BUILDING ORGANIZATIONAL CAPACITY FOR PREVENTIVE CONSERVATION

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CHAPTER 1: PREVENTIVE CONSERVATION IN CONTEXT

To enable the long-term preservation of heritage resources, stewards and advocates strive to protect the significant fabric and cultural integrity of our historic sites. Inherent in preserving are the concepts of maintaining, sustaining, and enduring which are manifested in proactive and preventive strategies. In practice, however, preservation is not always synonymous with proactive care. In advocacy, preservation is often coincident with 'saving' places when advocates devote substantive effort to resource protection under threat of demolition. In historic site management, preservation often applies to extensive capital interventions to repair long-standing issues within the context of a discrete project. The tendency toward reactive preservation is explained by incredible backlogs of needed maintenance. However, when reactive maintenance takes precedence over nonemergent, regular maintenance, the backlog of building issues continues to grow. To manage and preempt the maintenance backlog, a proactive philosophy for preservation, termed "preventive conservation," is needed. Stewards implementing preventive conservation devote daily attention to historic resources and address the root causes of deterioration to mitigate future damaging environments thereby preserving more of the original fabric at a lower cost.

The call for stewards and advocates to adopt preventive conservation is not a wholly contemporary issue. As early as 1877, William Morris of the Society for the Protection of Ancient Buildings (SPAB) pleaded with his colleagues to provide incremental care:

> It is for all these buildings, therefore, of all times and styles, that we plead, and call upon those who have to deal with them, to put Protection in the place of Restoration, to stave off decay by daily care, to prop a perilous wall or mend a leaky roof. . . . Thus, and thus only can we protect our ancient buildings, and

> hand them down instructive and venerable to those that come after us.[1]

Despite the long-standing call for preventive conservation, stewards of historic sites remain challenged to embrace a proactive philosophy. Of sixty historic sites in the United States surveyed in 2008, only one-third reported use of a plan for preventive conservation despite an overwhelming 83% that reported a maintenance backlog.[2] In the competition between preventive conservation and operational needs such as visitor programming, the operational needs appear to dominate across historic sites. This raises a critical question: how can organizations build sufficient capacity for successful implementation of preventive conservation?

1.1 Literature Review

Though Morris was among the early advocates for "daily care" of historic buildings, his theories were preceded by those of John Ruskin in 1849. Ruskin firmly believed that to restore was to destroy and was a staunch advocate for preservation over restoration. Referring to the perceived need for restoration, Ruskin wrote, "And look that necessity in the face before it comes, and you may prevent it. . . . Take proper care of your monuments, and you will not need to restore them."[3] Though the pleas of Ruskin and Morris resonate with contemporary issues, they failed to gain momentum in the nineteenth and twentieth centuries. The idea of a proactive philosophy for building preservation was absent from literature until the 1980s when

[1] William Morris, "The Society for the Protection of Ancient Buildings Manifesto (1877)," in *Historical Perspectives on Preventive Conservation*, ed. Sarah Staniforth (Los Angeles: Getty Conservation Institute, 2013), 8-9.
[2] Alice Louise Finke, "Implementing Preventive Architectural Conservation: Do Historic Property Stewards in the United States Possess the Tools to Meet the Challenge?" (University of Pennsylvania, 2008), 88-90.
[3] John Ruskin, "The Lamp of Memory (1849)," in *Historical Perspectives on Preventive Conservation*, ed. Sarah Staniforth (Los Angeles: Getty Conservation Institute, 2013), 3.

the term "preventive conservation" was first recognized by the field.[4] The term is applied to the care of both collections and historic sites, in which case it is sometimes called "preventive architectural conservation." However, unless stated otherwise, the term "preventive conservation" applies only to historic buildings and sites in this thesis.

Throughout most of the twentieth century, dialogue surrounding preventive conservation of collections eclipsed that of historic buildings. Some literature on preventive care of historic buildings emerged in the 1990s, then took off in the early 2000s with increasing attention from European universities and research institutions. Critical to this movement was the University of the West of England, English Heritage, and Maintain our Heritage (also a British organization). In addition, Katholieke Universiteit Leuven (KU Leuven) in Belgium served as the hub of research activity for preventive conservation of historic structures, often contributing to many international research efforts. Recent efforts were catalyzed and accelerated when UNESCO appointed Koenraad Van Balen of KU Leuven as the chair of Preventive Conservation, Monitoring and Maintenance of Monuments and Sites (PRECOM^{3}OS) in 2009.[5] The founding of PRECOM^{3}OS not only increased the volume of literature surrounding preventive conservation, but also catalyzed a thematic shift in scholarship. In the early 2000s, authors focused on technical solutions for preventive care of historic fabric while emphasizing the perspective of owners and property managers. Additionally, some authors discussed the economic impact of

[4] Sarah Staniforth, *Historical Perspectives on Preventive Conservation* (Los Angeles: Getty Conservation Institute, 2013), 15.
[5] "Unesco Precomos Chair," KU Leuven, accessed December 7, 2017, https://set.kuleuven.be/rlicc/research/precomos/unesco-precomos-chair.

preventive conservation and the potential for strategic planning and policy at the municipal and national levels.[6]

As dialogue surrounding preventive conservation continued to gain traction, authors tended to approach the subject through literature reviews to consolidate historic sources with those from the late-twentieth century. Notable scholarship incorporated qualitative research methods, such as the 2006 report by Nigel Dann, Sarah Hills, and Derek Worthing of the University of the West of England and the 2008 thesis by Alice Sloan (née Finke) of the University of Pennsylvania. Both collected data on the current management strategies employed by stewards of historic sites and drew conclusions about the barriers to and successful strategies for implementing preventive conservation. Dann, Hills, and Worthing surveyed and interviewed organizations responsible for the stewardship of heritage sites in England and concluded that efficiency, as opposed to conservation principles, tends to drive maintenance strategies.[7] Sloan provided the American perspective by surveying over sixty historic sites to characterize the state of implementation of preventive conservation in the United States, considering factors such as staff composition, expertise, professional collaboration, and funding.[8] Sloan authored one of the few American works addressing the distinct intersection of preventive conservation, historic buildings, and site management.

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[6] Nigel Dann and Sue Wood, "Tensions and Omissions in Maintenance Management Advice for Historic Buildings," *Structural Survey* 22, no. 3 (July 2004): 144, https://doi.org/10.1108/02630800410549035; "Putting It off: How Lack of Maintenance Fails Our Heritage" (Bath, England: Maintain Our Heritage, 2004), 5.

[7] Nigel Dann, Sarah Hills, and Derek Worthing, "Assessing How Organizations Approach the Maintenance Management of Listed Buildings," *Construction Management and Economics* 24, no. 1 (January 2006): 103, https://doi.org/10.1080/01446190500249510.

[8] Finke, "Implementing Preventive Architectural Conservation," 14.

After the founding of PRECOM^{3}OS in 2009, there was a thematic shift in literature toward a more holistic definition of preventive conservation. KU Leuven mobilized a research effort that promotes ongoing maintenance within a social context while emphasizing broader applications of preventive conservation to a stock of buildings, rather than individual sites. For example, previous authors advocated for preventive conservation as a cost-effective means of preserving original fabric. Recently, authors like Stefano Della Torre of Politecnico Milano expanded the impact of preventive conservation to include stakeholders: "planned conservation practices should introduce a systemic approach to decision-making and values appraisal, giving the utmost importance to involvement of people and opportunities for education and capacity-building."[9] Van Balen furthers this notion, emphasizing the ability of preventive conservation to "empower society at large to take care of its heritage by maintaining it."[10] By broadening the definition of preventive conservation to include skills outside of traditional conservation practices, Van Balen argues that stewardship responsibilities are more widely distributed therefore increasing the likelihood that heritage resources will be preserved in perpetuity. Though in a nascent stage, authors like Della Torre and Van Balen assessed pilot programs as case studies to demonstrate the possible social application and impact of preventive conservation.[11]

[9] Stefano Della Torre, "Shaping Tools for Built Heritage Conservation: From Architectural Design to Program and Management," in *Community Involvement in Heritage*, ed. Koenraad Van Balen and Aziliz Vandesande, 2015, 96.
[10] Koenraad Van Balen, "Preventive Conservation of Historic Buildings," *Restoration of Buildings and Monuments* 21, no. 2–3 (January 1, 2015): 100, https://doi.org/10.1515/rbm-2015-0008.
[11] Della Torre, "Shaping Tools for Built Heritage Conservation," 98; Gabriela Garcia, Fausto Cardoso, and Koenraad Van Balen, "The Challenges of Preventive Conservation Theory Applied to Susudel, Ecuador," in *Community Involvement in Heritage*, ed. Koenraad Van Balen and Aziliz Vandesande, 2015, 123.

1.2 Definitions

Though literature surrounding preventive conservation appears to have surged in recent years, newfound popularity may be explained by slow recognition of "preventive conservation" as the preeminent term. There are many similar terms, often used interchangeably, to describe the principles and actions of preventive conservation. In some cases, professionals may have written about preventive conservation but applied different terminology that may have unintentionally clouded the meaning of their work. For example, the US Army Corps of Engineers published a 1994 report titled "Proactive Maintenance Planning for Historic Buildings." The report refers to "preventive maintenance" and "predictive restoration" to describe actions of the proactive maintenance plan (PMP). The authors describe foundational characteristics of the PMP as follows:

> The premise of proactive maintenance is to prevent deterioration. . . . The term *proactive* means to act in anticipation of an expected event. . . . It incorporates a diverse group of preservation activities to anticipate and avoid the deterioration and failure of building components.[12]

Despite different applied terminology, such definitions embody the proactive qualities and multicomponent implementation of preventive conservation through which stewards address the root cause of deterioration.

The Army Corps report illustrates that across disciplines, terms such as maintenance, preventive maintenance, or conservation are often used synonymously or inconsistently to describe the principles and actions associated with preventive conservation. Each of these terms represents a discrete set of tasks applicable to the preservation of historic buildings, and while

[12] Frederick J. Rushlow and Don Kermath, "Proactive Maintenance Planning for Historic Buildings" (Champaign, IL: U.S. Army Construction Engineering Research Laboratories, 1994), 7.

preventive conservation may incorporate aspects of each, it is critical to recognize the nuanced differences between these related terms.

Review of Terms Used in this Thesis

A survey of commonly used definitions in the fields of historic preservation, facilities management, conservation, and museum studies demonstrated the inconsistency with which terms are applied to similar definitions. As a result of the varied terminology applied across disciplines, this section presents the definitions used in this thesis, informed by the survey of terms presented in Appendix A, and identifies the relationship of each term to preventive conservation.

> **Preventive Conservation:** a proactive, holistic philosophy for building preservation that uses records of frequent condition observations to identify the root causes of deterioration and mitigate the future impact of those causes through direct or indirect intervention to prolong the service life of the historic resource.

Preventive conservation considers not only individual building materials and components, but the "events and environments" that affect them.[13] Through a comprehensive understanding of the systems and factors that influence a building's condition, stewards may implement small, incremental measures to avoid or lessen possible mechanisms of deterioration.[14] Such actions prolong the service life, or the length of time a component can perform its intended function. While implementing preventive conservation may include some of the practices defined as follows, it is distinguished by its proactive, holistic, and minimally interventive approach.

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[13] Jane Merritt and Julie A. Reilly, *Preventive Conservation for Historic House Museums* (Lanham, MD: AltaMira Press, 2010), 13.

[14] "Terminology to Characterize the Conservation of Tangible Cultural Heritage," International Council of Museums - Committee for Conservation, accessed January 21, 2018, http://www.icom-cc.org/242/about/terminology-for-conservation/#.WmTCyainFPY.

> **Conservation:** curative, interventive treatment for building materials that modifies the chemical or physical characteristics of the resource to prolong its service life.

When completed in isolation, conservation treatments may not address the causes of deterioration. After a conservation treatment is applied, the building or object is often subject to the same environment therefore establishing a reactive treatment cycle.[15]

> **Maintenance:** servicing of building components, assemblies, and systems after failure has occurred (synonymous with repair).

Maintenance is a reactive action that occurs after failure. In contrast, preventive conservation aims to limit deterioration or events that result in required maintenance by intervening at the cause of the deteriorative mechanism before failure occurs.

> **Cyclical Maintenance:** routine, schedule maintenance of building components, assemblies, and systems occurring on a predetermined interval to improve performance, extend service life, and preempt failure (synonymous with preventive, planned, or programmed maintenance).

Usage maximums or schedules, typically seasonal or annual, trigger cyclical maintenance actions. Cyclical maintenance serves to stave off repair by intervening when failure is imminent, whereas preventive conservation minimizes damage by addressing the cause of deterioration and failure.

> **Restoration:** interventive treatment applied to return a component, assembly, or system to a known, previously documented state or function, often though the introduction of new materials.

[15] Koenraad Van Balen, "Challenges That Preventive Conservation Poses to the Cultural Heritage Documentation Field," *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* XLII-2/W5 (August 23, 2017): 715, https://doi.org/10.5194/isprs-archives-XLII-2-W5-713-2017.

In contrast, preventive conservation aims to slow or avoid future deterioration and does not always prescribe restoration, unless returning the component to its previous state would prevent further deterioration.

> **Stabilization:** intervention to protect a damaged building component, assembly, or system against further deterioration.

While both stabilization and preventive conservation aim to mitigate mechanisms of future deterioration, stabilization is interventive and reactionary while preventive conservation seeks to address the cause of damage.

Surveyed Definitions of Preventive Conservation

As demonstrated through the survey of terms presented in Appendix A, many definitions of preventive conservation provided by practitioners, stewards, and professional organizations align with the definition of preventive conservation used in this thesis. However, not all practitioners recognize the need for such a term, nor do they apply the term "preventive conservation" to actions that merit its use. Instead, they use terms such as "preventive maintenance" to describe the monitoring, condition assessments, minor maintenance, and anticipatory analysis associated with preventive conservation. For example, English Heritage uses the term "maintenance" to describe a preventive conservation philosophy, while the American Institute for Conservation of Historic and Artistic Works (AIC) applies the term "preventive care."[16] Across disciplines, inconsistent terminology or lack thereof indicates the need for agreement upon a preeminent definition of preventive conservation.

[16] Paul Drury and Anna McPherson, "Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment" (London, England: English Heritage, 2008), 51; "Definitions of Conservation Terminology," AIC: American Institute for Conservation of Historic and Artistic Works, accessed March 14, 2018, https://www.conservation-us.org/about-conservation/definitions#.Wsu3fljwZPY.

The prominence of the work produced by KU Leuven suggests that the PRECOM^{3}OS definition of preventive conservation should be highly distinguishable and widespread. However, few scholars and practitioners refer to PRECOM^{3}OS' three-tiered definition borrowed from preventive medicine:

> **Primary prevention**: means to avoid the causes of the unwanted effect (damage);
>
> **Secondary prevention**: means of monitoring that allow an early detection of the symptoms of the unwanted effects (damage);
>
> **Tertiary prevention**: means that allow avoiding further spread of the unwanted effect (damage) or the generation of new unwanted (side) effects (damage).[17]

The PRECOM^{3}OS definition is significant for its recognition of the limitations of preventive conservation. While preventive conservation ideally addresses the causes of deterioration mechanisms before or at the onset of damage to building components, systems, or assemblies, it is rare that a historic structure is without damage when stewards seek to implement preventive conservation. The tiered structure of the PRECOM^{3}OS definition acknowledges that not all mechanisms of deterioration can be slowed; some necessitate diligent monitoring to mitigate extant damage and control future deterioration. The PRECOM^{3}OS definition can be applied to any historic structure, regardless of extant condition, yet it is rarely used by practitioners outside of PRECOM^{3}OS or KU Leuven.

Toward a Working Definition

While the reason for slow recognition of PRECOM^{3}OS' decade-old definition is unclear, it is possible that the definition follows the phraseology of preventive medicine too closely, limiting its clarity as a result. Yet the tiered-structure is compelling and merits clarification. The

[17] "Unesco Precomos Chair."

following is an adaptation of the PRECOM^{3}OS definition, as interpreted by the author of this thesis, and supplemented by examples from related scholarship.

> **Primary prevention:** avoid the cause or mechanism of deterioration before it acts.
>
> **Secondary prevention:** observe and monitor the substrate to detect early signs of deterioration.
>
> **Tertiary prevention:** mitigate the spread of an existing and inevitable deterioration mechanism.

To expand upon these forms of prevention, it is useful to consider them in reverse while continuing the medical analogy. In tertiary prevention, if a building is damaged and exhibits an active deterioration mechanism, preventive conservation prescribes a triage strategy. The evident mechanisms causing deterioration are identified and ranked in order of potential, holistic impact on the building systems and assemblies with the most severe mechanisms addressed first. At this level, slowing deterioration often requires maintenance, stabilization, or restoration. Though tertiary prevention may include interventions such as repointing, patching of concrete, or reroofing, each of these actions prevents propagation of a deterioration mechanism and therefore contributes to a preventive conservation philosophy.

Once existing deterioration mechanisms are addressed, secondary prevention methods can be applied. Monitoring strategies include historic structure reports, regular condition surveys, and frequent visual inspections. Through regular inspections and analysis of building conditions over time, stewards can identify deterioration mechanisms at their onset allowing for timely, but limited, intervention that preserves more of the extant fabric, often at a lower cost.[18]

[18] Veronica Cristina Heras et al., "A Value-Based Monitoring System to Support Heritage Conservation Planning," ed. Maria Lusiani and Luca Zan, *Journal of Cultural Heritage Management and Sustainable Development* 3, no. 2 (October 28, 2013): 133, https://doi.org/10.1108/JCHMSD-10-2012-0051.

Primary prevention constitutes preventive conservation in its most ideal application. Informed by the study of secondary and tertiary prevention measures, primary prevention seeks to control the causes of deterioration mechanisms before they act. For example, consider a plaster wall in a historic structure with evidence of moisture damage. The steward assumes that the deterioration mechanism, a roof leak, is no longer active due to exterior maintenance. The steward repairs the damaged portions of the plaster. However, a few weeks later, the wall begins to stain again. As a means of secondary prevention, the steward begins to monitor the temperature and relative humidity in the room. The monitoring reveals that during cold winter weather, the interior relative humidity is 45% on average, high enough to cause moisture vapor to saturate cold spots on the plaster finishes and cause staining.[19] The monitoring program indicated that high interior relative humidity and cold plaster surface temperatures caused the plaster damage. This identification enables primary prevention to take place by adjusting the heating and humidification controls to lower the relative humidity, thereby avoiding the causal mechanism of deterioration.

A three-tiered definition of preventive conservation enables stewards to apply proactive strategies regardless of the starting condition of the historic resource. In doing so, stewards can holistically consider building systems and act preventively at any time over the building's service life. This interpretation of the three-tiered, PRECOM^{3}OS definition serves as a framework for preventive conservation that is supplemented by the evidence presented in this thesis.

[19] Sharon C. Park, "Holding the Line: Controlling Unwanted Moisture in Historic Buildings," National Park Service, October 1996, https://www.nps.gov/tps/how-to-preserve/briefs/39-control-unwanted-moisture.htm#signs.

CHAPTER 2: METHODOLOGY

2.1 Rationale and Undertaking

Although the literature surrounding preventive conservation has grown rapidly in the last twenty years, depth of study is concentrated within a few countries and the literature lacks a pragmatic analysis of implementation at the site level. A range of international perspectives are represented, yet perspectives from England and Belgium dominate the literature. Recent studies also focus on applications of preventive conservation at the level of national policy without addressing the specific challenges stewards face at individual sites. As a result, recent scholarship focuses on proposed changes in policy and practice without producing qualitative research to support claims about implementation. Sloan is one of few American authors to address the role of stewards in implementing preventive conservation, and her written survey completed in 2008 represents an industry-wide perspective.[20] Nearly a decade later, there is a need for a second look at the state of preventive conservation in the United States considering a qualitative, in-depth assessment of management strategies for implementation and capacity-building at individual sites.

A nuanced methodology that incorporates opinions, perceptions, and experiences through narrative data is needed to characterize current implementation of preventive conservation. This thesis employs semi-structured interviews as the primary research method to explore each steward's extant preservation practices and conceptual understanding of preventive conservation. The flexibility of interviews allows for trends and themes to emerge naturally and accommodates analysis of unanticipated themes that alternate research methods, such as written surveys or questionnaires, may overlook.

[20] Finke, "Implementing Preventive Architectural Conservation," 1.

This thesis addresses the gap in literature through in-depth interviews with a representative sampling of stewards throughout the United States to inform recommendations for stewardship practices and areas of future research. This study is not intended to be an industry-wide analysis. Rather, interview data from a moderate number of diverse participants is analyzed to identify themes in stewardship practices. The trends, issues, and successes identified through interviews will inform recommendations for future work to establish and document industry-wide applicability.

2.2 Methodology

The interview process occurred in four phases: selection of interviewees, preparation, execution, and synthesis.

Selection of Interviewees

The goal of the interviewee selection process was to identify a list of organizations with diverse management practices such that resulting themes would represent the field at large. A preliminary list of fourteen sites was developed to ensure diversity across three variables: number of buildings or sites managed, staff composition, and interpretive focus. Staff members responsible for building preservation at fourteen different sites were contacted, eleven of whom responded and were engaged in the research process. The eleven interviewees are listed below in alphabetical order by last name:

- Ellen Cone Busch, Director of Historic Sites Operations at the Texas Historical Commission;
- Christopher Daly, Director of Properties at the Preservation Society of Newport County;
- Taylor Davis, Historic Preservationist at Jekyll Island Historic District;
- Gardiner Hallock, Robert H. Smith Director of Restoration at Monticello;
- Mark J. Heppner, Vice President of Historic Resources at Historic Ford Estates;

- Joseph C. Mester, Property Manager at Historic Brattonsville;
- Fred Prozzillo, Vice President of Preservation at the Frank Lloyd Wright Foundation;
- Christopher Roddy, Director of Buildings and Grounds at Brucemore;
- Patricia Smith, Curator of Historic Architectural Resources at Drayton Hall;
- William Tyre, Executive Director and Curator at Glessner House Museum; and,
- Matthew Webster, Director, Grainger Department of Architectural Preservation and Research at Colonial Williamsburg.

Preparation

In addition to the primary interviewees, mock interviews were conducted with two stewards, indicated below. Mock interviews with informed participants enabled restructuring and refinement of questions in preparation for primary interviews.

- David Hollenberg, University Architect and Adjunct Professor at the University of Pennsylvania; and,
- David Young, Executive Director at Cliveden.

The results of the mock interviews were not included in the pursuant analysis due to selection bias and changes implemented after completion of the mock interviews.

Prior to each primary interview, participants were asked to complete a preliminary questionnaire via GoogleForms to gather brief or quantitative operational data. Questions covered topics such as number of employees, funding and budget, ownership type, and public visitation.

Execution

Interviews were conducted via phone, were audio-recorded, and ranged in length from thirty minutes to an hour and thirty minutes with an average length of one hour. The interviews

followed a semi-structured format through which standard questions were prepared, but the interviewer was free to digress to facilitate meaningful conversation and deep understanding of stewardship practices related to preservation.

The topic of this thesis was introduced to each interviewee as a study of managerial and operational strategies for building preservation including maintenance and conservation activities. However, preliminary communication purposefully excluded the term “preventive conservation.” Delayed introduction of the formal terminology mitigates bias by enabling comparison between a holistic review of stewardship activities and an informed discussion of preventive conservation at each site. The first half of each interview served to characterize extant practices of each organization without full disclosure of the thesis topic. Toward the end of each interview, participants were asked about their familiarity with the term “preventive conservation” and if they could offer a definition. Then, the interviewer read each interviewee a vernacular version of the definition used in this thesis before proceeding with the final series of questions. A vernacular definition was used to facilitate comprehension and foster shared understanding for the proceeding conversation about implementing preventive conservation.

Synthesis

After completing each interview, the audio-recording was used for notetaking and capturing partial transcriptions. Quantifiable data, such as traits characterizing each site and topics repeated across interviews, were recorded on a matrix to determine frequency of discussion. Qualitative results were synthesized through an iterative process whereby themes present across interviews were extracted from the notes. Subthemes were identified to characterize the factors or positions contributing to the overall themes.

The purpose of this study was to identify themes across the portfolio of sites interviewed to suggest strategies for improvement within the field at large. Due to the importance of the aggregate results, the data presented typically omits the names of interviewees or sites. Furthermore, partial anonymity enables critical analysis and honest representation of shortcomings without impacting the reputation of any given site. To enable partial anonymity, each interviewee was randomly assigned a letter that is used to cite each interview throughout this thesis.

2.3 Interviewee Characteristics

Interviewees were selected to represent the larger population of historic sites by establishing diversity in organizational structure for characteristics such as operational scale, staff capacity, and financial strength. Preliminary research focused on anticipated site characteristics, then more accurate demographic data for each site was collected via the preliminary questionnaire and interview.

Operational Scale

Operational scale characterizes the magnitude of the preservation undertaking considering the impact of ownership type and amount of public visitation. Diversity in operational scale is essential to this study as it directly relates to a steward's strategy for expending resources. For example, the number of buildings managed informs the amount of ongoing maintenance which has direct implications for hiring and budgeting. As illustrated in Figure 1, the spectrum of interviewees ranges from directors of single-structure historic sites like the Glessner House to managers of hundreds of historic and non-historic structures like Colonial Williamsburg.

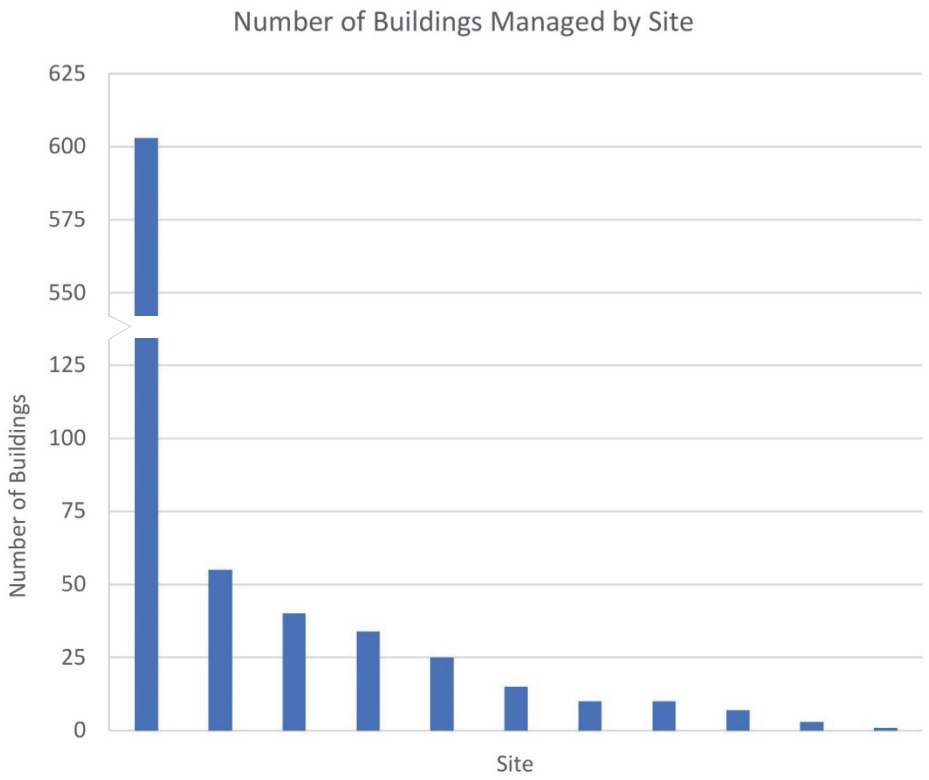

Figure 1: Number of Buildings Managed by Site

Annual public visitation, shown in Figure 2, influences operational scale through impact on revenue, staff time required to manage visitors, and physical wear on the historic resource. While some sites track visitation through ticketed entry to individual sites, larger sites have broader means of tracking. For example, the visitation reported for the Jekyll Island Historic District is based on the number of cars that enter the island annually, though not all visitors spend time in the historic district.

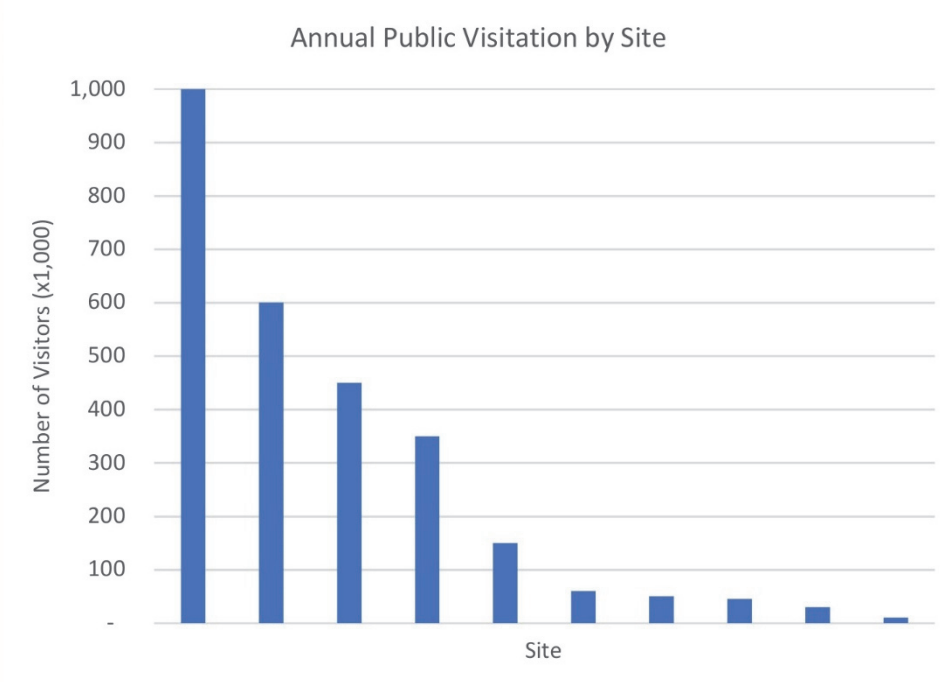

Figure 2: Annual Public Visitation by Site

Finally, operational scale depends on support provided by owners. In this study, three categories of ownership were used: government, local nonprofit, and national nonprofit (such as the National Trust for Historic Preservation, NTHP). Ownership type is indicative of required processes or revenue streams and therefore impacts organizational capacity for preservation activities. For example, Drayton Hall and Brucemore both reported recent completion of a "Critical Priorities" assessment, a physical evaluation of all historic structures mandated by the NTHP.

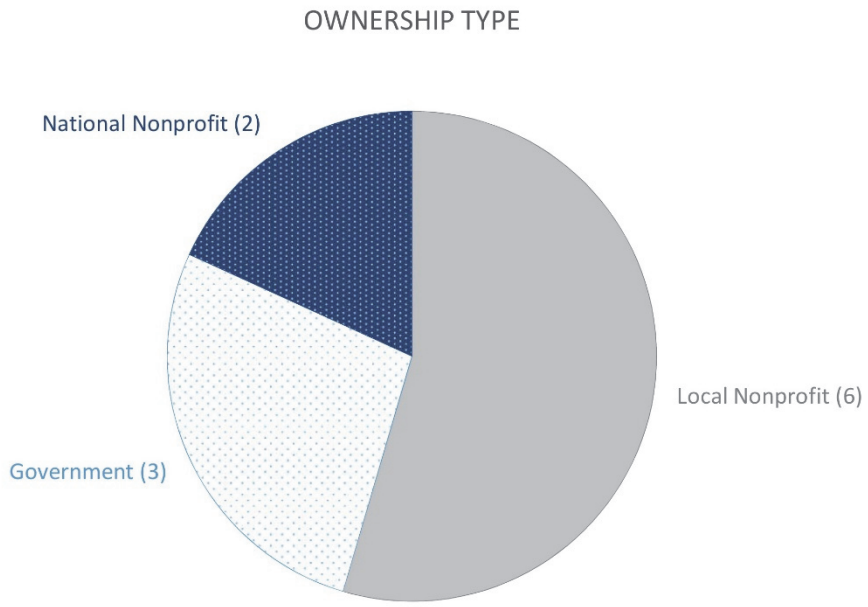

Figure 3: Distribution of Ownership Type Across Sites Studied

Staff Capacity

The capacity of an organization's staff to undertake preservation efforts is dependent on factors such as number of employees, staff structure, quality of leadership, type of expertise, and past work experience. This section will first characterize leadership at each site interviewed, then illustrate the spectrum of organizational structures represented in this study.

The aim of this study was to reach stewards in preservation leadership positions who also have in-depth knowledge of day-to-day preservation activities. At some organizations, this meant that a staff member was a more suitable interviewee than the department director. All interviewees have similar educational backgrounds: six have postgraduate degrees in historic preservation, three have degrees in history, and two are licensed architects. The amount of time each steward has been employed at their current organization varied from a few months to ten years, as shown in Figure 4. Recent transitions in leadership indicated a broader organizational

restructuring at a few sites. While two sites have new preservation leadership, four sites are actively hiring or recently hired preservation support staff.

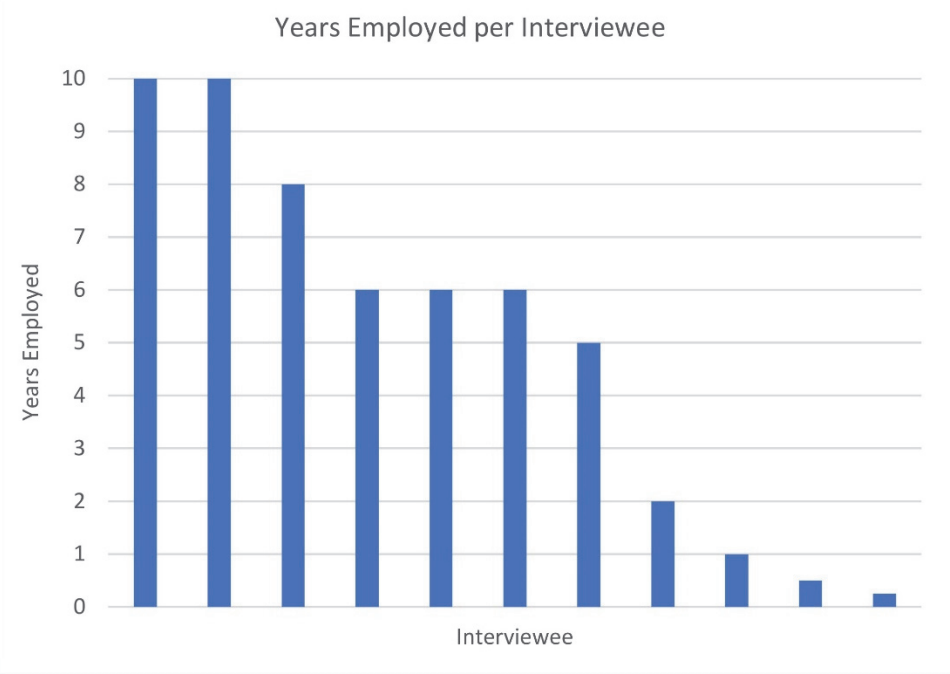

Figure 4: Years Employed per Interviewee at Current Organization

The expertise of leadership and support staff also characterizes organizational structure. While all stewards interviewed were in a position of leadership, only seven of the interviewees held positions dedicated to preservation tasks. Two interviewees were in a property management role, one was a buildings and grounds manager, and one interviewee was an executive director responsible for operational, interpretive, and curatorial tasks in addition to preservation.

The number and expertise of staff supporting these leaders varied widely across sites but can be grouped into four categories based on job duties: preservation staff, preservation assistants, maintenance staff, or no support staff. Sites with a preservation staff have a robust team of employees with preservation training, typically skilled in hands-on conservation,

architectural history, or building archaeology. A site with a preservation staff employs many more people than a site with preservation assistants. Sites with preservation assistants engage one or two supporting staff members with preservation training to perform hands-on or strategic preservation tasks. However, not all sites have staff with preservation expertise. Many sites have maintenance staff in place of preservation support meaning that hands-on technicians, often with a background in facilities maintenance, assist leadership in preservation efforts. Finally, some sites have no support staff beyond the capacity of the steward leading preservation efforts. The distribution of support staff and leadership across interviewees is as follows:

- Of seven sites with a preservation director, three had maintenance support staff, two had a preservation staff, one had preservation assistants, and one had no support staff;
- Of two sites with property managers, one had maintenance staff and one had preservation staff;
- The site with a buildings and grounds director had supporting maintenance staff; and,
- The site with an executive director had no support staff.

The magnitude of the preservation undertaking relative to overall site operations is illustrated by comparing the number of preservation staff to the total number of full-time employees at each site. As shown in Figure 5, the size of staff supporting preservation activities varied across sites interviewed, while the number of staff with preservation expertise was under six employees for all sites.

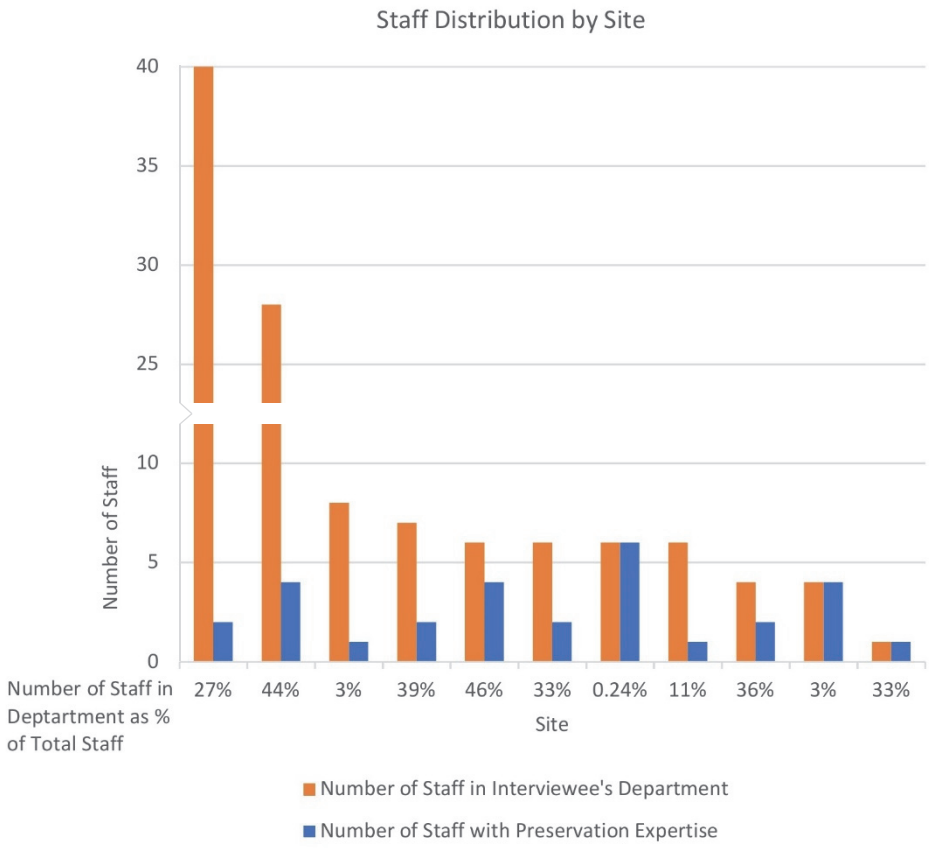

Figure 5: Staff Distribution by Site

Financial Capacity and Preservation Spending

Interviewees reported approximate figures for annual operating and preservation budgets that were used to illustrate the financial diversity represented in this study. The annual operating budget characterizes the financial capacity of a site, while the proportional amount designated for annual preservation efforts characterizes the perceived importance of preservation. As illustrated in Figure 6, most sites have an annual operating budget of less than $10 million with less than 10% devoted to preservation. The operating budget of one site far exceeds the rest at $185 million, while another site has a relative preservation budget as 20% of the operating budget. While the purpose of this preliminary analysis is to demonstrate financial diversity across interviewees based on operating budget, future research could analyze how

sources of income such as endowments, ticket sales, grants, and private donations, impact the preservation budget.

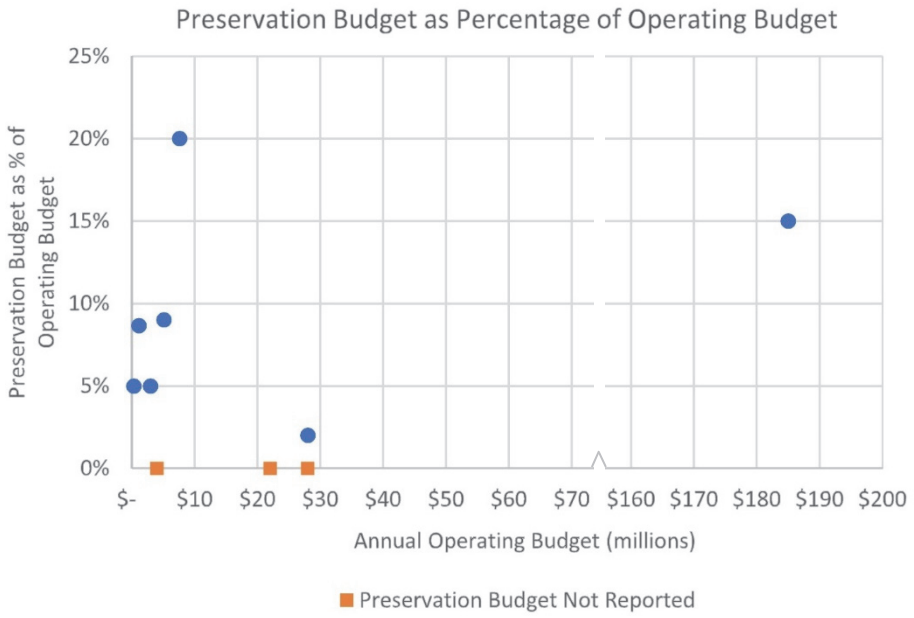

Figure 6: Preservation Budget as Percentage of Operating Budget

CHAPTER 3: ASSESSING AND REDEFINING PREVENTIVE CONSERVATION

As discussed in Chapter 1 and shown in Appendix A, the nuanced definition of preventive conservation has resulted in inconsistent use of terminology by scholars, professional organizations, and stewards over time. The evident lack of unified terminology heightened the importance of understanding preservation practices in this study in addition to assessing interviewee knowledge of terms and definitions. To enable thorough understanding of extant preservation practices, the term "preventive conservation" was not formally introduced as the focus of this study until the latter half of each phone interview. The delayed introduction of preventive conservation allowed interviewees to express their self-assessed familiarity with the term. It also enabled the interviewer to conduct a comparative analysis whereby an interviewee's familiarity with the concepts underlying preventive conservation was evaluated through analysis of their extant preservation practices. This chapter first presents the assessed understanding of preventive conservation among stewards represented in this study. Then, the practices and insights of interviewees are used to inform a revised, systematic definition of preventive conservation that illustrates the strategic components needed for implementation.

3.1 Interview Results: Familiarity with Preventive Conservation

Familiarity with preventive conservation was assessed by evaluating each interviewee's understanding of the term, the concept, and associated preservation practices.

Familiarity with Terms

Each interviewee was asked if they were familiar with the term "preventive conservation." Four interviewees confirmed familiarity and provided the following definitions:

> It's basically to do no harm and prevent harm . . . it's a proactive approach.[21]

[21] Steward G, interview by author, February 20, 2018.

> Preventive conservation is like preservation maintenance. You keep something in good repair so that you don't lose what you have. . . . [It is a] proactive view of preservation in terms of maintaining and taking steps in order to prevent deterioration to begin with.[22]

> It is . . . taking the responsibility to be proactive, to be thoughtful, to be holistic, and not to be reactionary to issues in regards to preservation. . . . Identifying those needs, being aware of them, always revisiting the priorities, at the end of the day it's doing something about it.[23]

> Personally, I think it runs hand in hand with the cyclical [maintenance]. If you're keeping up with things, then you're not going to have to be dealing with major projects or nearly as many emergencies as you would have. I think it's about having a system in place.[24]

Of the four interviewees who expressed familiarity with the term, all knew of preventive conservation within the context of historic structures while two of the four were also familiar with preventive conservation as applied to collections.

Four of the seven stewards who expressed little to no familiarity with the term "preventive conservation" offered an inferred definition without prompting by the interviewer. While the definitions varied in depth and accuracy, there were many commonalities between both the unprompted and informed definitions presented above. When analyzed in tandem, the most commonly used term is maintenance, closely followed by proactive. The following concepts were mentioned twice across all eight definitions provided by interviewees: preservation, not reactionary, fewer emergencies, prevent, and issues. The key terms and concepts of these definitions are represented visually in Figure 7.

[22] Steward B, interview by author, February 19, 2018.
[23] Steward I, interview by author, February 8-9, 2018.
[24] Steward C, interview by author, February 12, 2018.

Figure 7: Key Words from Definitions of Preventive Conservation Provided by Interviewees

While the definition of preventive conservation may be intuitive to some stewards, seven interviewees were unfamiliar with the term. In contrast, the similar study conducted in 2008 by Sloan found that 47 of 60 respondents to a written survey were familiar with the term "preventive conservation" as applied to buildings and collections, while an additional two respondents knew of the term as applied only to historic buildings.[25] However, the differing results of these studies do not necessarily suggest that the term has fallen out of use in the last decade; it is likely that the distinct methodologies applied in each study impacted steward responses. In a written survey, stewards may be more susceptible to social desirability bias when asked a direct question with inherent implications about their professional standing. These stewards may have dishonestly indicated familiarity to appear knowledgeable,

[25] Finke, "Implementing Preventive Architectural Conservation," 92-93.

recognizing that they could privately research the definition of the term before continuing with the survey. In contrast, phone interviews create a personal environment in which live feedback is possible, perhaps enabling stewards to be more honest in their responses.

Familiarity with Concepts

The established variability in the field and among interviewees about the definition of preventive conservation suggests that interviewees may understand the concepts underlying preventive conservation without having familiarity with the term itself. The interview process aimed to assess conceptual understanding in part through questions about how interviewees do or plan to implement preventive conservation at their site. First, the interviewer read a vernacular version of this thesis' definition of preventive conservation to each interviewee to maintain a conversational tone and enable ease of understanding:

> Preventive conservation is a proactive, holistic approach to building preservation that aims to protect historic resources by addressing the root causes of deterioration and decay. It follows a little and often approach, meaning that everyday observations and documentation serve to inform building care, therefore reducing the need for large, discrete projects.

The pursuant line of inquiry addressed self-assessed level of implementation, perceived benefits and barriers, and identification of necessary strategic components for successful realization of preventive conservation. Each interviewee's level of familiarity with the foundational concepts was evaluated based on their response to the given definition and related stewardship practices. Familiarity was rated on a scale from 1 to 5, as summarized in Table 1. Nine of eleven interviewees demonstrated moderate to very strong understanding of the foundational concepts of preventive conservation resulting in an average rating of 3.45.

Table 1: Rubric for Evaluating Conceptual Understanding of Preventive Conservation

Rating		Rationale	No. Interviewees
1	Low	Little demonstrated understanding of the concepts after hearing the above definition	1
2	Mild	Demonstrated understanding of definition, low understanding of associated preservation activities	1
3	Moderate	Demonstrated understanding of definition and some understanding of associated preservation activities	3
4	Strong	Clear understanding of nuanced definition and associated preservation activities	4
5	Very Strong	Clear understanding of nuanced definition, associated preservation activities, and holistic organizational strategies	2

Components of Preventive Conservation

Interviewees were asked to identify specific preservation activities that they either execute or associate with successfully implemented preventive conservation. While many interviewees initially mentioned staff capacity, securing funding, or an extant maintenance backlog as barriers to successful implementation, these are organizational factors influencing preventive conservation rather than technical activities that comprise a preservation management plan. These organizational factors are addressed in Chapter 4 while this section focuses on the pragmatic aspects of preservation management plans, including financial planning, as discussed by interviewees.

Four stewards identified the need to have a plan or system in place when implementing preventive conservation, and made the following recommendations:

- Plan holistically: preventive conservation must consider and reflect the site's master plan (mentioned by three sites);
- Prioritize: use ongoing documentation to inform a prioritized list of issues (mentioned by three sites);

- Record conditions and work performed: documentation aids in recognizing patterns of deterioration and establishing a record of institutional knowledge (mentioned by four sites);
- Use technology: processes for recording conditions and scheduling maintenance are improved by embracing technology (mentioned by two sites); and,
- Commit: be diligent in observing and recording (mentioned by three sites).

Many interviewees discussed specific preservation management plans they have in place but did not consciously link them to preventive conservation. Names applied to these plans varied widely, though some commonly used terms were: asset management plan, cyclical maintenance plan, preventive maintenance plan, routine maintenance, or preservation plan. Despite varying terminology, these plans shared many underlying principles and can be grouped into three categories: cyclical maintenance plans, predictive maintenance plans, and prioritized task lists.

In a cyclical maintenance plan, observations of a site over time guide an annual schedule of preventive tasks that is updated throughout the year as visual inspection continues to inform building needs. One site with a large portfolio of managed buildings demonstrated a particularly robust cyclical maintenance plan. The large portfolio of buildings enables the site to execute material-specific cyclical maintenance programs at scale for masonry, paint, and roofing. Each year, work is performed at a predetermined set of buildings for each material category. The work is repeated at the same buildings a scheduled number of years later. The crew addresses the material needs of each building cyclically with the intent to complete the scope of work before conditions become critical.[26]

[26] Steward G, interview.

Predictive maintenance plans utilize the anticipated service life of materials and equipment to forecast needs years into the future. For example, one site utilizes a robust, thirty-year predictive maintenance plan created in 2000 after completing a thorough assessment of building conditions. The steward applied service life data to extant conditions to develop a schedule of anticipated maintenance activities or replacements thirty years into the future. While predictive maintenance plans appear to be a useful management strategy, they were criticized by this steward for being overly idealized. Now eighteen years into the plan, the current steward has found many inaccuracies in the predictive maintenance plan due to evolving management needs, growing site uses, and changing service life predictions. The interviewee plans to update the predictive maintenance plan in the near-term future.[27]

Finally, prioritized task lists are comprised of all needed preservation and maintenance projects, ranked according to importance. Prioritized task lists are often informed by or support cyclical and predictive maintenance plans.

Below is a summary of how these plans were discussed during the interview process:

- Eleven sites discussed at least one of the above preservation management plans;
- Ten sites implement at least one of the above preservation management plans;
- Eight sites discussed cyclical maintenance plans (four implement cyclical maintenance, four do not);
- Two sites implement predictive maintenance plans; and,
- Eight sites use prioritized task lists.

[27] Steward D, interview by author, February 28, 2018.

Interviewees mentioned a series of actions to support all three categories of preservation management plans, including:

- Frequent visual inspection (mentioned by eight sites; two reported scheduled seasonal walk-throughs while three reported scheduled, annual condition assessments);
- Record work performed (mentioned by eight sites; seven actively record work performed while one seeks to keep better records); and,
- Monitor building data such as relative humidity, temperature, or crack widths (reported by two sites).

When interviewees discussed frequent visual inspection, most referred to informal observations made on a daily or weekly basis when preservation professionals, maintenance staff, or other employees walk through the site. Four sites emphasized that visual observations are the basis for regular updates and revisions to the prioritized list of preservation tasks. Many stewards emphasized the importance of recording work performed to establish continuity of institutional knowledge and discover patterns in damage or repair that elucidate causes of deterioration.

Interviewees commonly identified attributes of effective preservation management plans, including:

- Flexible: newly identified building needs are easily added to the plan, immediately prioritized, and quickly addressed (mentioned by five sites);
- Holistic: consider goals and needs of the entire site (mentioned by five sites);
- Usable: plans are created for the audience that will use them; e.g., develop task lists for hands-on maintenance activities (mentioned by five sites); and,
- Embraces technology: capture building conditions digitally and automate the maintenance schedule (mentioned by four sites).

Most interviewees mentioned the importance of funding and financial planning for implementing the above preservation management plans. Sites that have sufficient funding can plan for and implement proactive, anticipatory preservation efforts while responding quickly to unforeseen maintenance needs when they arise. Specifically, interviewees identified the following attributes of successful financial planning when implementing preventive conservation:

- Financial stability and commitment: secure reliable funding sources and account for them in the budget (mentioned by three sites); and,
- Prepare long-term budgets: support budgets with data about material and equipment service life (mentioned by one site).

Future Goals

Throughout the interviews, nearly all stewards expressed goals for future changes or improvements to extant preservation practices and financial planning. Nine stewards mentioned specific changes, including:

- Establish a cyclical or preventive maintenance program (mentioned by five sites);
- Improve an extant cyclical maintenance program (mentioned by one site);
- Update records of past preservation efforts (mentioned by five sites; two seek to update extant condition records, one seeks to update HSR's and HABS drawings);
- Improve monitoring of existing conditions (mentioned by two sites);
- Increase utility of preservation management plans (mentioned by two sites);
- Strengthen long-term budgetary planning (mentioned by two sites); and,
- Improve recording of work performed (mentioned by one site).

Toward Analysis

The interview results indicate that many stewards are familiar with the concepts underlying preventive conservation and may execute some supporting preservation activities associated with the philosophy. However, only four stewards were familiar with the term while few interviewees implement preventive conservation holistically as a set of deliberate actions. There is a need for a clarified, pragmatic definition of preventive conservation that conveys the importance of implementing a comprehensive set of preservation activities in service of a greater goal: to increase the service life of historic structures by avoiding or slowing the causal mechanisms of deterioration. A definition that incorporates the pragmatic activities identified by stewards should build on the definition provided in Chapter 1:

> Preventive Conservation is a proactive, holistic philosophy for building preservation that uses records of frequent condition observations to identify the root causes of deterioration and mitigate the future impact of those causes through direct or indirect intervention to prolong the service life of the historic resource.

Simply stated, preventive conservation is a philosophy for slowing mechanisms of deterioration at their source to prolong the service life of a historic resource. However, its successful implementation is also dependent on the condition of the resource and site management practices. Together, the service life of a historic building, preventive conservation, and site management comprise a system of interdependent components. Systems thinking is a means of organizing these components to understand the functionality of the system as a whole. Systems thinking was applied to the data gathered through interviews to clarify the definition of preventive conservation and provide a framework for improving stewardship practices.

3.2 Introduction to Systems Thinking

In practice, a myriad of actions supports the identification of deterioration mechanisms, just as a series of factors support the implementation of plans for mitigating deterioration at an organizational level. Systems thinking is a means of demonstrating the interconnections between components to yield a functional system achieving a specific purpose. Systems are organized around stocks which are quantifiable, finite, or tangible components of the system. Flows directly impact stock levels via a mechanism, process, or action. The flow rate is controlled by feedback loops that balance or reinforce the behavior of the system.[28] Systems diagrams are represented visually using the symbols in the legend below:

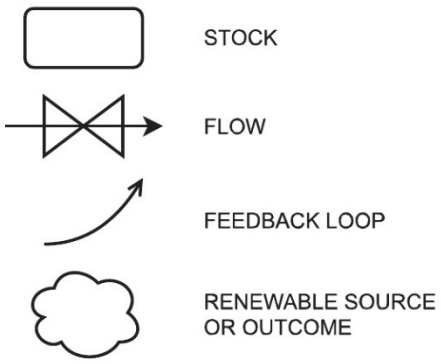

Figure 8: Legend for Symbols Used in Systems Diagrams

3.3 A System for the Deterioration of Historic Resources

When considering the condition of historic resources over time, the only certain process is deterioration. As shown in the systems diagram below (Figure 9), deterioration is the mechanism by which the condition of a historic resource flows from its current to future state. Though deterioration is inevitable, the rate of deterioration can be slowed by feedback loops in

[28] Donella Meadows, *Thinking in Systems* (White River Junction, VT: Chelsea Green Publishing, 2008), 30.

the form of action by stewards. However, the presence of a feedback loop does not ensure its effectiveness.[29] Effective stewardship mitigates the causal factors of deterioration, yet some actions may have no impact on the natural rate of deterioration while improper actions may increase the rate of deterioration. To demonstrate this principle, three types of stewardship actions will be considered: neglect, episodic campaigns, and preventive conservation.

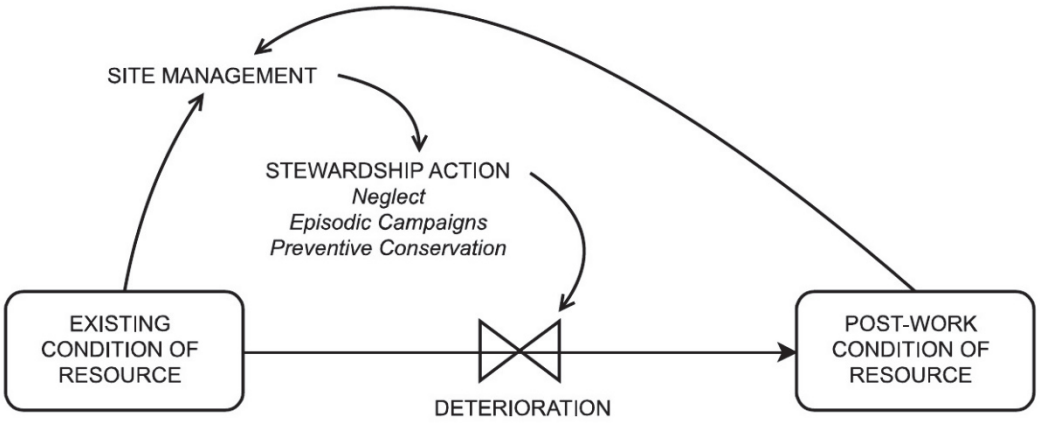

Figure 9: Systems Diagram for the Deterioration of a Historic Resource

In the absence of prevention or intervention, the rate of deterioration assumes its natural course. As shown in Figure 10, the resource deteriorates slowly at first, then at an increasing rate as issues with building materials, assemblies, and systems compound until the resource loses all functionality or integrity. In the second case, a historic resource is subject to episodic, interventive restoration campaigns that fail to address the root causes of deterioration and do not include ongoing maintenance and preservation. Though deterioration is temporarily stalled at each intervention, episodic campaigns do not substantively increase the service life of the building. In the third case, preventive conservation enables frequent observations and small

[29] Ibid.

interventions to slow the rate of deterioration and increase the service life of the historic resource.

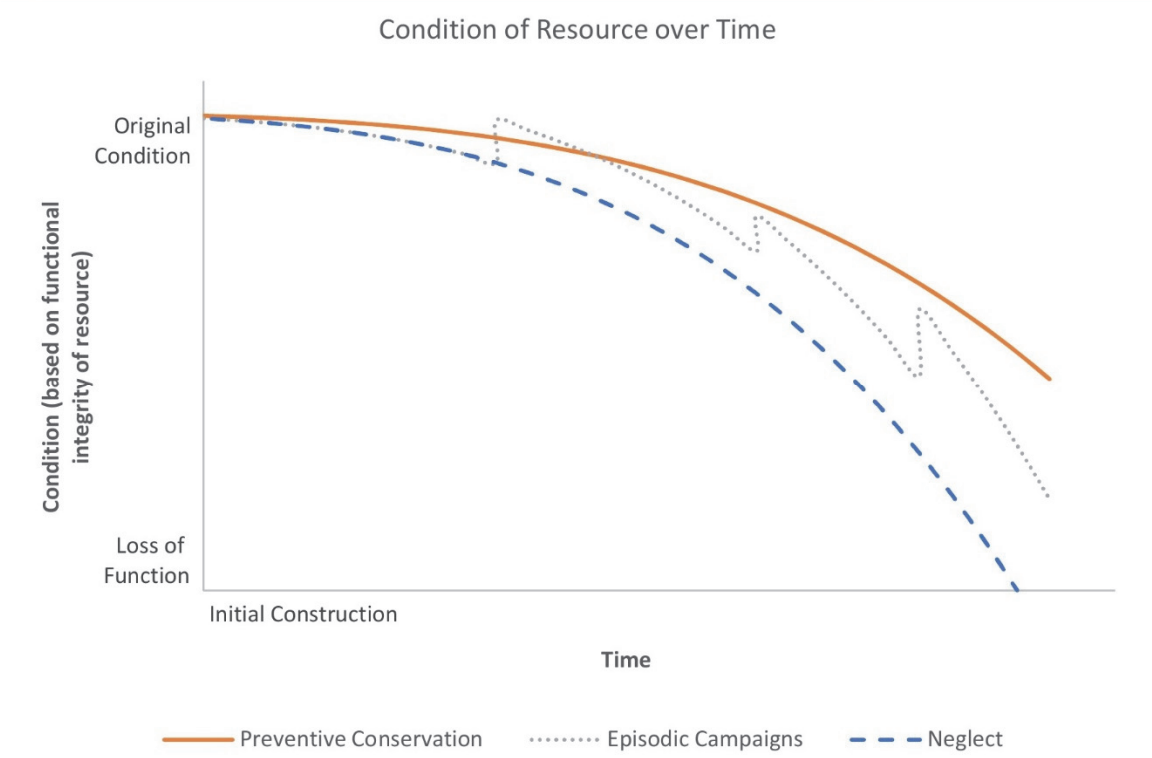

Figure 10: Graph of Historic Resource Condition by Type of Stewardship Action over Time

Figure 10 illustrates that the most effective stewardship action is preventive conservation when compared to episodic campaigns or neglect. However, the effective implementation of preventive conservation to lengthen the service life of a historic resource is directly impacted by site management practices. Both site management and preventive conservation are systems comprised of a network of interrelated factors that influence the rate at which a historic resource deteriorates. Preventive conservation is comprised of a set of behaviors and strategies that inform the analysis and planning of preventive stewardship actions that are further defined in the following section. The site management system, defined in

Chapter 4, considers organizational factors, such as staff capacity and funding, that act on and influence the implementation of preventive conservation.

3.4 Defining the Preventive Conservation System

Preventive conservation aims to influence the path of a building from its current condition to future state by slowing causal mechanisms of deterioration. It is a system comprised of two stocks (information and management plans) and multiple feedback loops (informed by observations) as illustrated in Figure 11. Research increases the information stock which is analyzed by stewards to develop information management plans for implementing preventive conservation. Observations made during frequent inspections and work performed act as feedback loops, continuously updating and increasing the information stock, enabling the management plans to be refined.

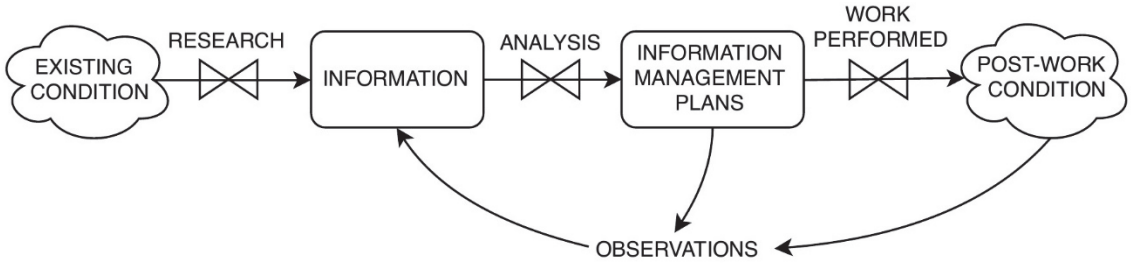

Figure 11: Functional System for Preventive Conservation

When successfully implemented, preventive conservation is a philosophy for sustainable management that avoids capital interventions while mitigating the effects of active deterioration mechanisms on functional building components. It necessitates that building components are in a stable condition before entering the preventive conservation system, meaning that a separate system must address deferred maintenance. As demonstrated in Chapter 4, the preventive conservation and deferred maintenance systems can exist in parallel,

but all projects associated with deferred maintenance must be planned for, budgeted, and executed outside of the preventive conservation system.

Information

In the preventive conservation system, information is defined as aggregated documentation of the history, condition, and use of a historic structure. A variety of resources support the stock of information including HABS drawings, Historic Structure Reports, Cultural Landscape Reports, archival photos, or records of past projects. However, a crucial record for adopting preventive conservation is a comprehensive assessment of existing conditions. The assessment is founded upon a thorough set of graphical documentation, including comprehensive drawings and current photos, that accurately represent the structure's present condition as informed by archival documents and historic repairs. Foundational documentation serves as the basis for measuring deterioration by comparing future conditions to a fully documented state to determine the rate of deterioration. The rate informs management plans that specify actions for mitigating the root causes of deterioration. Stewards may return to the foundational documentation when making decisions, proposing interventions, and refining management plans. When preventive conservation is strictly adhered to, completing a comprehensive condition assessment is a one-time investment. The feedback loop of ongoing observations serves to continually update records of building history and extant conditions.

Information Management Plans

Information serves as the basis for developing management plans and executing preservation work. When adopting preventive conservation, initial information gathering informs the first iteration of management plans: a cyclical maintenance plan, a predictive

budget, and a prioritized task list of one-time projects. Each plan is continually updated by information gained through observational feedback loops.

Cyclical Maintenance Plan. Cyclical maintenance plans are an essential component of the preventive conservation system and were discussed by eight of eleven interviewees. Cyclical maintenance plans organize tasks that need to be completed on a predetermined time interval, from as short as a day to as long as a few years, into a single schedule. The aggregated schedule serves as a guide for stewards in allocating resources to plan for and execute regular tasks and may be manifested in an automated calendar or weekly schedule of tasks. Interviewees gave a variety of examples for tasks that might be included on a cyclical maintenance plan such as masonry repointing or clearing gutters. The first iteration of these tasks comes from the foundational documentation whereby stewards identify materials or components that would benefit from cyclical care.

Prioritized Task List. Prioritized task lists include aggregated solutions to observed, nonregular building needs. While cyclical maintenance plans are predictive and anticipate building needs that will repeat over time, prioritized task lists address singular needs that do not repeat on a cycle. Prioritized task lists are informed by newly identified needs in response to unpredicted events, such as replacing a broken pane of glass. The lists also include solutions to anticipated, isolated needs based on observed conditions. One interviewee gave the example of a landscape sprinkler spraying the same section of the building façade.[30] If the sprinkler goes unnoticed, it can cause discoloration or water damage at the façade. If quickly added to the prioritized task list, the simple yet anticipatory solution to move the sprinkler away from the building prevents future deterioration and loss of original material. Prioritized task lists are

[30] Steward B, interview.

useful when they include discrete, immediate actions, such as repairing windows, rebuilding displaced masonry, or redirecting moisture, that can be completed by site staff or within the preservation operating budget.

Predictive Budget. A predictive budget utilizes data about building materials, components, and systems to forecast required maintenance and preservation needs and secure commensurate funding to execute those projects. It considers cyclical maintenance in the long-term using lifecycle cost data to forecast and account for future needs. A useful tool for determining lifecycle cost is the Heritage Building Reinvestment Model.[31] It uses service life and current replacement value to determine the required annual capital renewal, or the amount set aside each year to ensure that adequate funding is available when maintenance or preservation projects are needed. As identified by one interviewee, it is difficult to obtain data for the predicted service life of century-old materials.[32] Thus, the model highlights the importance of observation and recording such that experience may inform lifecycle data for untested materials or components.

The funding identified in the predictive budget can take a few forms, such as a building reserve fund or endowment. To be sustainable, however, the funding must be planned for and easily incorporated into the annual operating budget when necessitated by the cyclical maintenance plan. While the predictive budget accounts for future capital projects due to the predicted service life of materials or systems, it assumes those components are currently in a stable condition. The predictive budget does not account for capital projects needed immediately due to imminent failure caused by deferred maintenance.

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[31] Michael C. Henry, "The Heritage Building Reinvestment Model," Technical Note (Bridgeton, New Jersey: Watson & Henry Associates, 2013).
[32] Steward D, interview.

Observation and Feedback

Management plans for implementing preventive conservation are continually revised and updated through observations that increase information about the site. Observations made while implementing management plans and the corresponding projects are part of the observational feedback loop. However, there are three types of ongoing, structured observational activities that contribute to continual information gathering: frequent inspection, data collection, and recording work performed.

Frequent Inspection. Interviewees commonly identified frequent visual inspection as a necessary activity in support of preventive conservation as observations of damage over time serve as the basis for detecting causative factors of deterioration. The first level of visual inspection is informal daily observation by both trained and nonexpert staff who are uniquely positioned to observe change over time due to constant engagement with the site. Observed damage is further monitored or analyzed to assess causes of deterioration. Isolated issues are addressed via the prioritized task list while ongoing needs are added to the cyclical maintenance plan. The second level of visual inspection is scheduled seasonally. As mentioned by one steward, "being able to see it [building conditions] over the course of a year . . . is really important."[33] Stewards may recognize patterns in changing conditions through seasonal observations that elucidate causes of deterioration. These observations inform refinements to the cyclical maintenance plan through adjustments to work intervals or adding additional tasks to the plan. Finally, two stewards mentioned annual condition assessments which assist in identifying and planning for major cyclical projects to be completed in upcoming years.

[33] Steward C, interview.

Data Collection. Two stewards mentioned collecting data such as interior temperature, relative humidity, or crack measurements to record change over time. When considered over a period of time and in conjunction with other observations, this data aids in pattern recognition to inform the cyclical maintenance plan. Furthermore, the data informs evaluation of building conditions and elucidates root causes of deterioration that are addressed via the prioritized task list.

Record of Work Performed. Eight interviewees emphasized the importance of recording all work performed at historic sites through various methods. At one end of the spectrum, something as simple as a spreadsheet suffices. One interviewee populates the spreadsheet with fields such as the date, the issue, and who performed the work.[34] At the other end of the spectrum is a comprehensive, user-friendly database. One site developed a digital archive of all projects completed over the last forty years. The archive is searchable so that stewards can readily refer to lessons learned from past work when planning new projects.[35] Though stewards expressed difficulty in regularly updating the record of work, keeping accurate records is critical for improving foundational documentation. Current records enable stewards to recognize patterns in maintenance and preservation activities that inform the cyclical maintenance plan and elucidate causative factors of deterioration. Furthermore, thorough records build institutional knowledge to establish continuity over the service life of the resource through transitions in stewardship.

[34] Steward K, interview by author, February 6, 2018.
[35] Steward H, interview by author, February 8, 2018.

Conclusion

The functional system for preventive conservation is comprised of a network of interrelated components that serve to mitigate the causal factors of deterioration. However, none of the components can exist in isolation; information and management plans are constantly changing due to additional information gained through observation. The flexibility inherent in the preventive conservation system is representative of values held by five interviewees. As stewards manage the constantly evolving needs of historic sites, flexibility in a preventive conservation system is essential as it enables stewards to quickly prioritize a newly identified need. However, flexibility can also be a burden when stewards choose to deprioritize needed maintenance due to other operational pressures. Chapter 4 will present site management strategies for organizing these competing interests.

CHAPTER 4: TOWARD STRATEGIC IMPLEMENTATION

The rate of deterioration of a historic resource is influenced by preventive conservation and site management systems that enable or prohibit the successful mitigation of deterioration. Though the preventive conservation system is defined by technical components (Chapter 3), its successful implementation is also dependent on observations, analysis, and execution by informed and committed stewards. However, stewards of historic sites are subject to a myriad of competing priorities that create a challenging environment for preventive conservation. To develop recommendations for implementation, analysis must move beyond the technical components of preventive conservation to focus on the people executing the philosophy. This chapter aims to reassess the relationship between implementation of preventive conservation and stewards' understanding of the term, then present interview data to characterize other organizational factors that prohibit or enable implementation. The insights gleaned from interviews are used to inform a process for organizational change to guide stewards in moving from deferral toward a sustainable state of preventive conservation.

4.1 From Theory to Practice

The functional system for preventive conservation was informed by insights from interviewees to represent the necessary technical components for implementing preventive conservation. However, it is a theoretical system when considered in isolation. Preventive conservation is a holistic philosophy that is successfully implemented when organizational factors and site management practices are properly considered and leveraged. Assessing how stewards currently understand and implement preventive conservation is a prerequisite for analyzing the remaining organizational factors that influence implementation.

Assessing stewards' understanding of preventive conservation began with an analysis of terminology. When prompted, four interviewees expressed familiarity with the term "preventive conservation" and offered a definition. Interviewees provided definitions that were conceptually-based, often focusing on general approaches rather than pragmatic means of execution. For example, stewards described preventive conservation as a "proactive approach," a "proactive view," and "taking the responsibility to be proactive." Each of these definitions uses the word "proactive," illustrating alignment with this thesis' definition of preventive conservation, while framing preventive conservation as a holistic philosophy rather than a series of discrete tasks.

However, not all stewards were familiar with the term "preventive conservation." No stewards used the term during the interview before the interviewer introduced it, and seven interviewees were unable to provide a definition when prompted by the interviewer. Rather than applying strategic terms such as preventive conservation, most interviewees were more comfortable using terms with traditionally pragmatic meanings. For example, interviewees commonly used the term "cyclical maintenance," defining it with discrete tasks such as repointing, clearing gutters, or inspecting boilers. Interviewees were similarly comfortable with words like routine maintenance, preventive maintenance, or prioritization. Though each of these words are associated with a discrete set of tasks, they are also aligned with the principles underlying preventive conservation. The interviews suggest that stewards are comfortable with the isolated tasks of preventive conservation without a holistic understanding of the foundational principles. Quantitatively, as discussed in Chapter 3, only four interviewees expressed familiarity with the term while nine of eleven interviewees demonstrated understanding of the underlying principles.

Though stewards understand and execute some actions associated with preventive conservation, their evident discomfort with applying the term "preventive conservation" to those actions indicates a larger problem within the field. This chapter will demonstrate that preventive conservation is not an idealized philosophy and is not an individual task to perform. Rather, preventive conservation is a useful philosophy comprised of a set of pragmatic actions and strategies that, when executed holistically and diligently by stewards, is an effective and utilitarian means of managing extant maintenance needs and staving off future deterioration. However, the effectiveness of preventive conservation is limited when stewards, design professionals, and academics apply each management plan individually while failing to recognize that the components are part of a larger philosophy.

Furthermore, when professionals fail to apply consistent terminology to the principles of preventive conservation, they limit their ability to effectively advocate for better stewardship. Three interviewees raised the need for stewards to be internal advocates by educating other staff members about preservation practices, while three other sites emphasized the role of stewards in advocating for preservation publicly. However, advocating for seemingly mundane projects can be challenging. Referring to other staff members, one interviewee said, "we're trying to make sure everybody understands what we're doing and why it sometimes takes longer [to complete a project]."[36] Stewards expend substantive effort trying to inform nonexpert staff members of the need for preventive work. Similarly, another interviewee said "we work to educate donors" when asked how their site secures funding for projects.[37] In both cases, having

[36] Steward F, interview by author, February 15, 2018.
[37] Steward K, interview by author, February 15, 2018.

consistent terminology for the philosophy that guides preventive work would build credibility and therefore increase support and understanding.

There is a need among stewards and in the field at large to identify a common term as the organizing philosophy under which stewardship actions are prioritized and executed. This thesis proposes preventive conservation to serve as that organizing philosophy. However, a theoretical definition of preventive conservation alone does not ensure execution by stewards. Historic sites are uniquely challenged by an excess of competing priorities that may limit how effectively preventive conservation is applied. As mentioned by one steward, preventive actions are "the first thing that gets pushed to the side when things get crazy" while another said that in hectic times, the system for preventive care goes "by the wayside."[38] Assessed implementation across sites in this study is influenced by the organizational factors that compete with implementation of preventive conservation. The state of implementation and organizational factors must be understood before identifying a holistic process for realizing preventive conservation.

4.2 State of Implementation

The interview process aimed to assess the extent to which each site implements preventive conservation, both explicitly and implicitly. After each interviewee was given the same definition of preventive conservation, they were asked whether they execute the philosophy at their site. Nine of eleven interviewees confirmed that they practice preventive conservation. However, these self-reported practices are likely subject to social desirability bias as the wording of the given definition was not neutral. The definition leads the interviewee to understand that preventive conservation is a beneficial philosophy that is of interest to the

[38] Steward H, interview; Steward C, interview.

interviewer. Furthermore, as illustrated by the incongruity between term recognition and conceptual understanding, self-identified implementation is not necessarily indicative of realized implementation. The assessment of implementation considered the entirety of each interview to assign a rating on a scale from 1 to 5, summarized in Table 2:

Table 2: Rubric for Assessing Implementation

Implementation Rating		Conceptual Understanding	Rationale	No. Interviewees
1	Low	Low	Little to no effort to improve extant practices	0
2	Mild		Some demonstrated monitoring practices or growth	2
3	Moderate	Moderate to strong	Demonstrated monitoring practices but little to no evidence of continued growth or momentum	4
4	Strong		Demonstrated cyclical maintenance and inspection practices with evidence of growth	3
5	Very Strong		Demonstrated holistic thinking and commitment with thorough maintenance and inspection practices	2

The average implementation rating was 3.45 suggesting a moderate to strong level of implementation across sites. Despite a relatively strong average, over half the interviewees fell into the mild-to-moderate range therefore demonstrating substantive opportunity for improvement.

4.3 Interview Results: Successes and Challenges in Site Management

As stewards discussed the successes and challenges of site management, four overarching topics emerged: financial capacity and planning, staff capacity, deferred maintenance, and organizational history.

Financial Capacity and Planning

Though the financial capacity of sites ranged widely, each interviewee mentioned the importance of funding when planning for and implementing aspects of preventive conservation. Sites with adequate funding execute projects proactively while quickly addressing unforeseen building needs as they arise. These sites reported greater autonomy because they can manage a greater portion of building needs through the operating budget without delay caused by seeking additional approval or funding.

Despite varying financial capacities, interviewees identified the following strategies for financial planning in support of preventive conservation:

- Educate internally: advocate among staff members for the importance of preservation work (mentioned by six sites);
- Pursue financial stability: secure reliable funding sources and dedicate those funds to preservation in the budget (mentioned by three sites);
- Maintain relationships with loyal donors (mentioned by one site); and,
- Prepare long-term budgets: support with material lifecycle data (mentioned by one site).

Most stewards recognize the importance of education and advocacy in financial planning. When considering the net activity of a historic site, preservation efforts comprise the largest expenditures despite the preservation or maintenance department having little direct impact on generated revenue. Interviewees expressed that stewards must be effective internal and external advocates for the preservation needs of a site, especially for the projects that comprise preventive conservation efforts which are often perceived as dull or mundane.

Though many stewards had suggestions for successful financial planning, eight interviewees identified insufficient funding as a barrier for implementing aspects of preventive

conservation. Five interviewees expressed a general concern for the amount of funding available without further commentary, while three interviewees specifically commented that inadequate funds create an environment in which deferral and temporary or inappropriate repairs are prevalent. Inadequate funding makes long-term budget planning difficult and often results in episodic preservation efforts when project funding becomes available. Interviewees indicated the following symptoms of inadequate funding: a growing maintenance backlog, reactionary approaches to emergent conditions, slow response time for newly identified issues, and insufficient research for identifying the cause of an issue.

Many stewards expressed that they are inadequately funded because funding is difficult to obtain. Interviewees identified the following challenges when pursuing funding opportunities:

- Misperceived financial strength of organization (mentioned by two sites); and,
- Competition with social services organizations (mentioned by two sites).

With respect to misperceived financial strength, interviewees expressed that the public incorrectly assumes that the site has plentiful funding. In one case, a wealthy family previously owned a site and created an endowment for it upon transfer of ownership. The site is challenged to secure financial support from the local community due to a perception that the endowment covers most building needs. However, approximately 75% of the endowment draw is devoted to salaries, leaving little funding for preservation projects. Another organization, owned by state government, finds that the public presumes all needs are covered by government funding. This organization is challenged to teach the public that they can accept and need private donations.

To infer strategies for improving financial capacity, interviewees were asked how they might persuade a donor to give to an outwardly invisible or low-profile preventive conservation

project. One of the most common answers relates to public education: for these projects, interviewees often appeal to donors with deep knowledge of building preservation and maintenance who understand the need for seemingly dull projects before completing more aesthetic work. When appealing to donors without this knowledge, interviewees suggested using documentation of building conditions, work anticipated, and work performed to convince donors of the need and to build trust based on past achievements. Finally, interviewees emphasized the need to make the project personal, even if the project has a utilitarian focus. They recommended getting donors on site and framing the project as a relatable home-improvement project or explaining the programmatic consequences that fail the mission if building needs are not addressed.

A few stewards referred to challenges in financial planning, specifically at the intersection of budget and institutional memory. Two stewards expressed difficulty growing the budget after years of neglect, while another expressed hesitancy to spend money on smaller projects due to recent completion of an expensive restoration project.

However, financial capacity and planning alone does not always enable preventive conservation. Three sites indicated that staff capacity is a limiting factor, though for differing reasons. At one nonprofit, the building needs were many and the funding to address them was available. However, they did not have sufficient preservation staff to quickly complete the necessary planning or to support execution of the projects. At one government institution, the funding was available to hire additional staff, but to do so, they must request additional full-time staff positions through the state legislature.

Despite widespread concern over funding opportunities and financial planning, only two stewards expressed future goals focused on financial growth. One interviewee hopes to create an endowment, while another expressed commitment to growing an existing endowment.

Staff Capacity

Nearly all interviewees raised the topic of staffing. Regarding the preservation staff as a whole, stewards sought:

- Adequate staff time: achieved by hiring more staff (mentioned by five sites);
- Organizational commitment to education: train and provide professional development to grow a skilled workforce (mentioned by two sites); and,
- Long-standing employees: as a means of transferring institutional knowledge to the next generation (mentioned by one site).

Most stewards identified attributes that they seek in preservation employees, specifically:

- Eager to collaborate within and across organizations (mentioned by seven);
- Qualified to perform preservation tasks (mentioned by four);
- Skilled in hands-on work (mentioned by four); and,
- Passionate and interested (mentioned by one site).

In support of these skills, four stewards discussed training staff. These interviewees expressed the need for organizational commitment to staff training, both upon hiring and through professional development programs for current employees. Training is not limited to preservation and maintenance staff; some interviewees expressed that stewards with preservation expertise should be internal advocates for preservation by educating nonexpert staff about preservation theory and practice.

All interviewees identified staff capacity as a potential barrier to implementing preventive conservation in the following ways:

- Eight sites discussed staff quantity (six expressed a lack of employees while two expressed appreciation for the number of staff members they have);
- Six sites expressed inadequate staff time; and,
- Five sites discussed staff expertise (two have difficulty finding skilled employees while three expressed appreciation for the skills they have on staff).

With regards to expertise, one interviewee aptly recognized a shift in their staff expertise over time. The interviewee commented that in the past, there was an "approach of dealing with the results of the problem and not the actual problem itself," whereas today, they are "very aggressive about going after the root cause."[39] In addition to the primary issues of staff time, quantity, and expertise, one interviewee also expressed concern for the staff's ability to execute work prescribed by an outside consultant.

Two interviewees raised a staffing and training challenge to the field at large about preparing the next generation to enter the trades. These sites have aging craftsmen on staff and no trained, younger employees to promote. As said by one steward, the site has "not nurtured the model of apprentice, journey to journeyman, to master craftsman."[40] Interviewees expressed that their current staff are a great, but underutilized, resource for the next generation.

Interviewees also expressed interest in strengthening their staff in the future. Five interviewees identified specific goals, including:

[39] Steward G, interview.
[40] Steward D, interview.

- Hire more hands-on preservation support staff (mentioned by three sites);
- Hire new strategic preservation support staff (mentioned by three sites); and,
- Increase professionalism by through staff hires and training (mentioned by two sites).

Deferred Maintenance

Five stewards identified an extant maintenance backlog as a barrier to successful implementation of preventive conservation. These interviewees expressed that before adopting a preventive approach, the site must reach a point of stability whereby all historic resources are in fair condition. Interviewees commonly suggested a hierarchy of needs to address before prevention, typically necessitating a secure roof and exterior envelope in addition to a stable foundation. These stewards believe that a preventive approach cannot exist concurrently with deferred maintenance, though most interviewees identified a maintenance backlog:

- Eight sites self-reported deferred maintenance; and,
- Three sites self-reported little to no deferred maintenance.

Pursuant discussion revealed that some self-reported cases of little to no deferred maintenance may be inaccurate. When deferred maintenance is defined by seemingly insubstantial projects such as addressing peeling paint, it is evident that:

- Ten sites were assessed to have a backlog of deferred maintenance; and,
- One site accurately self-reported little to no deferred maintenance.

Organizational History

Nearly all interviewees mentioned the impact of past stewardship practices on current preservation efforts. Though all stewards interviewed have either a formal education in historic preservation or considerable experience working with historic buildings, many expressed absent preservation expertise in the past:

- At seven sites, past preservation work was managed by a facilities department; and,
- At two sites, previous preservation efforts were managed by nonexpert stewards such as caretakers, groundskeepers, or owners without a preservation-focused mission.

Six stewards identified specific practices associated with nonexpert leadership, such as reactionary behaviors, uninformed or 'band-aid' repairs that fail to address the cause of the problem, episodic repair campaigns when project resources become available, or an overreliance on outside consultants.

When discussing organizational history, eight stewards identified a catalyst that moved the organization from one governed by facilities maintenance to one guided by preservation practices. Most commonly, five stewards identified renewed organizational commitment at the level of upper management and the board as the greatest driver of change. However, organizational commitment was never mentioned in isolation. Renewed commitment was often paired with a desire for professionalism or planned organizational growth. In some cases, a new source of income or the retirement of a long-standing building manager catalyzed renewed commitment.

Despite current preservation leadership and past evidence of change, many interviewees identified lingering impacts of previous nonexpert stewards:

- Maintenance backlog inherited from predecessors (mentioned by eight sites);
- Inappropriate repairs by predecessors (mentioned by two sites);
- Difficulty growing budget and staff due to standards set by predecessor (mentioned by three sites); and,
- Resistance from maintenance staff in implementing more robust preservation standards (mentioned by one site).

Subthemes

One or two stewards mentioned remaining subthemes. Some mentioned concerns over realistically planning for preventive conservation and remaining diligent in observation and execution over time. Others expressed a need for templates or standards to ease the transition into preventive conservation. A few stewards are challenged by material concerns, such as shortening service life of restoration materials or restricted physical access to historic building components that require attention. Only one steward commented that there are no barriers to implementing preventive conservation.

While many stewards expressed specific challenges and barriers to implementing preventive conservation, only three sites explicitly identified shortcomings in their extant stewardship practices. These stewards recognized that their practices are not sufficient to improve the long-term preservation of their historic resources for the following reasons:

- Reactive approach: addressing maintenance issues as they arise (mentioned by two sites);
- Deferral: knowingly contributing to a growing maintenance backlog (mentioned by two sites); and,
- Episodic campaigns: addressing preservation and maintenance needs sporadically due to an overwhelming maintenance backlog (mentioned by one site).

Conclusion

A holistic system for preventive conservation must specifically address how to align organizational variables and mitigate deferred maintenance to support preventive conservation. While the functional system for preventive conservation proposes stewardship actions and plans for stable historic resources with well-managed maintenance backlogs, in practice, stewards across historic sites are challenged to control deferred maintenance. Ten of eleven

interviewees have deferred maintenance, while two interviewees acknowledge that they are perpetuating the cycle of deferral. Unfortunately, maintenance backlogs are the norm in the United States rendering any system that does not address that backlog and its contributing organizational factors inadequate. A more useful system shows a path from deferred maintenance to preventive conservation.

4.4 A Process for Organizational Change

The transition from deferred maintenance to preventive conservation is dependent on organizational factors that enable or prohibit stewards to apply proactive strategies. Many stewards of historic sites in the United States are challenged to manage building needs while subject to managerial constraints prevalent in nonprofit or governmental settings. To effectively preserve historic structures through preventive conservation, stewards must strategically grow an effective staff and budget, engage with owners, secure funding, and maintain donor relationships in addition to managing the physical care of buildings. A useful preventive conservation philosophy must consider all these factors and illustrate how they might be aligned to enable effective stewardship.

While the service life of historic resources and the functional aspects of preventive conservation are illustrated via traditional systems diagrams, the path from deferral to prevention is better shown as progression through stages of implementation. The process illustrated in Figure 12 embraces the functional system for preventive conservation by placing it within the greater context of organizational change and site management. In addition to demonstrating how preventive conservation works at successful sites, the process identifies the challenges faced by stewards and proposes a strategy for overcoming those barriers. The purpose of the process for organizational change is to provide a guiding framework for stewards

to consider while moving toward successful implementation of preventive conservation, rather than assuming all sites can immediately execute the philosophy. Stewards may use the process for organizational change to assess a site's state of implementation and identify next steps. The process is applicable to sites of varying financial strength and staff capacity as it is scalable to meet the needs of a given site.

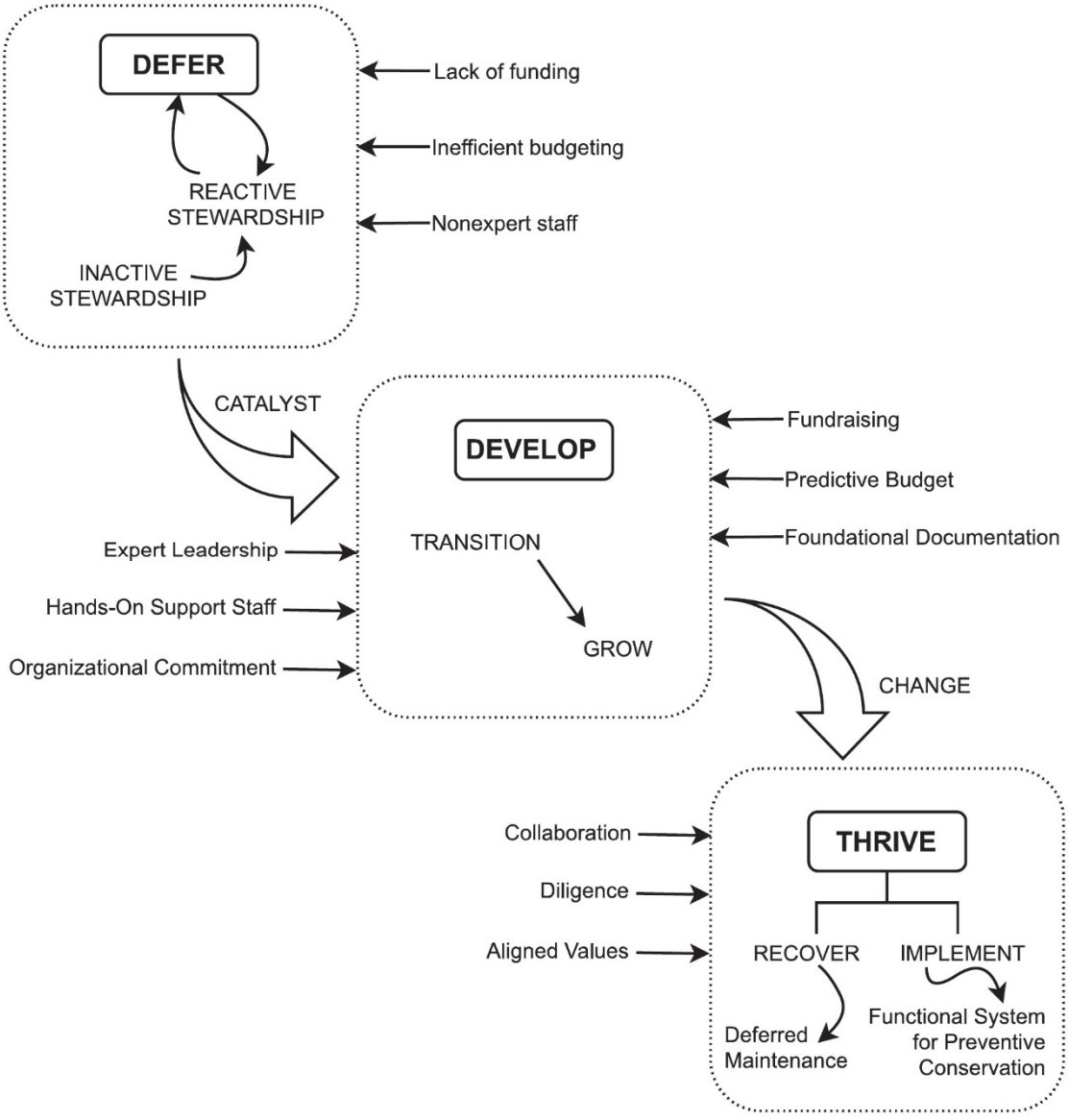

Figure 12: Process for Organizational Change to Implement Preventive Conservation

Defer

As demonstrated by the interview process, many sites are caught in a cycle of deferred maintenance. In the deferral stage, stewards fail to slow the mechanisms of deterioration and instead contribute to a growing backlog of needed repairs. It is a self-perpetuating cycle whereby a growing backlog increasingly overwhelms stewards resulting in behaviors that fail to increase the service life of the historic resource. The deferral stage is characterized by inefficient budgeting, a lack of funding, and nonexpert care that result in inactive and reactive stewardship.

Inactive. Sites with inactive preservation efforts rely on recently completed, high-quality projects to carry the site forward in the near-term future without ongoing prevention or maintenance. Past restoration efforts may appear to oppose deterioration in the broader system of a building's service life, yet restoration efforts are episodic campaigns when stewards do not provide ongoing care. As illustrated in Figure 10*,* episodic campaigns do little to prolong the service life of a historic resource. Interviews suggested that reasons for this perspective may be related to budgeting and strategic expertise. With regards to budget, one interviewee explained that they recently completed a capital project and a series of smaller efforts to address items on their deferred maintenance list. While discussing next steps, the interviewee said, "we know that we have all these things we need to address, but we've just spent all this money."[41] While investing financially and physically in a site is a notable accomplishment, the preservation work at sites can become static when past capital projects disincentivize spending for smaller, ongoing work to increase the longevity of a historic resource through ongoing prevention and maintenance.

[41] Steward H, interview.

Stewards are similarly challenged to see how work deferred while pursuing priority projects contributes to the maintenance backlog. For example, one interviewee said, "in theory we've tackled all of our deferred maintenance projects" and "we need to . . . catch up on other things that we had to set aside while we were focusing on these things [deferred maintenance]."[42] With this site's approach, deferred maintenance is a self-reinforcing feedback loop. Similarly, another steward mentioned, "you start to funnel all your efforts into addressing the deferred maintenance and perhaps routine maintenance work that you have to do every day like cleaning out the gutters or painting . . . some of that stuff gets skipped because you're focusing on patching a hole somewhere else."[43] While many sites are tempted to label deferred maintenance as an isolated project addressed incrementally, these stewards suggest that maintenance backlogs are not discrete; stewards can contribute to the backlog while addressing other previously deferred projects. Preservation efforts become inactive when stewards are not aware of how their actions contribute to the growing maintenance backlog and subsequent loss of material integrity of the resource.

Reactive. Deferral is also characterized by nonexpert care, often manifested as reactionary stewardship whereby issues are addressed with temporary fixes or episodic campaigns. At sites with nonexpert leadership, there is no designated staff member for preservation efforts, or those efforts are led by stewards without preservation expertise. These stewards may come from a background in facilities and operations or may act as a caretaker or groundskeeper. They prioritize functionality and operations in the short-term over improving the long-term protection of historic resources and original fabric. Thus, sites in the reactive

[42] Ibid.
[43] Steward K, interview.

stage often lack diligence in monitoring and observation which enables conditions to worsen, often to a point that preservation of original fabric becomes impossible. Needed maintenance is deferred and repairs completed are superficial, necessitating the same issue to be addressed again in the near-term future.

As demonstrated throughout the interview process, many sites have a history of stewards with facilities and maintenance backgrounds leading preservation efforts. Interviewees expressed that stewards without a preservation background work hard but tend to focus on operational and maintenance projects while neglecting preservation needs and relying heavily on consultants and contractors. As put by one interviewee, "there are similarities between maintenance and facilities management and historic preservation, but they are not the same. It takes a different mindset and different skillset and different education."[44] Without that expertise, stewards are unprepared to anticipate mechanisms of deterioration specific to historic structures and instead react to issues as they arise. Furthermore, when the voice of informed preservationists is absent from the conversation about site operations, the budget and support staff tend to suffer resulting in insufficient resources to enable a proactive approach to preservation.

Much like inactive stewardship, reactionary stewardship is symptomatic of unstable or inadequate funding. At some sites, inadequate funding results in reactively addressing symptoms without treating the root cause of an issue. For example, one site reported that they respond to roof leaks as they arise after doing a limited investigation to identify the source of the individual leak. While the steward is aware that the site needs a comprehensive roof investigation to identify and prevent future leaks and therefore damage to the interiors, the site

[44] Steward I, interview.

does not have sufficient funding for such an investigation.[45] At another site, unstable funding and nonexpert care resulted in an episodic repair campaign when the site was chosen as the set of a movie. The film production crew provided a discrete, superficial restoration effort to make the site film-worthy. This episodic campaign allowed for work to be completed that the site would otherwise not have been able to perform, yet the work failed to address the root cause of issues or provide a holistic, long-term solution.[46] As a result, unstable or inadequate funding caused the site to get caught in a reactive cycle by responding to issues only as they arise or when project funding becomes available.

Reactive stewardship often follows a period of inactive stewardship. When sites rely on recently completed restoration efforts to last without ongoing prevention and maintenance, the past work eventually reaches the end of its service life and when it does, the site must reactively provide a treatment with funding that they did not budget for. For example, one site identified an "incredible amount of stabilization and preservation" work in the 1980s that "they were able to . . . ride for a while."[47] However, the facilities department eventually subsumed preservation department. When the preservation department was recreated over a decade later, the previous repairs were at the end of their service life. The current steward must react to severe deterioration caused by nonexpert staff and overreliance on previous repairs and must do so with a budget that does not reflect the scale of the needed repairs.

Conclusion. Reactive and inactive stewardship practices, such as temporary fixes or noncomprehensive and episodic campaigns, eventually lead to deferred maintenance. In the deferral stage, stewards may complete preservation and maintenance projects but are not

[45] Steward K, interview.
[46] Steward F, interview.
[47] Steward A, interview by author, February 21, 2018.

equipped to halt deferred maintenance and instead contribute to a growing backlog. For example, at the site used as a movie set, the reactive and superficial repairs completed by the film crew soon deteriorated.[48] The failing repairs now contribute to the maintenance backlog because the site was not prepared to address the deterioration. Similarly, deferral can result from preservation projects completed by nonexperts. For example, an interviewee expressed that a previous steward used Portland cement plaster on a historic house that is now causing moisture retention issues. However, removing the extant Portland cement plaster and replacing it with a historically appropriate plaster will cost over one million dollars. Now the site must mitigate water damage from the nonexpert repair while waiting for a funding opportunity to remediate the cause of deterioration.[49] Finally, deferral can also result from the inactive phase when stewards allow prior, high-quality campaigns to deteriorate due to a lack of ongoing prevention and maintenance. In one such case, an interviewee said, "there was a lot of deferred maintenance because there was no preservation staff," thereby associating nonexpert staff with the cycle of deferral.[50]

The reinforcing feedback loop of reactionary stewardship perpetuates the cycle of deferral. As the maintenance backlog grows due to inappropriate repairs, neglect, and nonexpert care, stewards become increasingly reactive due to an unmanageable workload. They do not have the resources or expertise with which to control the backlog and must adopt a reactive approach whereby they respond to the most pressing issues as they arise. When a steward's time is spent on severe conditions, smaller projects are deferred as the condition

[48] Steward F, interview.
[49] Steward B, interview.
[50] Steward H, interview.

worsens. While there are some variables outside a site's control, stewards can leverage other variables to break the cycle and move the site forward in the process for organizational change.

Develop

In the process for organizational change, a catalyst breaks the cycle of deferral and induces a stage of development. Development is catalyzed by a period of transition and is proceeded by a stage of growth during which meaningful change begins.

Transition. When a site progresses into the development stage, it is because an event or shift occurred to catalyze change and break the cycle of deferral. The interviews demonstrated that the catalyst often comes in three forms: a new funding source, retirement of a long-time employee, and renewed professionalism. For example, one organization was caught in the deferral cycle because of an absence of expert care. In the last decade, the site underwent a rebranding campaign that drastically improved visitation and therefore revenue.[51] The new source of funding catalyzed change and enabled the site to renew its commitment to its historic resources by reestablishing the previously abandoned preservation department.

At three other sites, the retirement of long-standing facilities and maintenance employees catalyzed change by creating an opportunity for site leadership to reassess its direction. For example, one interviewee was hired after a long-standing employee retired. The current steward said, "leadership knew that to be the best stewards possible" a shift was needed, "but the appetite for trying to change someone's job description who had been doing the same thing for [many] years wasn't there."[52] Similarly, at another site with recently retired staff, the current steward expressed the desire for "new blood, some new ideas, some new

[51] Steward A, interview.
[52] Steward C, interview.

methodologies and processes in place to . . . bring our institution to the next level."[53] At both of these organizations, the retirement of long-standing employees allowed the organization to create change by bringing in new staff with preservation expertise and a renewed commitment to preventive conservation. However, retirement is only a successful catalyst when accompanied by organizational commitment. At another site, a steward retired, and the preservation department dissolved for over a decade.[54]

Other sites transition while under pressure to increase professionalism. At one site, leadership identified a need to adhere to "best industry standards" and have a "more formalized preservation program" which resulted in hiring staff with preservation expertise for the first time.[55] At another site, the organization grew to manage both historic and new buildings. As the management structure evolved and professionalized, leadership recognized the need for dedicated attention to historic structures: "there was a feeling that we really needed to have people who specialized."[56] Pressure from high-level leadership such as the board or the executive director is symptomatic of the growth stage in the nonprofit life cycle. When the organization transitions from a start-up to a recognized historic site, staff must further specialize to reflect the growing needs of an evolving organization.[57]

In summary, sites seeking to induce a period of transition should reconsider:

- Site mission and identity: if increasing the longevity of a historic resource is central to a site's mission, reevaluating extant practices can elucidate opportunities to improve mission alignment and implementation of preventive conservation;

[53] Steward D, interview.
[54] Steward A, interview.
[55] Steward K, interview.
[56] Steward E, interview by author, February 22, 2018.
[57] "Nonprofit Organizational Life Cycle" (Speakman Management Consulting, n.d.).

- Importance of professionalism: a growing organization should have specialized staff to fulfill the current needs of the site;
- Duties of extant staff: similarly, the job descriptions of long-standing facilities or grounds management positions should be reevaluated to reflect preservation goals for the site; and,
- Potential funding sources: increased funding catalyzes the reevaluation of site operations and provides an opportunity to rethink an organization's preservation philosophy to include preventive conservation.

If a site in the deferral stage reaches a catalyst, undergoes a self-assessment, and finds extant preservation practices to be adequate, the site will continue to operate in deferral. If reassessment elucidates a need for renewed organizational commitment to preventive conservation, the site moves on to the growth phase.

Grow. The catalyst initiates change and moves an organization into the transitional stage, then a period of growth follows to create meaningful and long-lasting change. During growth, sites make substantive organizational changes to prepare for implementing preventive conservation and strategically addressing the maintenance backlog.

The first step of preparation is to address financial concerns. To implement preventive conservation, the operating budget for preservation must be developed after a likely period of neglect. For example, at a site with a long history of reactive care, the current steward said, "the buildings and grounds budget shows it. It [the budget] is much smaller than it would've been if we had the same approach all along."[58] Growing the preservation budget takes time and happens in two ways. In all cases, organizations can reassess their existing, site-wide operating budget and revise it to reflect shifting priorities. This does not necessarily mean cutting

[58] Steward C, interview.

community programs or interpretation; as mentioned by one steward, devoting resources to preservation in the short term may enable another program to thrive in the future.[59] Rather, growing the preservation budget means looking for cost savings by increasing efficiency. In other cases, growing the preservation budget is synonymous with fundraising as some sites may need to increase their income and establish a building reserve fund to implement preventive conservation. The primary goal in growing the preservation budget is to develop a reliable operating budget for maintenance that sufficiently and consistently funds the needs prescribed by the predictive budget as part of the functional system for preventive conservation.

Fundraising is also a critical component of addressing the maintenance backlog. As shown in the thriving stage, deferred maintenance can be addressed in tandem with implementing preventive conservation. However, the holistic operating budget must reflect plans to begin mitigating the maintenance backlog. The growth stage includes fundraising to secure the means of executing capital campaigns associated with deferred maintenance.

Second, sites must develop needed support staff to implement preventive conservation. At sites that need to substantively develop foundational documentation or coordinate the management of exceedingly large maintenance backlogs, leadership often seeks to hire support staff with strategic preservation expertise. At one site in the recovery stage, the property manager created a new "preservation specialist" position to help with the day-to-day tasks of preparing for increased commitment to preservation projects.[60] The new hire is responsible for tasks such as assessing conditions and estimating costs. At other sites, stewards prioritized growing the hands-on staff. For example, after one site acquired a portfolio of buildings from

[59] Steward K, interview.
[60] Steward F, interview.

another organization, the new steward commented that the last owner "never had full-time maintenance staff there and you really see it . . . I wish it was an easier decision for small nonprofits that are struggling with hiring staff to make the choice to hire a good maintenance person."[61] Interviewees demonstrated that hands-on staff are critical to the successful implementation of preventive conservation as all three sites assessed to be in the thriving stage have staff members with hands-on expertise.

While developing the staff and budget, growing sites can also begin strengthening the foundational documentation that serves as the entry point to the functional system for preventive conservation. Staff or consultants should complete a comprehensive condition assessment to enable strategic planning for addressing deferred maintenance and developing the cyclical maintenance plan, the predictive budget, and the prioritized task list.

In summary, sites that transitioned into the growth phase execute the following in preparation for effective implementation of preventive conservation:

1. Reprioritize the operating budget for preservation activities: accommodating the predictive budget necessitates efficient budgeting and, in some cases, fundraising.
2. Hire preservation staff: create strategic preservation positions for planning, research, and documentation; hire staff with hands-on experience to execute daily preservation and maintenance tasks.
3. Perform a comprehensive conditions assessment: developing foundational documentation is critical to creating a cyclical maintenance plan, predictive budget, and prioritized task list.

[61] Steward B, interview.

Thrive

The development stage serves to embrace change and grow the components that enable an organization to thrive through preventive conservation. In the process for organizational change, thriving sites engage in two parallel processes: recovering from deferred maintenance and implementing the functional system for preventive conservation.

Recovery. While recovering, organizations utilize the funding and staff secured in the growth phase to characterize deferred maintenance, prioritize issues, and develop solutions for mitigating the backlog. The goal for sustainable management is that recovery processes become extinct after all deferred projects have been addressed, therefore enabling all future building needs to be managed through implementation of the functional system for preventive conservation. While addressing deferred maintenance takes place in tandem with the functional system for preventive conservation, it utilizes separate funding and is not part of the operating budget for preservation.

Many interviewees expressed that you cannot adopt a preventive approach until deferred maintenance is addressed. However, as demonstrated by one interviewee, there are strategies stewards can employ to control and mitigate the backlog while enabling preventive conservation to thrive. During the recovery stage at one site, they completed a comprehensive condition assessment that yielded a list of deferred maintenance items, then made an organizational commitment to freeze the deferred list. Maintenance needs identified after the deferred list was created were treated not as deferred items, but as one-time issues. Categorizing newly-identified issues this way enables them to be addressed quickly via the prioritized task list. Hands-on maintenance staff at this site receive a to-do list every day, populated with items from the prioritized task list and cyclical maintenance plan. Once they

complete their minimum, ongoing tasks for the day from the to-do list, they continue making progress on a deferred maintenance project.[62] In doing so, this site achieved a sustainable form of preservation management whereby staff addresses ongoing preventive and maintenance needs while mitigating the maintenance backlog.

The following steps of recovery enable sites to address the maintenance backlog while implementing preventive conservation:

1. Create a list of deferred maintenance items.
2. Address any deferred issues identified after the initial assessment through the prioritized task list.
3. Daily maintenance staff executes tasks related to ongoing, preventive needs first, then deferred projects once their daily to-do list is complete.
4. Complete any capital projects to address deferred maintenance.
5. Exit the recovery stage after addressing all deferred maintenance by continuing the functional system for preventive conservation in perpetuity.

Implementation. Once an organization sufficiently develops its staff and budget, it is poised to implement the functional system for preventive conservation. However, as discussed by seven interviewees, implementation requires more than having the components in place; organizational culture must also align with the goals of preventive conservation. Interviewees most commonly advocated for collaboration, both within the departments of any site and in external relationships with professional organizations and consultants. Collaboration within an organization is often manifested in reliance on nonexpert staff to report observations of possible building issues to preservation or maintenance staff. Holistic and well-communicated

[62] Steward K, interview.

plans can contribute to the flow of information-sharing within an organization. For example, one steward expressed the need for larger plans that go "across our system so that we can ensure that both financial and human resources are marshalled behind both implementing smaller, cyclical stuff and addressing the larger issues when we need to."[63] Collaboration and communication aid in garnering support for preservation efforts.

To thrive, the values throughout an organization must be aligned with the goals of preventive conservation. One steward mentioned that their organization seeks passionate employees, "people who believe at the core that this is our responsibility, our stewardship role, and we owe it to these estates to be proactive and to have these preventive plans developed."[64] Holding these fundamental values demonstrates organizational commitment and causes preventive conservation to infiltrate everyday activities and become central to the mission of the organization. Organizational commitment creates an environment in which diligent stewardship is encouraged thereby enabling ongoing observation and continual feedback loops refining the functional system for preventive conservation.

In summary, the successful implementation of preventive conservation is dependent not only on the technical components of the functional system, but also on the following organizational attributes:

- Collaboration within and across organizations;
- Nonexpert staff with an understanding of preventive conservation goals and practices; and,
- Organizational commitment to preventive conservation through identifying shared values among site staff, leadership, and the preservation department.

[63] Steward B, interview.
[64] Steward I, interview.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Care is better than cure, prevention is better than intervention – proverb [65]

Preventive conservation is a powerful organizing philosophy that, when embraced by site managers, serves to protect historic resources in perpetuity. However, the nuanced definition of preventive conservation as a holistic set of behaviors and practices often impedes its widespread recognition and full implementation, as demonstrated by interviews. To harness the power of prevention, practitioners and scholars alike must agree upon a common definition of preventive conservation and advocate for its widespread use. Chapter 1 of this thesis included an interpretation of one such definition put forth by PRECOM^{3}OS, an industry leader in preventive conservation:

> **Primary prevention:** avoid the cause or mechanism of deterioration before it acts.
>
> **Secondary prevention:** observe and monitor the substrate to detect early signs of deterioration.
>
> **Tertiary prevention:** mitigate the spread of an existing and inevitable deterioration mechanism.

Primary prevention characterizes fully-implemented preventive conservation operating in the ideal conditions represented by this thesis' functional system for preventive conservation. When successfully implemented, primary prevention enables perpetual care of a historic resource by directly addressing the causal factors of deterioration before damage is evident. However, interviewees commonly lamented the feasibility of implementing such an idealistic philosophy, citing the many organizational barriers that inhibit not only primary prevention, but also the less

[65] Manoelle Verbeeck, Luc Verpoest, and Elisabeth Michiels, "Long-Term Maintenance Planning and Cost Estimate as an Extension of the Services of Monumentenwacht," in *Reflections on Preventive Conservation, Maintenance and Monitoring by the PRECOM^{3}OS UNESCO Chair*, ed. Koenraad Van Balen and Aziliz Vandesande (Leuven, Belgium: Acco, 2013), 107.

rigid levels of secondary and tertiary prevention. Historic sites are commonly challenged by an extant maintenance backlog or organizational history and culture of deferral, yet these barriers are absent from technical definitions of preventive conservation. This thesis served to supplement these definitions by proposing a process for organizational change to guide stewards in the transition from deferral to prevention. While there are many organizational factors that impact this transition, creating meaningful change at individual sites begins with the knowledge and practices of informed stewards. The following recommendations for the field at large ultimately serve to create resources that empower stewards to be better advocates for preventive conservation.

1. Adopt Consistent Terminology

Analysis of interviews and literature established that terms applied to preservation and maintenance activities are inconsistent or absent, both across and within disciplines. When practitioners fail to use consistent terminology to describe the tasks, behaviors, and management plans associated with preventive conservation, they limit their ability to advocate for widespread implementation of the philosophy itself. There is a need within the field to agree upon definitions and terms and advocate for their uniform adoption. As espoused by PRECOM^{3}OS among other scholars and practitioners, preventive conservation addresses a void in extant terminology by defining a strategic set of tasks and behaviors founded upon principles of proactive care and should be adopted as the preeminent term.

2. Represent Preventive Conservation as a Holistic System

The nuanced definition of preventive conservation as a philosophy comprised of technical components and ongoing behaviors necessitates clarity to ensure implementation. Similar terms such as cyclical maintenance are components of preventive conservation, but

distinct in that they are predefined and procedural. As an overarching philosophy, the feedback loops within preventive conservation continually revise the subsidiary information management plans. However, interviews demonstrated that stewards have not embraced this nuanced definition. Many stewards utilize one or more of the management plans included in the functional system for preventive conservation but fail to understand their interrelationship and how a network of actions contributes to the overarching philosophy. Effective communication of the holistic definition of preventive conservation can improve implementation and advocacy.

3. Acknowledge the Relationship of Preventive Conservation to Deferred Maintenance

Interviewees demonstrated that familiarity with the principles underlying preventive conservation does not ensure successful implementation. Instead, stewards are stymied by overwhelming maintenance backlogs inherited from past stewards that result in a cycle of deferral or reactive intervention. Though stewards may have a conceptual understanding of preventive conservation, those with an excess of deferred maintenance regard preventive conservation as an unattainable goal. There is a need for improved dissemination of knowledge that advocates for preventive conservation as a philosophy for staving off deterioration, implemented in tandem with projects to address deferred maintenance. Additionally, advocacy efforts targeted toward stewards must incorporate a process for organizational change to guide stewards in managing organizational variables during the shift from deferral to prevention.

4. Develop Specific Resources for Stewards

Due to time constraints, this study served to identify the primary organizational factors influencing implementation of preventive conservation and to suggest trends in the relationships between those factors. A more focused study with a larger sample size would move this research forward through quantifiable analysis of deliberate combinations of site and

organizational characteristics to assess a hierarchy of importance. For example, future research could focus on sources of income and assess whether endowments, restricted donations, or robust revenue streams best support preventive conservation. Such studies would inform decision-making processes as stewards plan for future growth and implementation of preventive conservation. Furthermore, two stewards expressed a need for templates or standards to guide documentation efforts in support of cyclical maintenance, prioritized task lists, and predictive budgets. Developing and disseminating these guidelines as part of a preventive conservation philosophy would ease implementation while advocating for holistic execution.

5. Establish Evidence for Advocacy

Stewards are commonly challenged in their role as advocates to educate nonexpert staff in the mission of preventive conservation and to persuade donors that preventive care is a worthwhile investment. At the site level, stewards identified the value of documentation in advocacy, relying on past work as a record of incremental progress or to illustrate remaining needs. However, financial concerns also emerged as a dominant concern among both stewards and donors when implementing preventive conservation. To supplement a conversation about the budgetary impact of preventive conservation when compared to deferral, an analysis of the financial benefits of preventive conservation is needed that considers a stock of historic buildings as case studies. Some organizations, such as the Changes Project in Europe, have made progress in studying the economic impact of preventive conservation. Their sixth work package (in a series of eight) is forthcoming and will address “economic analysis of costs and benefits of

preventive conservation practices."[66] Similar resources will assist stewards in advocating for preventive conservation.

6. Broaden the Context for Preventive Conservation

In the last decade, recent literature by Della Torre and Van Balen proposed a role for preventive conservation within a social context by including diverse stakeholders in the process and expanding the responsibility for preservation beyond traditional stewardship roles.[67] Interviewees expressed a similar need to relate to a social purpose through discussion of funding differences between historic sites and social services organizations. As identified by one interviewee, there is an opportunity to create social purpose at historic sites within the context of preventive conservation through apprenticeship programs. Understaffed sites overwhelmed by deferred maintenance lament the absence of young workers in the trades to fill positions when senior staff move on. By addressing the need for employees with niche skills through developing workforce training programs, historic sites can prove their utility in a social context while implementing preventive conservation.

Amidst a deluge of preservation terminology, preventive conservation is distinguishable for comprehensively addressing causative factors of deterioration though proactive care of historic resources. Moreover, it is also merits recognition as a philosophy for managing historic sites. Through incremental care and minimal intervention, preventive conservation breaks the

[66] "Deliverables," Changes, accessed April 2, 2018, http://www.changes-project.eu/index.php/deliverables/.

[67] Stefano Della Torre, "Shaping Tools for Built Heritage Conservation: From Architectural Design to Program and Management," in *Community Involvement in Heritage*, ed. Koenraad Van Balen and Aziliz Vandesande, 2015, 96; Koenraad Van Balen, "Preventive Conservation of Historic Buildings," *Restoration of Buildings and Monuments* 21, no. 2–3 (January 1, 2015):100, https://doi.org/10.1515/rbm-2015-0008.

cycle of deferred maintenance and mitigates the need for costly capital projects. Sustainable management of historic site is made possible through preventive conservation as a philosophy for protecting our historic resources in perpetuity.

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APPENDIX A: COMPARATIVE DEFINITIONS

TERMS AND DEFINITIONS USED IN THIS THESIS		ALTERNATE TERMS AND DEFINITIONS Grouped by conceptual alignment with terms used in this thesis (**bold** recognizes key words indicating alignment)		SOURCE	
Term	Definition	Definition	Term	Scholar or Organization	Full Citation
Preventive Conservation	A proactive, holistic philosophy for building preservation that uses records of frequent condition observations to identify the root causes of deterioration and mitigate the future impact of those causes through direct or indirect intervention to prolong the service life of the historic resource.	"It refers to the actions and procedures that aim at **preventing damage** or at **reducing them** through **control of the environmental factors** and at creating the best condition for its preservation . . . may include **curative** actions and treatments that aim at **stabilizing** the actual condition of the heritage property or artefact or to **reduce its decay**."	**Preventive Conservation**	Koen Van Balen and Aziliz Vandesande, PRECOMOS	Koenraad Van Balen and Aziliz Vandesande, eds., *Reflections on Preventive Conservation, Maintenance and Monitoring by the PRECOM^{3}OS UNESCO Chair* (Leuven, Belgium: Acco, 2013), iii.
		". . . a **proactive** philosophy aiming to **ensure the longevity** of the culturally-significant built environment. Measures that **mitigate decay** . . . may be considered as preventive measures. Central to the philosophy . . . is the establishment of an accessible and comprehensive system for the recordation of the historic property stewards' **frequent, informed observation** of building conditions, enabling the steward to **minimize probable deterioration risk factors**."	**Preventive Conservation**	Alice Sloan (née Finke)	Alice Louise Finke, "Implementing Preventive Architectural Conservation: Do Historic Property Stewards in the United States Possess the Tools to Meet the Challenge?" (University of Pennsylvania, 2008), 10-11.
		". . . the **holistic** discipline that looks to the events and environments that surround material culture with an eye to **slowing the pace of deterioration** and preventing damage, wear, and decay."	**Preventive Conservation**	AASLH	Jane Merritt and Julie A. Reilly, *Preventive Conservation for Historic House Museums* (Lanham, MD: AltaMira Press, 2010), 13.
		". . . concerns all items of heritage, be the in a sound state or one of active deterioration. It is aimed at **protecting** them against all types of **natural and human aggression** . . . much **more than mere maintenance** and climate monitoring."	**Preventive Conservation**	ICCROM	Gael de Guichen, "Preventive Conservation: A Mere Fad or Far-Reaching Change?," *Museum International* 51, no. 1 (January 1999), 4.
		". . . a **systematic** and **routine** maintenance process designed to **extend the useful life** of building materials, components, and systems. Through **regular servicing** and **minor repairs**, PM extends a building's useful life by i**nterrupting the natural process of deterioration** . . . PM is a **proactive approach** because it detects problems in materials and components **before complete failure** occurs."	Preventative Maintenance (PM)	US DOD	Frederick J. Rushlow and Don Kermath, "Proactive Maintenance Planning for Historic Buildings" (Champaign, IL: U.S. Army Construction Engineering Research Laboratories, 1994), 22.
		"The use of regular maintenance inspections to **monitor development of conditions over time** combined with the **timely execution of needed maintenance operations**. The overarching objective is to conserve the original material substance for as long as possible."	Preventive Maintenance	Terje M. Nypan	Terje M. Nypan, "Cultural Heritage and Harvestable Economic Values and the Importance of a Proactive Management System," in *Reflections on Preventive Conservation, Maintenance and Monitoring by the PRECOM^{3}OS UNESCO Chair*, ed. Koenraad Van Balen and Aziliz Vandesande (Leuven, Belgium: Acco, 2013), 51.
		". . . intended to **reduce or remove the need for repairs**, so **preventing** the loss of fabric which embodies a building's cultural significance . . . **reduce the probability of decay** and the chances that decayed material will have to be renewed."	Preventative Maintenance	Dann and Cantell	Nigel Dann and Timothy Cantell, "Maintenance in Conservation," in *Understanding Historic Building Conservation*, ed. Michael Forsyth (Malden, MA: Blackwell Publishing, 2007), 186.
		". . . a **planned approach** that **maintains** assets through a rationalised programme formulated through **knowledge of condition**, identified priorities and **predictive assessments**."	Preventative Maintenance	Bond and Worthing	Stephen Bond and Derek Worthing, *Managing Built Heritage: The Role of Cultural Values and Significance* (West Sussex, UK: Wiley Blackwell, 2016), 194.

TERMS AND DEFINITIONS USED IN THIS THESIS		ALTERNATE TERMS AND DEFINITIONS Grouped by conceptual alignment with terms used in this thesis (**bold** recognizes key words indicating alignment)		SOURCE	
Term	Definition	Definition	Term	Scholar or Organization	Full Citation
Preventive Conservation	*(Continued)*	"The main objective . . . is to **limit deterioration. Inspections carried out at regular intervals**, coupled with prompt action to pre-empt or remedy problems, are the basis . . . Maintenance is cost-effective, the time and money spent on **routine care, regular surveys and minor repairs** protect the value of the building."	Maintenance	English Heritage	"Maintenance and Repair of Older Buildings," Historic England, accessed March 14, 2018, https://historicengland.org.uk/advice/technical-advice/buildings/maintenance-and-repair-of-older-buildings/.
		"The **mitigation of deterioration and damage** to cultural property through the formulation and implementation of **policies and procedures** for the following: appropriate environmental conditions; handling and maintenance procedures for storage, exhibition, packing, transport, and use; integrated pest management; emergency preparedness and response; and reformatting/duplication."	Preventive Care	AIC	"Definitions of Conservation Terminology," AIC: American Institute for Conservation of Historic and Artistic Works, accessed March 14, 2018, https://www.conservation-us.org/about-conservation/definitions#.Wsu3fIjwZPY.
Conservation	A curative, interventive treatment for building materials that modifies the chemical or physical characteristics of the resource to prolong its service life.	". . . the intentional **intervention** or alteration of the **physical and/or chemical state** of cultural resources to **extend their existence**."	Conservation Treatment	AASLH	Merritt and Reilly, *Preventive Conservation for Historic House Museums,* 33.
		". . . the **deliberate alteration of the chemical and/or physical aspects** of cultural property, aimed primarily at **prolonging its existence**. Treatment may consist of stabilization and/or restoration."	Treatment	AIC	"Definitions of Conservation Terminology."
		". . . an item of heritage which risks being lost because of the presence in it of an **active destructive agent**: insects in wood, mould on paper, slats in ceramics, or simply an object unable to bear its own weight"	Curative Conservation	ICCROM	de Guichen, "Preventive Conservation," 4.
Maintenance	Servicing of building components, assemblies, and systems after failure has occurred (synonymous with repair).	". . . actions of **servicing and repair** that are scheduled **in response** to degradation or **failure…** The objective of maintenance is to regain utility."	**Maintenance**	Alice Sloan	Finke, "Implementing Preventive Architectural Conservation," 10.
		". . . **remedy defects** caused by decay, damage or use, including minor adaptation to achieve a sustainable outcome, but not involving restoration or alteration."	Repair	English Heritage	Paul Drury and Anna McPherson, "Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment" (London, England: English Heritage, 2008), 72.
		". . . can be seen as a '**point of failure**' because . . . it will usually involve damage to or replacement of historic fabric."	Repair	Bond and Worthing	Bond and Worthing, *Managing Built Heritage,* 188.
		". . . occurs when an element or component is **assessed** through an inspection or condition survey and the **action to repair or maintain** it is subsequently **prioritised."**	Condition-dependent maintenance	Bond and Worthing	Bond and Worthing, *Managing Built Heritage,* 4.
Cyclical Maintenance	Routine, scheduled maintenance of building components, assemblies, and systems occurring on a predetermined interval to improve performance, extend service life, and preempt failure (synonymous with preventive, planned, or programmed maintenance).	". . . actions of servicing and repair that are **anticipated** and therefore **scheduled** a year or more in advance, often in coincidence with the seasons"	**Cyclical Maintenance**	Alice Sloan	Finke, "Implementing Preventive Architectural Conservation," 10.
		"Any activity such as cleaning, painting and minor repair **carried out systematically**, on a **planned cycle** and based on regular inspection."	Maintenance	Dann and Cantell	Dann and Cantell, "Maintenance in Conservation," 186.
		". . . requires no pre-inspection and tends to be work that is undertaken at **regular intervals** - work such as external painting, annual safety checks, clearing gutters, lubricating moving parts, removing plant growth and bird droppings, painting and testing, etc."	Condition-independent maintenance	Bond and Worthing	Bond and Worthing, *Managing Built Heritage,* 194.

TERMS AND DEFINITIONS USED IN THIS THESIS		ALTERNATE TERMS AND DEFINITIONS Grouped by conceptual alignment with terms used in this thesis (**bold** recognizes key words indicating alignment)		SOURCE	
Term	Definition	Definition	Term	Scholar or Organization	Full Citation
Restoration	Interventive treatment applied to return a component to a known, previously documented state or function, often through the introduction of new materials.	"Any **direct human activity** which is aimed at ensuring that the damaged object in a collection **regains its aesthetic** or (sometimes original) historic condition."	**Restoration**	ICCROM	de Guichen, “Preventive Conservation,” 4.
		"**Treatment** procedures intended to **return cultural property to a known or assumed state**, often through the addition of **nonoriginal material**."	**Restoration**	AIC	“Definitions of Conservation Terminology.”
		"To **return a place to a known earlier state**, on the basis of compelling **evidence** without conjecture."	**Restoration**	English Heritage	Drury and McPherson, “Conservation Principles, Policies and Guidance,” 72.
Stabilization	Intervention to protect a damaged building component, assembly, or system against further deterioration.	"**Treatment procedures** intended to maintain the integrity of cultural property and to **minimize deterioration**."	**Stabilization**	AIC	“Definitions of Conservation Terminology.”

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