, date, and place the traps.

When you have all the sticky traps in place, develop a regular monitoring schedule to monitor the traps once a month. Using a pest logbook, record and quantify the catches on each trap. The logbook will keep a record of which traps see the most pest activity throughout the year or during the seasons.

#### *Identify*

Once you have recorded pest activity in the logbook, identify the type and life stage of each pest. Common damaging pests found in collections are: silverfish, book lice, termites, clothes moths, and beetles. These insects prefer warm, dark, humid environments. There are many references to use to identify these pests. Your pest control contractor, county extension agent, or one of the faculty members can help.

#### *Control*

The final step in a successful Integrated Pest Management program is control. If an infestation is discovered and the pest is identified, a treatment plan can be created to specifically target that pest. There is a variety of treatment methods designed to eradicate pests in collections. Passive methods include caulking around windows and doors, filling all cracks and holes in the building, placing traps on drain pipes, maintaining a clean structure, preventing nest building, and other methods.

Pest infestations can also be controlled with inert methods such as spraying a silica aerosol around the edges of the room. The tiny, sharp silica crystals get stuck on the insect's legs, that the insect ingests when they clean themselves. They can also become lodged in the insect exoskeleton as they travel across the sprayed area. These sharp crystals kill the insects.

Freezing is a way of treating infested objects. This method is attractive to museums and libraries because it does not damage most objects, involve harsh chemicals, and can be carried out in a freezer. The freezer must not be “frost-free” as these freezers run cycling temperatures that defrost ice by raising and lowering the temperature. Freezing temperatures should reach -20°F or lower within 8 hours. The cycle should be repeated at least twice. (<http://museumpests.net/solutions-fact-sheets/solutions-low-temperature-treatment/>)

University has the means to perform cryogenic pest control on items small enough to fit into the freezer chamber.

There are many methods for controlling pests in your institution. Other treatments include baiting, anoxia, and pesticides. If evidence of a pest infestation is found in your institution, contact a conservator to determine the best method of treatment.

A formal written IPM program should include simple practical elements such as:

Maintain a stable environment with good and regular housekeeping. All spaces should be included, even those not in regular use like attics, basements, mechanical rooms, and storage areas.

The removal of all extraneous materials from buildings and grounds (i.e. trash, recycling bins, stored paper products, excess storage materials, cardboard boxes, unused equipment, and vehicles). These items provide attractive living and hiding places for pest. They are more often contaminated before they are brought into spaces. These materials should be stored in buildings or locations where collections are not present.

Foodstuffs brought into the building should be in plastic or metal containers and in sealed bottles. Trashcans used to dispose of food products should be labeled as such and have tight fitting lids. They should be emptied daily so no open food products will be left overnight. With regard to food related events, consumption and preparation areas should be limited to specific spaces with housekeeping immediately following. Coffee "stations" should be centralized and not established in each office or work area. If care is exercised, coffee and other drinks may be permitted in office areas, provided drink containers are returned to designated food areas for cleaning and storage or removed from the building each evening.

It is important to keep the exterior perimeter of the building and all associated structures clean of bushes, plantings, trash, and debris. Items close to the perimeter provide safe havens for pests trying to enter the building.

Ensure all holes to the exterior of the building are sealed, especially spaces around windows and doors. Windows and doors should have gaskets around the entire perimeter of the opening, and doors fitted with sweeps. Also seal pipe, electrical conduit, and HVAC duct passage holes. The traps of all unused plumbing fixtures, such as sinks and drains, should be kept filled or removed and capped to prevent gaseous and pest infiltration through dry pipes.

Live plants should be avoided in the building and the use of cut flower arrangements should be minimized or eliminated. Plants and flowers are a source of pest infestations and are difficult to treat or sterilize prior to their entrance into a space.

Maintain a close relationship with a pest control contractor or entomology faculty. A series of traps should be set up to catch pests that are present, and ask the contractor

to identify the pests found. It is important to ask for details of pest patterns and pest activities of those pests found in the traps, as well as detailed information about recommended treatments.

Assign a staff member to develop and implement a monitoring program with the pest control contractor. Pest activity should be regularly monitored. If any increase in the number of trapped pests is noticed, immediately search the surrounding areas to determine the source of attraction. Remove the attractants and closely monitor the area to ensure pest decline.

Cap all unused plumbing.

According to the pre-assessment questionnaire, the [REDACTED] Museum does routinely inspect for pest evidence or activity, but there does not appear to be fully integrated pest management program. Collection areas are routinely sprayed with pesticides for pest control.

#### Potential Pest Infestation

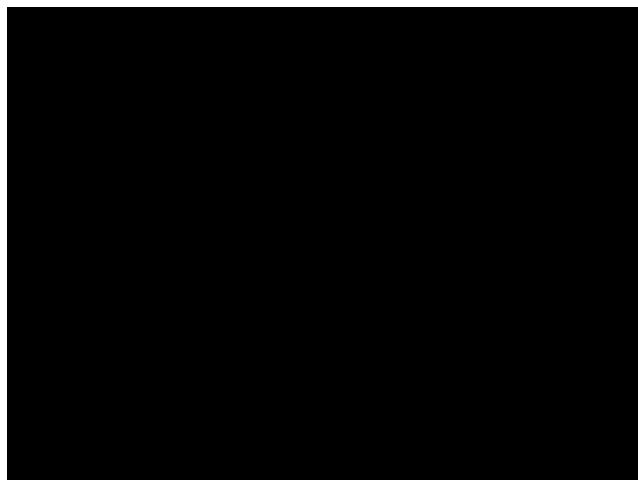
There is a strong chance that one or more of the mounted mammal specimens are contaminated with dermestids, carpet beetles, or moths. Questionable specimens should be bagged and watched for a period of time for pest activity. If insects or evidence of their presence is found, have the insects or evidence identified by an entomologist so that the best prevention strategy can be planned. The pieces that can fit into the freezer chamber on campus can be treated through a double freeze and thaw cycle. Pieces too large for the chamber will need to be treated by an alternative method such as anoxia.

The green wool baize covering the bottoms of the cases may well be an attractant for insects. It should be removed and replaced with a synthetic (polyester, polypropylene, or polyethylene) felt or another inert material. See the exhibit section for discussion of safe exhibit materials.

#### Mold Outbreak

It is also noted that there is mold present on several of the mounted mammal specimens. The mold infestation appears to have been a result of drastic fluctuations and very high relative humidity during the recent replacement of the windows in the building. Because of continued high relative humidity levels the infestation has remained a problem. Mold grows best in relative humidity levels above 50%, in dark areas, and in areas with still air. Lowering the RH, exposing the mounts to light (UV and/or visual), and ventilating the space with air movement will all help get the problem under control. Alcohol and other chemical such as Thymol (2-isopropyl-5-methylphenol), an ingredient in some Lysol brand products, will kill active mold on contact. Be aware the safety aspects of any solvents or chemical used in the Museum. Mold will continue to be problem until the RH is brought under control.

The high RH caused during the window replacement may have also caused delamination of layers the horn and antlers on several mounts and the mold activity may have contributed to this as well. The damages can be repaired by an experienced taxidermist, but should be done after the RH and mold problems are resolved.



### Screening for Arsenic Compounds

In the past, particularly during the turn of the century, arsenical salts, copper compounds, lead compounds and other toxic materials were used to prepare taxidermy specimens and prevent pest infestation. Of these, the arsenic based materials are of the most concern because of its cumulative nature. The specimens on the Stephens Collection should be tested for the presence of arsenic compounds. If contaminated

objects are found, they should be isolated and not handled by staff, students, or researchers. Test strips for arsenic are available and the testing procedure is not overly complicated. (<http://museumpests.net/solutions-residual-pesticides/>)

### Naphthalene Crystals

Currently there are beakers or jars of naphthalene crystals in hanging in the enclosed cases that house the bird and other specimens. These crystals do not kill pests, they are simply an irritant that may irritate pests and make the local environment less attractive. Unfortunately, they also affect the environment for humans as well and have been associated with both acute and chronic ill effects including lung and nasal issues, anemia, liver damage, cataracts, reproductive effects, and cancer. The crystals should be removed from the museum and safely disposed.

### Pest Control Recommendations

- Maintain a logbook for tracking pest activity. The log will help spot and identify long-term pest infestation trends.
- Clean all rooms on a regular schedule; even those not regularly used such as mechanical rooms and storage areas.
- Encourage the adoption of an Integrated Pest Management program for the [REDACTED] Museum.

- Investigate the suspected insect infestation in the mounts and treat any specimens found to active pest activity.
- Work to control the mold activity through RH control, light exposure, and ventilation, saving solvent and chemical treatment as a last resort and treatment after the environmental conditions are under control.
- Remove the green wool baize fabric in the exhibits.
- The [REDACTED] Collection specimens and ethnographic materials should be screened for the presence of arsenic.
- The naphthalene crystals should be removed from the museum and safely disposed.

## Housekeeping

As the preceding sections indicate, routine housekeeping in and around collection areas is essential to the long-term survival of an institution's collections. Employees that are often the most familiar with the condition of the building's spaces and the collection are those that do the housekeeping. They play a vital role in the prevention of damage to the structure and the institution's collection.

The primary preventive care for a collection is cleaning and housekeeping. In order for the staff to be as effective as possible, we suggest the following:

### Housekeeping Recommendations:

Establish a clear description of the duties of the cleaning staff, whether they are work-study students, curatorial staff, or custodial staff.

Provide training for the staff that clean as their regularly assigned duties. Also provide training in relevant professional collection issues such as artifact handling and emergency response. For example, cleaning in exhibit and storage areas should be discussed with the Curatorial staff to avoid potential damages to the collection objects.

Provide appropriate tools and resources to do the work required. A conservator can screen cleaning products for efficacy and safety.

Frequent oversight should be provided by the Curator.

Establish a system in which cleaning staff report to the Curator with observations or concerns regarding the collection or collection storage space.

## Collections and Collection Policies

The [REDACTED] Museum contains a large number of Natural History and geological specimens. It also has a significant number of historic, artistic, and ethnographic objects and textiles. The collection constitutes an important research and teaching resource for the University and the greater community. There are over 3,000 items in the collection.

According to the pre-visit questionnaire, approximately 80% of the collection is inventoried and 90% is cataloged. The records are kept on index cards and in an Excel© spreadsheet. Copies of the records are kept in several other locations on and off campus. 50 to 60% of the collection has been photographed.

Over time, the entire collection should be inventoried, catalogued, and documented with record photographs or digital images for insurance purposes, research purposes, and to document changes in artifact condition over time. Such photographs and scans not only provide baseline information of condition, but are also necessary if theft or loss occurs.

In general, the [REDACTED] Museum collection is in good to fair condition.

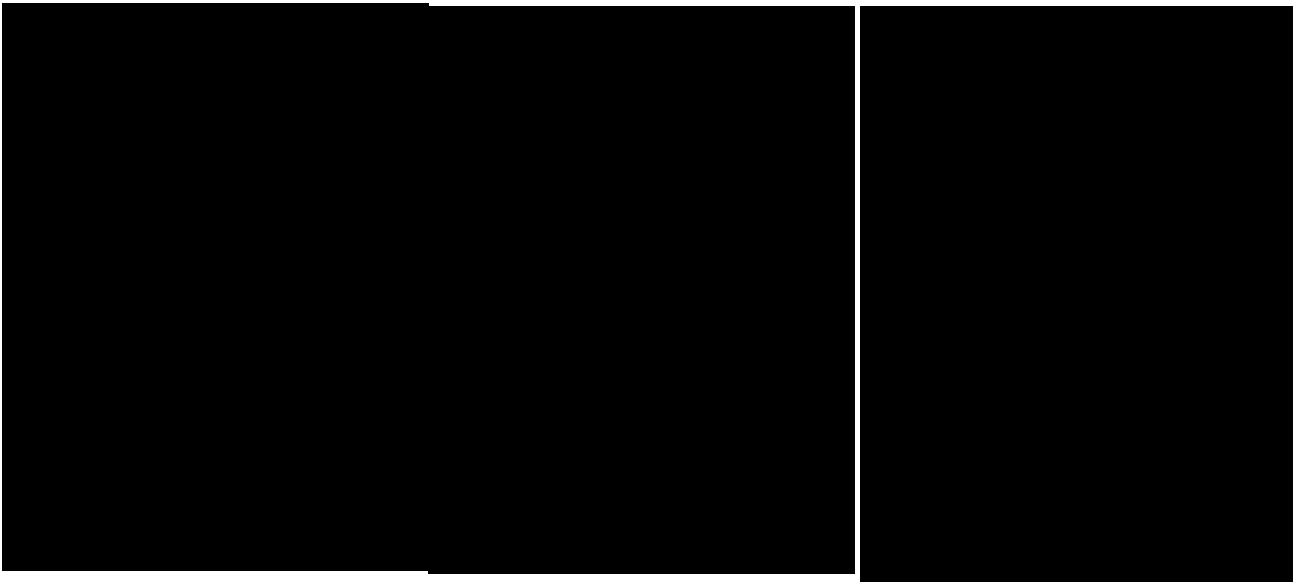
The Museum does not have a Collections Management. A written manual is critical to the management and use of the collection over time. The Manual should include a Collecting Plan that describes the scope and purpose of the collection and what should be considered or not considered for inclusion in the collection. It should also include:

- Smoking policy
- Restriction policies of fragile/vulnerable items
- Care and handling procedures
- Reproduction and intellectual rights policies
- Food and drink policy
- Emergency preparedness plans
- Pest management plan
- A long-range preservation plan
- Security/theft procedures
- Maintenance procedures
- Internal exhibition policies
- Environmental standards
- Loan policies

The assessor strongly recommends that Museum set up a website on which catalogue information and images of items in the collection can be more broadly shared and accessed. This would make it easier and more likely that [REDACTED] faculty, teachers from regional schools, the public and scholars around the world would know about the Museum's holdings and use them for teaching and research purposes.

The pace of the inventory, cataloguing and photography of the collection operation is slowed by the low level of staffing and could be increased by acquiring additional help through grant funding and continued work with students and volunteers. The website could be a project of students in information technology at the University, as could the recording of catalogue information and images.

The [REDACTED] collection of glass invertebrates is an extremely rare and important and should eventually receive conservation attention from a trained and experienced conservator. Individual pieces are very dirty and a few pieces need minor repairs.

A large rectangular area of the page is completely blacked out, indicating that the original content has been redacted for privacy or security reasons.

#### Collections and Collection Policy Recommendations:

- Complete the inventory and cataloguing of the collection.
- Develop a Collections Management Manual by formalizing unwritten policies and procedures and writing those that have not yet been written. Model Manuals are available online from professional organizations and other similar Museums. One or several of these could be copied and customized for the Stephens Museum.
- Carefully prepare a Scope of Collection and Collecting policy for the Museum as part of the Manual.
- Deaccession artifacts and objects that do not meet the Museum's mission and collecting plan and remove them from the building once they are successfully deaccessioned.

- Create record photo-documentation of each object in the collection. Much of this has already been completed and needs to be updated. This is can be long process, so in the meantime, make a photograph record of the objects on exhibit and in storage so the University will have at least some visual record of the collection. Digital scans can suffice as record documentation provided a provision is made for backing up and migrating the digital data to new formats and media over time. Otherwise, even a black and white print made with stable printing methods on stable paper can provide the needed documentation.
- Set up a website for the Museum and share information about the collection electronically.
- Consider planning for conservation of the [REDACTED] collection of glass invertebrates.

## Exhibitions

As with any use of an institution's collection, the use of artifacts for exhibitions presents opportunities for harm to the collections. Exhibition conditions, design features, case designs, and exhibition materials all contribute to damaging artifacts. Overall features of an exhibit such as the length of the show, type of artifacts, or the layout of the exhibit present risks. Long exhibit periods, exhibits of very sensitive objects, and open display layouts where artifacts are accessible to the public, are hazardous. Environmental conditions, lighting, and daily fatigue cycles from turning the lights on and off can create accelerated deterioration of the objects. By choosing appropriate materials, designs and conditions, an institution can reduce damages and better protect its collection. The exhibitions in the [REDACTED] Museum display less than 5% of the collection. Some are permanent exhibits that are found in the public and staff areas of the Museum and others are temporary exhibits that are changed approximately every three months.

The most serious problem noted relating to the exhibit of [REDACTED] Museum at the Museum is the use of non-archival materials in the exhibit displays and the long time period on which the same artifacts are on display.

Many volunteers working to produce displays are not aware of the sensitivity of textile, paper, and other collections to high levels of light, handling, and non archival display materials. By the time the problem is recognized, objects are often permanently faded, embrittled, or structurally damaged. This problem can be reduced by developing a rotation schedule for items on exhibit. For example, many of the photographs on display should be taken off exhibit, choosing instead a few related items. Then, over time, different small groups of related photographs could be exhibited for a few months each. Rare or particularly fragile images can be copied and the copy can be displayed, leaving the originals in safe storage for the future.

Object display methods can also be problematic for the long-term preservation of collections. Mounts should be not only of "safe" materials, but also of a design that provides adequate support, safe installation, safe removal, and adequate protection from handling and access by visitors. Some common problems often seen include:

- use of large tacks, nails, or adhesives to mount objects
- use of nails and wire to mount metal and other objects
- lack of padding in hats, gloves, textiles and other flexible objects
- textiles held with pins or displayed on unpadded hangers
- lack of padding in folded objects such as textiles and leather
- display of objects directly on wooden shelves, without inert isolation layers
- use of dyed wool fabric as a case liner

Items displayed using these techniques are likely to be in danger of permanent damage from display. There are videos and references available online from the Nebraska Educational Television (Saving your Treasures), the Society for the Preservation of Natural History Collections, the American Alliance of Museums and other institutions such as the National Park Service that discuss and illustrate better methods of display.

New exhibition case and mount materials can be a significant source of atmospheric pollution in the environment of the exhibition, and even more so, in the microenvironment of the case. Gaseous products that are produced as glues dry and set, as paints dry, as fabrics age, and as wood products age, are known to cause corrosion and deterioration of collection objects. When any new displays or changes to the exhibits are planned, a materials list should be discussed with a conservator to avoid costly or damaging errors. Old materials should be re-evaluated or different ones substituted as needed.

For example, pressure treated wood contains hazardous salts that could leach into items in physical contact with it and can off-gas volatile chemicals into the atmosphere. Thus, its use should be avoided in a museum context. MEDEX® brand fiberboard is a safer alternative to plywood or pine lumber. Moisture cure polyurethane paints are safer than oil paints, latex paints, or traditional polyurethane paints. Un-dyed natural fiber fabrics like cotton and linen are safe alternatives to dyed fiber blend fabrics, wool, or synthetic materials. Sulfur-containing rubber based carpet pads can cause the tarnishing of silver objects, and deterioration of photographic materials. Non-rubber padding such as polyester felt can prevent this problem.



To mitigate the effects of some of the more hazardous and unavoidable materials in exhibitions, it is advisable to provide the maximum ventilation possible in enclosed exhibit cases if they are used. Ventilation methods, both mechanical and passive may be built into the design of the cases. It would be helpful to discuss materials testing with a conservator prior to construction.

#### Exhibition Recommendations:

- Exhibit methods and materials should be upgraded. All materials used should be acid free and give adequate support to the objects on display.
- Sensitive items such as light sensitive minerals, textiles, photographs, and works of art on paper should be placed on a rotation schedule to minimize light damage from excessive exhibit time.
- Utmost care and current professional standards should be used in the design, materials, and fabrication of object mounts for display.
- A long-range exhibition plan should be formalized into a written plan that can be used for planning purposes and can be used for fundraising and grant writing support

#### Storage

## Short-term and Artifact Preparation

It is important for any collection institution to have a place where materials can be safely held temporarily. There are many uses for such a space. It can provide a buffer area between the public areas of the institution and the permanent storage facility, allowing for careful examination of an artifact to look for pest infestation. New materials coming in to the collection need to be cataloged, measured, numbered, and have baseline photographs taken prior to their movement to a permanent storage location. Artifact care, housing, and research should not take place in the permanent storage area. An area separate from the office or storage areas should be fitted out as a collection preparation area.

The space should have adequate ventilation for numbering, a basic setup for standard record photography, and padded tables for safe object examination, adequate lighting, appropriate archival quality storage units, and controlled and secure access. An isolation area should be provided for the temporary storage of objects suspected of harboring an insect infestation.

According to the pre-visit survey, the [REDACTED] Museum has a separate workroom for receiving and packing collections material, although it does also serve as a part time office space.

## Organization

The most efficient and effective method to organize collection storage is to separate the artifacts into object type (metal, glass, wood, stone, etc.). Storage of collections by object type is appropriate in that it usually makes it possible to store the largest number of objects in a given volume of space. It also provides the greatest protection for the fragile, light objects from the less fragile, heavier materials. All objects should be stored **four to six inches off the floor** at all times to prevent damages from pests, accidental kicking, water damage, etc.

Collection objects should never be stored with non-collection materials. For example, boxes of brochures, office supplies, exhibit props, holiday decorations, gift shop items, packing peanuts, and excess furniture should never be placed in areas where collections are stored and vice versa. This practice is very important for several reasons. Only collection staff should have access to collection storage areas. When these areas are shared, too many people have access to the space to permit an appropriate level of security. Often, a cavalier approach can develop for items that have been stored with unrelated and non-collection materials. This leads to accidental breakage, people taking "cool" items home because they do not know they are part of the collections, and unintentional separation of part or portion of objects from the whole.

Non-collection items can also contaminate or infest the collection when stored together. It is best to completely segregate all collection material and functions from non-collection materials and functions.

### *Housekeeping in Storage*

As noted, housekeeping is an extremely important function. This is especially true in a permanent storage area. Although poor storage conditions can cause very high levels of damage to artifacts over time, it can happen so slowly collections staff may not notice the problem until severity reaches an obvious point. Dirt and dust that are allowed to build up can cause significant harm to objects and dead insects attract scavengers. Enclosed storage furniture, dust covers, or polyethylene sheeting may be used to minimize damage from airborne particulates, soot, leaks, and dust. The storage areas examined in the [REDACTED] Museum seemed clean and maintained although the initial sorting and storage of the collection has not yet been completed leaving a small portion of objects in disarray and ambiguity.

### *Storage Equipment*

Good storage equipment can go a long way towards improving the long-term conditions to which collection artifacts are subjected. Properly configured and fitted storage furniture is instrumental in protecting large numbers of artifacts efficiently. Well-made and well-maintained modular powder coated steel storage units provide maximum flexibility and are the most cost effective for long-term collections storage.

The storage equipment used in the [REDACTED] Museum storage areas consists of a mixture of materials and finishes. Enameled steel, wood, and metal open shelving units are in use. Some of the metal storage units are in satisfactory structural condition. Wooden storage furniture, including original shelves, cabinets, and furniture can be damaging to collection materials. Acids emitted by the wood attack many materials. Oak and cedar are particularly harmful woods. This type of shelving should be properly sealed if it cannot be removed and replaced with more appropriate storage furniture. Alternatively, Microchamber® zeolite-impregnated paper (Conservation Resources International, LLC, Springfield, VA) 4 ply mat board could be purchased and cut to the size of the shelves in order to isolate artifacts from the bare wood, while adsorbing organic acids and other pollutants of Marvel Seal covering could be ironed onto the units to seal out acidic fumes.

The storage furniture currently used in the collection storage areas is functional; however, there is not enough of it to hold the collections. The artifact shelving is crowded. Many artifacts are placed on the floors in the storage areas and lean against the walls without covers or labels. This practice can lead to a casual approach towards the artifacts where they are already vulnerable to being bumped and damaged. If these objects are not accessioned artifacts, they should be removed from collections storage and stored with other non- collections materials.

## *Compacting/High Density Storage*

If the proposed new location for the Museum means that less of the collection will be on display and more will be in storage, the University might consider installing compact, high-density storage shelving for the [REDACTED] Museum collection. This would provide excellent storage furniture and the most efficient use of the space available for the collection.

## *Storage Methods*

One of the easiest and most effective ways to protect collections in storage is to use good storage methods and acid-free, lignin-free packing materials. These methods and materials provide the first line of defense for an object and are essential to its preservation. Conversely, the use of inadequate procedures and inappropriate materials can hasten the deterioration of the same object. Good storage procedures are well documented in standard museum literature and have been taught for many years in museum studies programs. Acid-free cardboard boxes, tissue and mat board, polyethylene and polypropylene foams and bags, and clean unbleached cotton muslin are mainstays used to house collections. Newsprint, acidic tissue, poly-vinyl chloride plastics (old slide pages), acidic cardboard and mat board, and wood should be avoided in storage and exhibit areas.

All three-dimensional objects should be protected from shelving with foam padding or other suitable interleaving materials, and artifacts boxed in acidic cardboard boxes should be re-housed in acid-free boxes and padded with acid-free tissue. If artifacts are not placed in acid-free boxes, the contents of open shelving units should be covered with polyethylene cover and/or unbleached muslin cover to provide protection from dust and water.

Archival and two-dimensional objects should be housed in acid-free, lignin-free mat board, acid-free, lignin-free folders, or framed using acid-free, lignin-free materials. All framed items should be properly mounted on acid-free, lignin-free backboards and D-rings applied to the backs to protect the object from puncture. They should then be secured to walls or storage racks. The two-dimensional objects that have been properly housed should be stored in flat files, file cabinets, open shelf racks (framed items), or on painting racks (framed items).

Because many of the [REDACTED] Museum objects are natural history specimens they will have specific storage, maintenance, and preparation needs. Much information is available in the literature and online that is specific to different Natural History collection types. Specialists in areas such as entomology, geology, and biology, like faculty members at the University will also have a body of knowledge that can be tapped for collections and specimen maintenance and care. I strongly recommend that someone affiliated with the Museum become a member of the Society for the Preservation of Natural History Collections. There is a juried Collections Forum on their website with

access to the bulk of the relevant current literature concerning care of Natural History collections.

### *Collection Storage Security*

Protecting collection artifacts from theft or loss is very important and can be a somewhat daunting task. Because most people working in libraries and archives have a strong sense of responsibility, they are often surprised and dismayed when artifacts go missing. Theft or loss from storage can take months or even years to detect without ongoing inventories. Rigidly enforced security procedures help to develop and maintain an awareness of the physical as well as the cultural value of the collection. In an overcrowded storage area, it is extremely difficult to detect misplaced or missing artifacts. The protection of the collection artifacts may take many forms, from locking doors to escorting visitors or contractors, to maintaining fire detection systems.

Access registers should be placed in all storage and collection locations in the Special Collections. Their use should be instituted to document access to all storage areas by anyone, including staff, students, volunteers, and visiting researchers.

### Storage Recommendations:

- Designated, collection only, storage areas should be established that are secure and climate-controlled.
- All storage furniture should be inert and sound for collection storage and should be at least six inches off the floor for cleaning access and for protection from leaks and floods. All objects in storage should be covered with polyethylene sheeting to protect them from dust or leaks.
- The density of storage can be increased through the use of stacked boxes and more shelves in the units so that all the vertical space can be effectively utilized or through the implementation of the proposed project to provide high density compacting storage for the collection.
- An adequate permanent budget line should be established and maintained to provide for the purchase of acid free materials, photographic supplies, and other items necessary to appropriately care for collection objects, especially the textile collection.
- Remove all non-collections items from collection storage areas.
- Acidic materials should be removed from storage and replaced with archival, acid-free materials.
- All collection items should be re-housed using standard museum storage materials, methods and furniture.

- Access logs should be used to monitor access to all collection storage areas.
- Access literature and expertise through online resources and membership in the Society for the Preservation of Natural History Collections.

## **Security and Safety**

---

The security of the collection is one of the primary goals of any institution concerned with the preservation of cultural materials. Protection of collection objects may take many forms from locking doors to the installation of fire detection systems. The safety of the volunteers and the visiting public is also of paramount importance. In many cases, good security and safety procedures can accomplish both goals.

The [REDACTED] Museum is equipped with locks and an electronic security system that monitors door and window intrusion. Access to the facility is through the use of keys and locks and a security code. Maintenance and other University staff have access.

At present, there is no entry logbook for the Museum exhibit and storage rooms. **Anyone** entering **any** of the rooms should be required to sign in and out every time they enter and indicate the purpose for their visit to the Museum spaces.

Heat-generating devices (like coffee pots, toaster ovens, etc.) are often found throughout work areas and offices in many museums and institutions. Coffee pots, in particular, can be very dangerous and are the cause of many museum and office fires. The number of heat-generating devices should be inventoried and should be reduced to the bare minimum. Staff should check each evening that these devices are in safe condition for use and have been properly turned off and unplugged.

An open flame policy should be adopted by every institution. This policy would require individuals using any kind of open flame in the museum (welding torch, soldering equipment, cooking equipment, etc.) to have an escort to “spot” for sparks and fires.

The collection should be screened for the presence of Arsenic compounds as discussed above.

### **Security and Safety Recommendations:**

- Entry logbooks should be established for each facility with separate logbooks where collection objects are stored.
- Key access to the facilities should be monitored. Keys should periodically be changed and access permitted only for those who require access. Lists of those issued keys should be kept. An open flame policy should be adopted.
- The collection should be screened for the presence of Arsenic.
- An open flame policy should be adopted.

## **Emergency Preparedness**

---

Each institution should have an emergency preparedness plan to deal with personnel and visitor safety, and collection safety in the event of medical, flood, water, or other emergency situations. The emergency preparedness procedures for the protection of the collection should be integrated into other non-collection procedures. Emergency plans are essential to:

- provide for the prevention of damage in the event of a threat;
- provide for the effective rescue of people and artifacts during a threat;
- provide procedures to mitigate continued damages should an emergency occur;
- and help staff return the institution to normal operation after a rescue or mitigation period is over

**Discovery** procedures should inform staff of who to call and what to do when problems are noted. For example, if on a weekend a volunteer finds a huge puddle on the floor in an area where collections are exhibited, who should be called? What should s/he do immediately? What procedure will museum staff follow if there is a problem at the local nuclear power plant? Discovery procedures allow preventive measures to be implemented prior to damage.

If someone discovers that a severe windstorm is approaching, what **preventive** measures can be taken in advance? The plan might suggest covering windows in storage areas and moving objects away from windows. Can these measures be taken permanently? Are the window covers available to protect each window? Are objects routinely stored off the floor? Are valuable pieces of equipment unplugged and covered every night with plastic? Discovery and **preparation plans** for emergencies often indicate daily practices that can save time, worry, and resources in an emergency.

Procedures for the duration of an emergency are often limited to personal protection and safety. However, training and contact with local civil defense personnel, regular inspections, and contact with fire, police, and other civil offices can contribute to a better understanding of the special needs of collections in emergencies.

The response and restoration of operations phases of emergencies involve specialized handling, processing, and treatment procedures. Staff training and strong contacts with local specialists and conservators can make these phases successful. Proper care and handling of accession artifacts after an emergency can help mitigate damage.

Immediate and appropriate responses to a specific type of disaster will ensure the best possible outcome for the collection. Lists of specialists, emergency depots of supplies and equipment, and well-trained staff are essential.

At present, the Museum has a formal emergency preparedness plan that is designed to ensure personal and life safety but it has no plan to ensure the salvage and safety of the Stephens Museum collection. The Museum is not alone - over 80% of the historical and archival collecting institutions in the United States do not have functional

emergency plans of any kind for their collections in place<sup>4</sup>. There are emergency plan models and templates that can be used for the Stephens Museum. They are available through the American Alliance of Museums, the America Association for State and Local History, state museums, and many other organizations.

Emergency Preparedness Recommendations:

- The Museum should develop an emergency preparedness plan for its collection that can be dovetailed with the existing plans for personal and University safety and protection.

---

<sup>4</sup> [\*A Public Trust at Risk: The Heritage Health Index Report on the State of America's Collections\*](#), Heritage Preservation, Inc., Washington, DC, December 2005.

## **SUMMARY OF FINDINGS FROM THE CONSERVATION ASSESSMENT**

The [REDACTED] University [REDACTED] Museum has an important collection of Natural History, cultural and historical materials under its care. It has a dedicated, knowledgeable manager in [REDACTED]. Many suggestions and recommendations have been made in this report with the hope that they will help the University better care and preserve the teaching, research, heritage, and community resource presented by the museum collection. The following items have been selected for consideration as higher priorities for the long-term protection and preservation of the collections.

The most important steps to take to insure the preservation of the [REDACTED] Museum collections are:

1. Relative humidity conditions within the [REDACTED] Museum collection spaces should be controlled to prevent deterioration of the collection through environmental fluctuations and attack by mold and insects.
2. The natural history and ethnographic items of organic material should be tested for the presence of toxic pesticide compounds such as arsenic. These compounds have been used historically to preserve biological materials. Testing is important to assure safe use of the collection for research, study, and display.
3. Complete the inventory, cataloguing, and photo documentation of the collection so that the Museum knows the scope and depth of its holdings. Share inventory, catalog, and photographic information with research communities and the public as soon as possible to increase the relevance of the collection as a research and teaching resource.
4. Include existing policies and procedures and develop new policies and procedures to include in a Collections Management Manual to govern the use and management of the [REDACTED] Museum collection. Most central to this is the development of a written scope of collection and collecting policy.

This report lists many recommendations for the [REDACTED] University [REDACTED] Museum. These recommendations are not intended to overwhelm or discourage the staff of the Museum, but rather as a prioritized reference or tool for the Museum to use in long-term planning for the [REDACTED] Museum. It was a pleasure to meet and work with Dr. [REDACTED] and the many other University representatives including the Dean, the President, Board members, and the Museum Committee. I found the [REDACTED] Museum collection brimming with research, teaching, and outreach potential. The plans to include the Museum in the renovations of the [REDACTED] Hall are very encouraging for the potential to preserve and make better use of the Museum and its collection containing rare and significant items. I look forward to helping in any way I can to facilitate future endeavors to preserve the [REDACTED] University [REDACTED] Museum collections.

## **Recommendations by Section**

---

Key: **S** = short term - 1 to 3 years; **L** = long term - 3+ years

### **General Museum Recommendations**

- An annual budget for [REDACTED] Museum collections care should be developed based on the recommendations in this report. It should include routine collections care supplies and equipment as well as supplies for exhibition, teaching, and outreach use of the collection. **S**
- A long-range preservation and conservation plan should be developed based on the recommendations in this report. **L**

### **Staffing Recommendations**

- The [REDACTED] Museum staff and students should become more involved with professional museum associations to increase their knowledge of collections management and care and to provide more capacity for collections care expertise within the University. **S/L**
- The [REDACTED] Museum staff should look into consulting with nearby colleagues for advice about professional museum collection practices. **S/L**

### **Temperature and Relative Humidity Recommendations**

- Purchase recording environmental equipment and monitor the temperature and relative humidity in the [REDACTED] Museum for a period of one year unless it is determined that this is a temporary location for the Museum and collection. **S/L**
- Investigate and select methods to bring the [REDACTED] Museum environmental conditions into line with recommended temperature and relative humidity levels for collection preservation in the current location if it will be the location for the Museum and collection for any length of time or permanently. **S/L**
- Design the HVAC systems for the potential new location for the museum to provide proper environmental conditions for the collections. **L**
- Calibrate the sensors the drive the HVAC system at least once a year with an independent monitoring device. **S/L**

## **Pollutants and Particulates Recommendations**

- All objects in storage should be covered whenever possible to prevent dust accumulation. **S**
- Before any more new furniture or modifications to old furniture or new construction is planned, give careful thought to pollutants produced by case and interior construction materials such as plywood, oak, and glues and paints. **S/L**

## **Lighting and Illumination Recommendations**

- The [REDACTED] Museum should borrow a full spectrum light meter to monitor light levels. Regular monitoring of both visible and UV light levels should be performed on a quarterly or biannual basis. **S/L**
- The [REDACTED] Museum spaces are illuminated with excessive levels of visible light. Efforts should be made to reduce the ambient visible light levels in these spaces and to reduce the time period of exposure. Levels can be reduced by reducing the number of lighting fixtures used and by reducing the output of the lamps and tubes used or filtering illumination from the lamp bulbs or tubes. **S/L**

## **Pest Control Recommendations**

- Maintain a logbook for tracking pest activity. The log will help spot and identify long-term pest infestation trends. **S/L**
- Clean all rooms on a regular schedule; even those not regularly used such as mechanical rooms and storage areas. **S/L**
- Encourage the adoption of an Integrated Pest Management program for the [REDACTED] Museum. **S/L**
- Investigate the suspected insect infestation in the mounts and treat any specimens found to active pest activity. **S**
- Work to control the mold activity through RH control, light exposure, and ventilation, saving solvent and chemical treatment as a last resort and treatment after the environmental conditions are under control.
- Remove the green wool baize fabric in the exhibits. **S**
- The [REDACTED] Collection specimens and ethnographic materials should be screened for the presence of arsenic. **S**

- The naphthalene crystals should be removed from the museum and safely disposed. **S**

## Housekeeping Recommendations

- Establish a clear description of the duties of the cleaning staff. **S**
- Provide training for the cleaning staff in their regularly assigned duties. Also provide training in relevant professional collection issues such as artifact handling and emergency response. For example, cleaning in exhibit and storage areas should be discussed with the Curatorial staff to avoid potential damages to the collection objects. **S/L**
- Provide appropriate tools and resources to do the work required. A conservator can screen cleaning products for efficacy and safety. **S**
- Frequent oversight should be provided by collections staff. **S/L**
- Establish a system in which cleaning staff report to a senior staff member with observations or concerns regarding the collection or collection storage space. **S/L**

## Collection and Collection Policies Recommendations

- Complete the inventory and cataloguing of the collection. **L**
- Develop a Collections Management Manual by formalizing unwritten policies and procedures and writing those that have not yet been written. Model Manuals are available online from professional organizations and other similar Museums. One or several of these could be copied and customized for the Stephens Museum. **S**
- Carefully prepare a Scope of Collection and Collecting policy for the Museum as part of the Manual. **S**
- Deaccession artifacts and objects that do not meet the Museum's mission and collecting plan and remove them from the building once they are successfully deaccessioned. **L**
- Create record photo-documentation of each object in the collection. Much of this has already been completed and needs to be updated. This is can be long process, so in the meantime, make a photograph record of the objects on exhibit and in storage so the University will have at least some visual record of the collection. Digital scans can suffice as record documentation provided a provision is made for backing up and migrating the digital data to new formats and media

over time. Otherwise, even a black and white print made with stable printing methods on stable paper can provide the needed documentation. **S/L**

- Set up a website for the Museum and share information about the collection electronically. **S**
- Consider planning for conservation of the [REDACTED] collection of glass invertebrates. **S/L**

## **Exhibitions Recommendations**

- Exhibit methods and materials should be upgraded. All materials used should be acid free and give adequate support to the objects on display. **S/L**
- Sensitive items such as textiles, photographs, and works of art on paper should be placed on a rotation schedule to minimize light damage from excessive exhibit time. **S/L**
- Utmost care and current professional standards should be used in the design, materials, and fabrication of object mounts for display. **S/L**
- A long-range exhibition plan should be formalized into a written plan that can be used for planning purposes and can be used for fundraising and grant writing support. **S/L**

## **Storage Recommendations**

- Designated, collection only, storage areas should be established that are secure and climate-controlled. **L**
- All storage furniture should be inert and sound for collection storage and should be at least six inches off the floor for cleaning access and for protection from leaks and floods. All objects in storage should be covered with polyethylene sheeting to protect them from dust or leaks. **L**
- The density of storage can be increased through the use of stacked boxes and more shelves in the units so that all the vertical space can be effectively utilized or through the implementation of the proposed project to provide high density compacting storage for the collection. **S/L**
- An adequate permanent budget line should be established and maintained to provide for the purchase of acid free materials, photographic supplies, and other items necessary to appropriately care for collection objects, especially the textile collection. **S**

- Remove all non-collections items from collection storage areas. **S**
- Acidic materials should be removed from storage and replaced with archival, acid-free materials. **S/L**
- All collection items should be re-housed using standard museum storage materials, methods, and furniture. **L**
- Access logs should be used to monitor access to all collection storage areas. **S**
- Access literature and expertise through online resources and membership in the Society for the Preservation of Natural History Collections. **S/L**

### **Security and Safety Recommendations**

- Entry logbooks should be established for each facility with separate logbooks where collection objects are stored. **S**
- Key access to the facilities should be monitored. Keys should periodically be changed and access permitted only for those who require access. Lists of those issued keys should be kept. **S**
- An open flame policy should be adopted. **S**
- The collection should be screened for the presence of Arsenic. **S**

### **Emergency Preparedness Recommendations**

- The Museum should develop an emergency preparedness plan for its collection that can be dovetailed with the existing plans for personal and University safety and protection. **S/L**