Notes on Operations

The Condition of Our "Hidden" Rare Book Collections

A Conservation Survey at the University of Illinois at Urbana-Champaign

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In response to the Association of Research Libraries' Special Collections Task Force's interest in "hidden" special collection materials, the University of Illinois at Urbana-Champaign's Conservation Unit undertook a conservation needs survey of the Rare Book and Special Collections Library's backlog of uncataloged rare book materials. The survey evaluated the binding structure; physical, biological, and chemical damage; and unique features of more than 4,000 randomly sampled pieces from the collection. The information gathered would aid in planning for the integration of immediate preservation actions with future cataloging projects and to better direct future conservation efforts. This paper details the development of the survey, interprets the results, and suggests methodologies for assessing other rare collections as well as approaches to integrating the identified immediate preservation needs with cataloging and processing projects.

Rare book collections in major research libraries have been perceived to hold a number of uncataloged and thus inaccessible items. In 2001, the Association of Research Libraries (ARL) formally acknowledged the need to address the problem of backlogs, and its Special Collections Task Force began exploring the challenge of enumerating the dimensions of the problem and providing access to uncataloged and unprocessed archival, special collections, and rare book materials.[1] The task force acknowledged that these hidden collections are pervasive in research libraries across the nation, and pose significant cataloging, storage, and preservation or conservation challenges (or both) to the libraries that hold them. In September 2003, ARL hosted the Exposing Hidden Collections Working Conference, where attendees were encouraged to outline the problems and potential strategies and solutions to this extensive dilemma.[2] At its close, the conference highlighted several plans of action, including support for "inter-institutional strategies to expand access to hidden collections including blending arrearage reduction efforts with preservation and retrospective conversion approaches, leveraging digitization efforts, and the sharing of expertise across and between libraries and archives."[3] This study provides one perspective for evaluating these hidden collections and sets a standard for other libraries to begin the assessment of their own hidden collections.

The Conservation Unit at the University of Illinois at Urbana-Champaign (UIUC) began its condition and needs analysis of the library's hidden collections in February 2003. This survey was undertaken to help determine how preservation efforts could be integrated with future cataloging projects and to begin a dialog with the curators about prioritizing future conservation treatments. The Rare Book and Special Collections Library (RBSCL) holds an estimated 80,000 uncataloged items. Of these, an estimated 20,000 pieces are printed, bound materials from the sixteenth and seventeenth centuries. To narrow the scope of the project, the research-

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ers selected these 20,000 uncataloged rare book materials as the focus of the project, though this collection is not as hidden as some other collections identified by ARL. All items do have author and title access through a card file, and English publications also are partially represented in the *Short-title Catalogue of Books Printed in England, Scotland, Ireland, Wales, and British America, and of English Books Printed in Other Countries, 1641–1700* and *English Short Title Catalogue: 1473–1800* (ESTC).[4]

This collection contains materials in a variety of conditions, many of which were acquired by RBSC in disrepair. Sample surveys are not commonly performed on rare book collections due to the highly variable bindings and physical condition of the materials. However, because of the collection size, the timeliness of the library's needs in quantifying its hidden rare book holdings, and ARL's current interest in such collections, the conservation librarian proposed a survey that would generate more generalized answers to questions on the material's preservation and conservation needs more rapidly than an item-level survey. This survey was planned to evaluate with a high degree of precision the condition and conservation needs of the 20,000 uncataloged pieces. Data generated from the findings then could be used for conservation planning and collection-wide preservation as well as to supply necessary information to RBSCL as it moves towards improved access and cataloging of these materials. Additionally, the authors hypothesized that because many of the materials in uncataloged backlogs in other research collections are likely in similar condition (due to their frequent status as unprocessed gifts, to which little or no treatment has been given), the results of the survey also could be used to represent the needs of similar collections of unprocessed sixteenth- and seventeenth-century materials in other libraries.

Literature Review

The typical preservation assessment focuses on collection-wide factors such as storage environment, policies, and procedures. By comparison, preservation and conservation surveys focus on a wide variety of factors that come into play when caring for collections. Surveys seek to answer questions related to the physical objects in the collection, either in a general or specific sense. Preservation professionals and curators then may use this information to better address the preservation needs of the collection by setting priorities, adapting policies and procedures, and, most importantly, by quantifying the needs of the collection to plan for the necessary staff, materials, and funding to meet those needs. Specific questions that may be addressed in a survey include age and provenance of materials in the collection, binding types, overall condition, damage incurred by the binding or paper of the item, and types of repairs that are needed.

Broadly speaking, surveys seek to answer these preservation questions from one of two perspectives. Depending on the type of collection and needs of the library or archives, surveys may be item-level or based on a random sample. In the professional literature, results of both such surveys have been noted, though far more sample surveys are documented. In most instances, sample surveys are used for large general collections, whereas item-level surveys are used for rare and special collection materials where item-level prioritization is desirable.

Much of the published research on preservation-needs surveys, the most important of which are detailed in this paper, focuses on the techniques used to derive information about library collections, reports on the findings of a survey of a specific collection, or compares assessment work done at various institutions. Approaches to surveying unprocessed, rare, or special collections are very limited in library and preservation literature, and no publications have been authored on the use of a sample survey to determine the conservation needs of an uncataloged backlog.

Sample Survey Methods

One important article written on the administration of a sample survey of a library collection is Drott's "Random Sampling: Tool for Library Research."[5] This is a classic article that anyone considering a random sample survey must read as a starting point for understanding methods of random sampling of library materials. Drott describes confidence and tolerance, how to select a sample, the use of random number tables, and how to translate random numbers into selected books on a shelf. This work remains a standard tool for performing a random sample survey of any nature. In 1989, the University of California at Berkeley introduced CALIPR, a computer-based tool programmed to aid in the management of a sample condition survey of general collections in the California State Library that was quickly utilized by other libraries.[6] In 1997, through funding by the U. S. Department of Education, CALIPR was made freely available on a Microsoft Windows platform. CALIPR leads preservation professionals and even those untrained in preservation through a sample survey of their collections and the analysis of the results. Although the technology for the program is now somewhat outdated, CALIPR was widely used at the time and is still available for use on a Windows 2000 platform. It served to disseminate the concept and administration of sample condition surveys for preservation planning purposes and introduced many people to the concept of the preservation survey. In his 1995 article, "Statistical Methodologies for Preservation," DeCandido approaches

a statistical topic similarly covered by Drott, but with a bend towards preservation assessments, and specifically for those using CALIPR.[7] DeCandido discusses how the sample size of 400 items, recommended by CALIPR, may prove inadequate when the assessor is seeking statistically valid data on subsets of a larger collection. He also discusses the different values of data acquired through an item-level versus sample survey and recommends that sample surveys are best used to establish a program or large project, but notes that item-level surveys are best to establish treatment priorities and therefore serve an established program and collection better.

Sample Survey Results

Libraries undertake preservation surveys for many reasons. Early published surveys were often large-scale and meant to direct the newly established preservation programs. One of the most influential results of a sample survey are found in Walker et al.'s "The Yale Survey: A Large-Scale Condition Survey of Book Deterioration in the Yale University Library."[8] This article reports on the results of the first large-scale survey of the condition of materials, including data from more than 40 Yale library units. To ensure high-confidence results, Yale preservation staff surveyed more than 36,500 volumes of the 7.7 million in their collections. They stratified their sample by library unit in order to make correlations based on environment, circulation, age, and origin of the materials in the various library units based on the data collected. The survey tool asked 16 questions that addressed the scope of the preservation needs and plan for preservation reformatting. Each of these questions had a finite number of responses, and details about the specifics of damage and treatment needed were not taken. This article has profound implications on planning a random sample survey, but does not cover any of the immediate treatment priorities or preservation actions that were implemented based on the survey.

A few other institutions have undertaken and published the results of sample surveys used to direct the beginnings of a preservation program. Bond et al.'s "Preservation Study at the Syracuse University Libraries" describes a sample survey undertaken by Syracuse University at the establishment of their preservation program in 1985.[9] The purpose was to determine the overall needs of the collection to help direct the fledgling preservation program. A stratified sample survey was designed to ensure that a proportionate number of books from each subcollection of the general collections was surveyed, though random number tables were used to identify individual items on the shelf. Another early sample survey that used similar methodologies as the Yale and Syracuse surveys, but that was not used to establish a new preservation program, was undertaken at the University of Illinois at Urbana-Champaign.[10] This article summarizes a general collections survey that used a stratified random sampling technique. In their research, the authors discuss their findings as well as the unsuccessful application of their sampling technique on such a large collection.

Starting in the 1990s, many preservation programs for larger institutions in the United States and Europe had been established. The survey results published in the literature tend to focus more on specific elements of collections rather than large-scale, collection-wide sample surveys. In Sheehan's "A Condition Survey of Books in Trinity College Library Dublin," the author gives the results of a paper condition survey performed on materials dating from the 1840s through the 1930s located in one gallery of Trinity College Library (approximately 250,000 volumes).[11] Tests performed on a 500-volume random sample of the collection consisted of fold endurance, burst strength, pH readings, moisture content, and paper thickness. This research differs from many other sample surveys because the random sample was stratified into decades, so that each decade of paper manufacture would be equally represented.

Another sample survey was undertaken by Teper and Atkins in 2003 in an attempt to assess short-term damage at the University of Illinois at Urbana-Champaign since the publication of Chrzastowski et al's research in 1989.[12] Though still performed through a stratified sample survey, Teper and Atkins did not attempt to resurvey the identical sample, but instead looked for preservation trends in the collection, including potentially increased levels of paper embrittlement and acidity.

Baird and Schaffner's "Slow Fires Still Burn: Results of a Preservation Assessment of Libraries in L'viv, Ukraine, and Sofia, Bulgaria" provides an excellent resource on assessing preservation needs of largely unprocessed collections in Eastern Europe.[13] Baird and Schaffner's research focused on library collections in Ukraine and Bulgaria's national repositories. By systematically surveying the collections of three research libraries, using a survey tool similar to one used to assess conditions at a research library in the United States and a personal digital assistant computer (PDA), they obtained results that can be compared with other published preservation studies.

Assessing Special Collections

Although condition assessments and surveys are cited as a key component of a preservation program for special collections repositories, few results of these projects are published. This may be because sample surveys are not frequently used for special collections materials. One exception is Green's "A Method for Undertaking

a Full Conservation Audit of Special Collections of Books and Manuscripts," in which the author outlined the method for statistically sampling cataloged special collections materials in both bound and unbound formats to provide overall condition ratings and estimates of treatment costs on a collection level, with a goal of setting treatment priorities and future grant applications.[14] In his survey, Green used a specific form that generalized damage to one of eight options, provided information on the suggested conservation treatment, and used a combined condition and usability rating scale of 1 to 4 for each item surveyed. Through this data, he projected the cost for repair for the larger collections by comparing the data to previous costs for similar conservation treatments. Green discussed at length how a random sample of the collection was derived and how the costs were determined for both the book and manuscript collections.

Compared to assessments and sample surveys, item-level surveys are much more time-intensive, but can give very specific information for curators and conservators attempting to prioritize collections for repair on an item-level. Although these surveys are critical when planning large-scale conservation treatments of rare book and special collections, few results of these surveys have been published. Documenting and sharing the process by which a survey is undertaken and priorities are established can be extremely helpful to other institutions planning similar projects. In Evans's "The Duke Humfrey's Library Project: Using An Item-by-Item Survey to Develop a Conservation Programme," the author described an item-level survey completed in the oldest part of the Bodleian Library at Oxford University.[15] The survey aimed to assess the volumes' conditions in order to establish a conservation treatment program specifically for this subcollection, with the goal of adapting the tool to larger portions of the Bodleian Library. The author used the resulting data to help establish priorities for conservation treatment by comparing the assessed condition with the context of each piece within the collection, the curatorial value, and the recorded use, and then attempted to project the best use of resources given that information.

Summary

The published literature aided in some elements of the design and implementation of this survey; however, the authors found no models that performed a survey of a similar collection—an uncataloged rare book backlog. Statistically significant sampling techniques suggested in the literature provided the basis for the authors' estimation of the number of items to be assessed and the framework for the sampling method. Surveying techniques utilized in general collection surveys could be adapted for work in special collections, however not all elements were similar. Different techniques and amounts of time were needed when surveying materials in the rare book room, and a higher level of detail was required for each piece than in a traditional general collections survey. These elements of the project more closely resembled published information on item-level condition surveys.

Overall, the authors found that the published literature on preservation surveys is rich in reports of general collections sample surveys, but lacking in results of successful surveys completed on special collections materials. No published results were found for a survey of uncataloged arrearages, or for the preservation and conservation challenges that they create.

Project Design

Conservators and curators of special collections often feel challenged by the design and the usability of data collected from surveys of uncataloged materials. Because these materials are uncataloged, several of the most important factors in prioritizing materials for conservation—assigned market value, curatorial value, and use—remain relatively or completely unknown. Therefore, the design of this survey must differ from those of a more traditional survey of rare book materials.

Goals of the Survey

The survey primarily focused on gathering information to inform future treatment projects and the impact on cataloging. This means that while attention was paid to significant conservation treatment concerns, the survey focused on more general collections care interests, including age and cover materials, need for cleaning, presence of mold or insect infestations, and appropriateness and necessity of protective enclosures and other means of stabilization. The rationale behind this was to reduce handling of materials as well as to aid future conservation planning, as these materials become more accessible to researchers and require more extensive treatments. Lastly, the survey addressed the preservation requirements often obligatory by granting agencies, should the library propose a grant-funded cataloging project.

Staffing

The conservation librarian oversaw the development, management, and training for the survey. To perform the survey, an hourly library science graduate assistant (GA) with experience working in museums, performing condition surveys of flat paper, and designing databases was hired to work ten hours a week. Together they constituted the research team. The total project required approximately one year, with the conservation librarian assisting in the development of

the survey tool, identification of the random sample, and identification of less common binding styles, materials, and deterioration.

Design of the Survey Tool

The researchers planned the survey tool (see appendix) to gather information about the following characteristics:

- condition and usability;
- bibliographic information including author, title, general size (miniature, octavo, quarto, or folio), date of publication, shelf location, and book number;
- condition, including binding style, cover materials, board and spine condition, cover-to-text attachment condition, and overall cover and text block condition (including observations for mold, water, and insect damage as well as other damage)—embrittlement was only gauged by visible indications and included no destructive testing;
- previous repairs, enclosures, or other methods of stabilization; and
- open-ended text section for notes on any observations not covered by the previous sections.

None of these sections were designed to go into great detail about the binding or condition of the materials. For instance, no attempt was made to record the exact dimensions of the materials, the types of leather (except in rare cases where it affected the conservation needs of the pieces, such as badly splitting sheep leather), or the sewing structures of the text blocks.

Once the questions for the survey were drafted, the GA entered data directly into a laptop computer using FileMakerPro software. Although the ease and maneuverability of paper survey forms were desirable, the time necessary to transfer all the data into a computer for analysis outweighed the benefits. The GA also pretested the survey tool on a sample of 6 volumes and adjusted as necessary before beginning the formal survey project.

Pulling a Random Sample

Before the survey could begin, a random sample had to be identified from the 20,000 uncataloged rare book materials in RBSCL. The RBSCL staff had divided these pieces into three groups according to size (octavos, quartos, and folios) and then arranged the items alphabetically by author, if known, or by title, if the author is unknown. Miniature books were interfiled with the octavos, and no elephant folios were present. These categories accounted for approximately 35 books per shelf for 482 shelves (16,870) of octavos, approximately 15 books per shelf for 188 shelves (2,820) of quartos, and 2 books per shelf for 50 shelves (100) of folios. Each category had been housed in a roughly continuous arrangement, though some breaks occurred due to the layout of the shelving and space availability around the cataloged collections.

The authors selected a sample of approximately 4,000 items, for an estimated 20 percent of the collection, giving 99 percent confidence with a ±1.8 percent margin of error. They created a methodology for randomly selecting the items based on existing guidelines for random sampling of library and museum collections and in consultation with the UIUC Survey Research Lab staff. Because the collection was physically distributed according to size, experts at the Survey Research Lab suggested that the sampling method also be stratified by size for the purpose of the survey. A preliminary measurement of items per shelf showed similar numbers of quartos and octavos per shelf, hence both sizes were combined into the same stratification. From this, staff estimated the proportion of the collection in each classification, as well as the proportional number of items to sample from each. Survey staff then defined the number of items per shelf to be sampled. For example, for each octavo and quarto shelf, 6 books were assessed. For each shelf, the researchers selected the books using a random number table. Due to the nature of the sample and human error in estimating the total number of shelves, a slightly higher total sample (4,036 items) resulted.

Once the survey was begun, however, the GA found significantly more octavos per shelf than quartos, as noted above as their final population dispersal. Although the sampling method produced a higher ratio of quartos sampled than were actually present in the population, the total number of items sampled in each group was still statistically very high and did not affect the overall results of the survey with any significance. The survey assessed 1,140 quartos and 2,590 octavos, which represented approximately 40 percent and 15 percent of the estimated total populations for those sizes, respectively. While the sample size of the octavos resulted in a slightly reduced confidence in the results, the total sample size still resulted in a 99 percent confidence, with a ±2.3 percent margin of error, which is sufficiently high to determine the overall needs of all parts of the collection.

Data Manipulation

Once the survey was completed, the researchers checked the data for errors and redundancy, and transferred them to a Microsoft Excel spreadsheet for manipulation. To simplify the analysis of the survey, and because they had little direct impact on the key analyses sought in this survey, very little cross-relational data are presented. For example, though one can deter-

mine how many vellum bindings had insect damage, figures for binding type and damage are not compared except in select cases where they obviously relate, such as previous water damage and mold development. The information derived from other cross-relations in data fields will be the subject of future analysis by the authors.

Survey Findings

Dates of Production and Binding Formats

Much can be learned about this hidden collection from some of the most basic information gathered in the survey. Table 1 shows the distribution of the dates of publication found in the collection. More than 97 percent of the books assessed date from between 1500 and 1700, indicating that this collection is fairly homogenous in age, and is composed of predominantly European publications, as few printing presses were established outside of Europe and Asia during those centuries. The oldest material found in the survey was a vellum manuscript dating from 1175. Although the survey indicates that 0.87 percent of the collection materials dated from the twentieth century, closer scrutiny indicates that these items are all reproductions (predominantly photostatic copies) of earlier publications. Thirty-eight (0.94 percent) of the items assessed had no identifiable publication date.

In addition to the dates of publication, the results obtained about binding materials, shown in table 2, provide information about the nature and history of the materials. For instance, most items bound in full, limp vellum are likely in their original bindings, whereas many of the items bound in cloth have been rebound. Similarly, pieces bound in full leather or vellum would likely have been considered more valuable by their original owners than those items that have remained in their paper wrappers, as books were sold unbound and bound only at the discretion of their owners (though those values may no longer hold true).[15] More than 15 percent (674) of the items assessed were bound in full vellum, and more than 48 percent (1,959) were bound in full leather (84 percent, or 1,650 of those being tight-back binding structures). Only 1.14 percent (46) were bound in full cloth, and 7.83 percent (316) were bound in full paper (74 percent, or 233 of those are pamphlets in thin paper wrappers). The remaining 9.94 percent (401) of the collection were bound in half- and quarter-bound combinations of leather, cloth, vellum, and paper. Five-hundred and nineteen (12.86 percent) were unbound. Although the GA did not attempt to gauge whether the binding was original to the piece, many of the materials and binding structures identified, such as full vellum and tight-back leather bindings, indicate bindings consistent with sixteenth- and seventeenth-century practices. Materials easily identified as rebound are discussed in a later section.

Damage and Usability Ratings

One of the most basic pieces of data collected during the survey, and the most critical to projecting accessibility by future catalogers and patrons, is the current damage levels of the materials and the estimated usability of each item in its present state. The authors chose to apply two scales, those of "damage" and "usability" to each item assessed. Damage was assessed on a scale of 1 to 5, with 1 being the least damage; usability was assessed on a scale of 1 to 3, with 1 being the most usable. Most materials (see table 3) assessed fell in the range (damage/usability) of 2/1 (20.3 percent), 2/2 (12.6 percent), 2/3 (0.1 percent), 3/1 (3.4 percent) and 3/2 (32.9 percent). These results indicate that 69.3 percent of the collection, while showing definite signs of wear and tear, incurred only moderate damage and can still be safely handled and used by patrons. An additional 5.2 percent of those assessed show light damage, leaving 25.3 percent of the collection in poor enough condition to offer challenges for processing and patron use.

Damage Types Identified

Four categories of damage were noted in the survey: "text block damage" (any physical damage or deformities to the pages of the book); "cover damage" (any damage or deformities to the cover of the book); "damage to board attachment" (complete or partial separation of one or both boards from the rest of the book); and "damage to cover-to-text attachment" (compromised integrity of the internal connection between the cover and the text block). Although the last two categories could overlap, a concerted effort was made to use "board attachment" when referring to complete separation of boards or damage to the external hinge, and "cover-to-text" when referring to the internal hinge only.

Table 1. Identified dates of publication in assessed materials

Date range	No. of items in sample	% of sample
1100–1199	1	0.02
1200–1299	3	0.07
1300–1399	1	0.02
1400–1499	4	0.10
1500–1599	1,210	29.98
1600–1699	2,706	67.05
1700–1799	33	0.82

Overall, text block damage was predominantly cosmetic as opposed to structural (table 4). While nearly all (97.32 percent) of the collection showed evidence of surface dirt, staining, discoloration, or all of these on at least some of its pages, a much smaller percentage of those assessed exhibited more severe damage. The most common structural damage found was cockling of the text block, which impeded full opening of the text block (exhibited by 74.06 percent of the assessed) and tears in the text block (47.03 percent), while other damage to the text block, such as mold (11.89 percent), detached pages (10.80 percent), visible paper embrittlement (3.2 percent), and losses (8.28 percent), were noted at a much lower occurrence. While the relatively high incidence of tears in the text block indicates a need for care when handling the items, many of the items displayed tears on only a few pages, frequently at the front of the book, and therefore can still be handled relatively safely.

The separation or loss of any pieces of the cover were recorded only as "board attachment" and "cover-to-text attachment," whereas "cover damage" recorded only that damage evident on any remaining covering materials, except where no binding remained. Similar to the damage noted for the text block, much of the most frequently noted damage to the covers of those items assessed was cosmetic, while a relatively small percentage of cover damage was structural or severe (table 5). Overall, at least 81 percent of the collection showed evidence of use through noted abrasion (81.0 percent), dirt (79.2 percent), and discoloration (75.6 percent). More critical types of damage were noted at much lower rates, including brittle (2.3 percent), portions of a board or spine missing (0.3 percent), and covering unattached (delaminating leather or separating cloth, 0.2 percent). The occurrence of mold (4.6 percent), spew (6.5 percent), cockled covers (17.5 percent), and splayed or drummed (16.1 per-

Table 2. Binding formats and materials

Binding Format	No. of tight-back	No. of limp	No. of hollow-back	No. of library binding	No. of pamphlet binding	No. of unbound	No. of other	Total	% of each binding material
Full Vellum	82	408	184	0	0	0	0	674	16.70
Full Cloth	6	1	17	17	5	0	0	46	1.14
Full Paper	24	16	68	4	204	0	0	316	7.83
Full Leather	1650	11	289	1	8	0	0	1959	48.54
n/a	1	0	0	0	0	518	0	519	12.86
Full Other	0	0	1	0	0	0	0	1	0.02
1/2 Vellum & Cloth	0	0	0	0	0	0	0	0	0.00
1/2 Vellum & Paper	2	2	26	0	0	0	0	30	0.74
1/2 Cloth & Paper	1	0	3	1	0	0	0	5	0.12
1/2 Cloth & Leather	29	0	16	2	0	0	0	47	1.16
1/2 Paper & Leather	113	0	85	3	5	0	0	206	5.10
1/4 Vellum & Other	2	0	0	0	0	0	0	2	0.05
1/4 Paper & Other	0	0	1	0	0	0	0	1	0.02
1/4 Leather & Other	11	0	1	0	0	0	0	12	0.30
1/4 Vellum & Cloth	0	1	0	0	0	0	0	1	0.02
1/4 Vellum & Paper	8	3	17	0	0	0	0	28	0.69
1/4 Vellum & Leather	4	1	4	0	0	0	0	9	0.22
1/4 Cloth & Paper	3	0	12	7	5	0	0	27	0.67
1/4 Cloth & Leather	12	0	17	1	2	0	0	32	0.79
1/4 Paper & Leather	64	0	51	2	4	0	0	121	3.00
Total	2012	443	792	38	233	518	0		
Percent of each binding format	49.85	10.98	19.62	0.94	5.77	12.83	0.00		

cent) boards (the vellum has warped and shrunk such that the boards are pulled taught and away from the text block) point toward improper storage environments for the items in the past or present. These findings only reinforce known problems with occasionally large fluctuations in both temperature and relative humidity in the RBSCL storage areas that must be remedied. Only 2.6 percent of the items assessed showed no signs of damage to their cover.

Both the data for board attachment and the data for cover-to-text attachment support the assumption that significant binding damage is present in the collection surveyed. More than 18 percent of the items surveyed had one or both boards detached or missing (table 6). For cover-to-text attachment, 5.9 percent of books assessed displayed two broken internal hinge attachments (while still having boards attached to the cover spine), 8.8 percent had one broken internal hinge, and 44.8 percent had weakened hinges (table 7). The survey results for these types of damage demonstrate the consequences of age and use. Although repeated use will weaken the external and internal hinges, the high percentage of items with leather in full- half-, and quarter-bindings (59.1 percent of the total assessed) and the known weakening of leather if stored in an improper environment may account for many detached and weakened board attachments.

Repairs and Enclosures

A small number of books assessed show clear evidence of previous repairs to the binding or the text block (table 8). To the best of the authors' knowledge, all of these repairs were made before RBSCL's acquisition. More than 16 percent of the items possess at least one previous paper mend, most frequently to the first few pages of the volume. Binding repairs, however, display a much lower occurrence. Only 7.88 percent of items exhibit spine replacements, 0.12 percent show evidence of cover-to-text repairs, 8.05 percent display other types of cover repairs, and a very low 0.87 percent of the collection was completely rebound. The observed quality of the repairs varies considerably, ranging from harmful,

Table 3. Combined damage and usability scales

Damage	Usability	No. of items in sample	% of sample
1	1	189	4.7
1	2	9	0.2
1	3	13	0.3
2	1	821	20.3
2	2	508	12.6
2	3	6	0.1
3	1	139	3.4
3	2	1328	32.9
3	3	149	3.7
4	1	0	0.0
4	2	151	3.7
4	3	464	11.5
5	1	0	0.0
5	2	0	0.0
5	3	259	6.4
	Total	4036	99.8

Table 4. Cosmetic and structural text block damage

Damage type—cosmetic	No. of items in sample	% of sample
Dirt	3,928	97.32
Discolored	3,858	95.59
Stained	3,418	84.69
Ink transfer	2,330	57.73
Foxed	1,671	41.40
Water damage	1,382	34.24
Creased	5	0.12
Surface deposits	4	0.10
Gouged	3	0.07
Damage type—structural		
Cockled	2,989	74.06
Torn	1,898	47.03
Insect damage	1,719	42.59
Mold	480	11.89
Detached pages	436	10.80
Brittle	129	3.20
Losses	8	0.20
Burned	5	0.12
Pages adhered together	4	0.10
Active infestation	4	0.10

amateur repairs on paper and covers, to skillful leather rebacks and rebinds completed by trained craftsmen. Although these data are helpful, rare book curators and conservators likely will find that, while the quantities found for spine replacements and cover repairs are roughly accurate, the less than 1 percent rebound estimation is likely very low. This is due to the fact that the GA performing the survey was not asked to evaluate whether the binding was contemporary to the printing date of the item unless it was extremely obvious that it had been rebound (for example, in buckram or another twentieth-century binding style). Many of the bindings were noted to be in limp vellum (15 percent) or tight-back leather (40.9 percent), which does indicate a high percentage of original bindings.

Although less permanent than repairs, nearly 40 percent of the collection has received some level of basic stabilization, either previous to RBSCL's receipt, or since its acquisition (table 9). More than 20 percent of the collection has been tied with varying qualities and ages of cotton twill tape, much of which was replaced during the survey. A fairly high percentage of the collection, 8.2 percent, is stored in brown paper envelopes. These envelopes, while providing a certain amount of structural support to the items they hold, present several conservation dilemmas. Of primary concern is their acidity level. Most of the envelopes and some of the older pamphlet binders observed are not constructed of preservation-quality materials, and the resulting high acidity levels are damaging to the collection materials they hold. Even more distressing, however, is the number of these envelopes with gummed flaps that have been tucked inside the envelope, often in direct contact with the artifact. This practice has resulted in a number becoming soundly adhered to the envelopes in which they are stored (4.2 percent of those items in envelopes, or 0.35 percent of the total population). Within the past year, the RBSC staff has undertaken a project to systematically replace acidic envelopes and binders with archival-quality, four-flap binders. This project, however, will not address the uncataloged collection for several years. An additional 10.46 percent of the sample was observed to have more permanent and appropriate enclosures, mostly consisting of proper pamphlet binders or folders, clamshell boxes, and slipcases.

Data Utility

Although the data produced by this survey are interesting as an examination of the physical condition of a specific uncataloged backlog of sixteenth- and seventeenth-century books, the challenge has been to dovetail the needs identified through the survey as much as possible with future cataloging or inventorying projects in order to best use staff time and reduce handling to these sometimes fragile materials.

Table 5. Types of cover damage

Damage type—cosmetic	No. of items in sample	% of sample
Abraded	3269	81.00
Dirt	3197	79.21
Discolored	3051	75.59
Leather dry	2093	51.86
Torn	1830	45.34
Stained	1570	38.90
Insect damage	840	20.81
Faded	342	8.47
Spew	264	6.54
Mold	184	4.56
No damage	106	2.63
Water damage	81	2.01
Gouged	13	0.32
Sticky	8	0.20
Damage type—structural		
Cockled	707	17.52
Boards splayed or drummed	651	16.13
No binding	518	12.83
Brittle	93	2.30
Missing portions	14	0.35
Covering unattached	8	0.20
Misshapen	6	0.15

Table 6. Recorded damage to board attachment

Damage type	No. of items in sample	% of sample
One board detached	257	6.37
Both boards detached	186	4.61
One board missing	5	0.12
Both boards missing	298	7.38
One board detached, one board missing	9	0.22
No damage	3,281	81.29

To be useful to a broader audience, these recommendations also must be applicable to other institutions with similarly aged backlogs.

The survey shows that immediate preservation needs, ranging from basic stabilization efforts and cleaning through some limited, high-end conservation treatments, are necessary if the RBSCL staff is to begin handling the collection materials during cataloging or inventory projects. While many items in this collection would benefit from item-level conservation treatment, the authors recommend that a more collectionwide approach first be taken to address the stabilization needs of these items, and very limited conservation treatment be begun for only those items deemed of high value or use potential. Even basic stabilization steps, however, must be prioritized due to the overwhelming number of items in need. To recommend priorities for stabilization, the authors first looked at the entire collections' needs and costs in both supplies and staff time for such measures. These figures, while specific to the RBSCL collection, represent the same process other institutions must face when prioritizing similar collections. Although priorities for individual items will vary from collection to collection, the overall approach for stabilization, minimal treatments, and full conservation would apply to many other rare book backlogs.

Cleaning

A cleaning project for all items would be of great benefit to the collection. An observed 4.6 percent of covers and 11.89 percent of text blocks exhibited at least minimal mold (few exhibited substantial mold growth, though no active mold was found during the survey), while an additional 6.5 percent of covers exhibited spew or other surface accretions. While the presence of spew and other efflorescence is predominantly an aesthetic issue, the presence of mold, even in small amounts, on these materials poses a significant threat to future outbreaks, especially given the history of unstable relative humidity in the RBSCL stacks. While complete mold remediation cannot be achieved without the use of more rigorous chemical treatments, the risks associated with the presence of inactive mold spores can be greatly reduced by thorough cleaning with a vacuum equipped with a high-efficiency particulate air (HEPA) filter. Using microtool attachments and a variable-suction HEPA filter vacuum to allow for the most gentle and precise cleaning possible, RBSCL staff or students could clean each item before processing to reduce the presence of inactive mold spores, as well as improve the appearance of items by removing other surface deposits and dust. Cleaning rare books, especially broken ones, requires more time than general collections materials, and previous cleaning projects in the RBSCL have required approximately two to three minutes per book for dusting and vacuuming. This would translate into at least an additional 667 hours to

Table 7. Recorded damage to cover-to-text attachment

Damage type	No. of items in sample	% of sample
Both internal hinges broken	237	5.87
One internal hinge broken	15	0.37
One broken and one weak hinge	338	8.37
Weak hinges	1,809	44.82
No damage	1,637	40.56

Table 8. Previous repairs found

Repair type	No. of items in sample	% of sample
Paper repairs	651	16.13
Cover repairs	325	8.05
Spine replacement	318	7.88
Rebound	35	0.87
Cover to text attachment	5	0.12

Table 9. Enclosures found

Repair type	No. of items in sample	% of sample
Brown paper envelope	332	8.23
Library pamphlet folder	319	7.90
Other enclosures	49	1.21
Clamshell	24	0.59
Slipcase	20	0.50
Paper wrapper	2	0.05
Phase box	1	0.02
Mylar jacket	1	0.02
Encapsulated	1	0.02
Total	749	18.54

clean the entire 20,000 volume collection (approximately 13 hours per week for 1 year).

Physical Stabilization

An estimated 78.4 percent of the collection—those with weak or broken internal hinge attachments (59.4 percent) plus those with one or more detached boards (19.0 percent)—would benefit from basic stabilization treatments. However, fewer than half of this estimated population (39.7 percent) has received any stabilization or enclosure. Treatments as simple as a clean, well-tied cotton twill tie would greatly aid in stabilizing those items that do not already have an enclosure as they are pulled from the shelf and handled for processing. For those items requiring slightly more support, the use of alkaline buffered binder's board cut to the approximate size of the piece and tied to each side of the book with cotton twill tie would give structural support and protection to these higher-risk artifacts. Lastly, for those thin items not presently in binders or envelopes, and for those items in non-preservation quality envelopes (8.2 percent), the purchase of buffered paper envelopes without gummed flaps, or preferably four-flap binders if funding is available, would offer enhanced protection and support during handling and while on the shelf.

Based on the estimated populations from this survey, the supply costs for these basic stabilization measures would be approximately $386 in unbleached, quarter-inch cotton twill tie ($0.05 worth of cotton tie per book multiplied by 7,720), $37.80 to $90 in alkaline buffered binder's board with quarter-inch cotton twill tie ($0.45 of board and cotton tie per book multiplied by 84 to 200 items missing bindings or requiring replacement of enclosures, or both), and $557.60 in replacement buffered paper envelopes or $9,020 in the pricier four-flap binders ($0.34 average cost per preservation-quality top opening envelope or $5.50 per folder multiplied by 1,640).

Staff time for each method of stabilization would be approximately thirty seconds for each item string tied, one minute for each item string tied with precut binder's board supports (assuming that the Conservation Unit precut the board; its time is not counted in the time estimate), and thirty seconds for each item placed in a preservation-quality envelope or four flap. These preservation efforts would result in an estimated 81.3 hours of additional staff time for the entire collection. Both the time and supply estimates are based on the author's previous experience in performing the same basic stabilization methods on items being stabilized for transfer to high-density storage.[16] Time estimates do not include any marking of the enclosures beyond transfer of call numbers in pencil.

Conservation Treatment

As stated earlier, a limitation of this survey is that conservation treatment priorities cannot be definitively set using the results of a sample survey. Priorities for high-level conservation treatments, such as leather rebacking, full rebinding, or resewing, must be set by the curator in consultation with the conservator. Due to the time necessary to perform such treatments, they must be undertaken only after careful consideration by the curator, or after a high level of use has been established.

Lower-level conservation treatments, such as minor paper repairs (47.0 percent of the collection, or an estimated 9,403 items), reattaching pages (10.8 percent, or an estimated 2,160), or minor leather hinge repairs (6.5 percent of the collection, or an estimated 1,300 items) may be completed in less time than the more major treatments. Treatments such as these may be completed in house, and could be planned for treatment after cataloging, if warranted. Using the data collected from this survey and estimating one hour for each minor conservation treatment (though in reality these would vary greatly) would project an estimated 12,863 hours of labor (one skilled conservation technician working full time for 6.5 years).

Setting Priorities During Processing

Not all items in need can be repaired or even stabilized without a significant commitment in time and money. Although in a few unusual cases, completing a repair may be necessary before cataloging (such as with more serious mold treatments or the construction of boxes for severely broken bindings), the authors believe that this practice should be kept to a minimum, as even small treatments should not be undertaken until the curator completes a cursory assessment of potential use and value of each piece. By weighing the benefits to the collection with the cost of undertaking each level of treatment, basic stabilization will benefit the books most in need for the lowest cost and should be made the first preservation priority. Unfortunately, this stabilization is not meant to be permanent, but only the first phase in future conservation steps. Due to the high risk of mold contamination, a collection cleaning should be considered as a second priority. In similar institutional collections with a reduced threat of mold, cleaning may be considered a lower priority. After consideration by the curator, materials needing minor treatments must be prioritized, and high-priority items should obtain treatment as they are catalogued. Due to the magnitude of need in the collection, a general rule of thumb would be that fewer than one third of items with damage should receive immediate treatment, while others should be prioritized into medium or low priority for treatment. For high-level conservation treatment,

only a select few should be treated before an established use level is identified. Other treatments, as identified in the next section, must be planned for the future as each item's value to the collection is established.

Undertaking these suggested prioritized treatments, even at the most basic levels without any major conservation repairs, is still a costly and time-consuming endeavor for any institution with a collection of similar scope and size. Cleaning the entire collection at the University of Illinois would require 13 hours per week of skilled student labor for one year and $1,316 in supplies. Basic stabilization would involve an estimated 81 hours of staff or skilled student labor for one year and $1,033 in supplies, while minor conservation treatments for the entire collection would require a full-time technician for 6.5 years plus minor supplies. More involved conservation treatments would only add labor hours and supply costs exponentially.

Future Conservation Needs and Grant Planning

From the snapshot taken of the uncataloged collection, the Conservation Unit can make some broad generalizations about the future conservation needs of a significant portion of the RBSCL collections. Items bound in vellum, which represent 18.43 percent of the total "hidden" collection, are at the greatest risk. Vellum is known to react very strongly to the fluctuations in storage climate, particularly relative humidity. This has resulted in a very high proportion of the vellum bindings (87.5 percent of the vellum bindings, or 16.1 percent of the total population) having splayed or drummed boards. While these items would be better shelved and handled if their covers were humidified and relaxed, this treatment is inadvisable until the relative humidity of the storage environment can be stabilized to more properly house such artifacts. Until that time, badly misshapen vellum bindings can be placed in custom-fitted protective enclosures to make shelving and handling the items easier. Although clamshell boxes are a more common enclosure for use on rare book materials, the more affordable rivet-and-string phase box has the advantage of offering cost-effective treatment with the ability to increase the tightness of the enclosure over time, actually helping to bring misshapen vellum back to a more proper shape. An added benefit of any protective enclosure is the addition of a protective, buffering layer between the artifact and the fluctuating environment. This layer reduces the effects of swings in temperature and relative humidity on hygroscopic vellum bindings. Rivet-and-string phase boxes can be made in-house by the Conservation Unit or outsourced through a contracted commercial binder for between $7.50 and $15, excepting folio-sized enclosures, which would be more costly based on their size.

Unlike vellum, many other conservation repairs are not as closely related to the environment and could be undertaken even if RBSCL's storage environment is unchanged for the near future. Those items having no bindings or having missing or detached boards should be a high conservation priority because they are structurally instable and present challenges to catalogers, shelving staff, and patrons. With an estimated 20.5 percent (4,100 items) of the collection missing entire covers or at least one board, and 11.3 percent (2,260 items) of the collection having at least one detached board, priorities must be established so that those items of the greatest value will be treated first. As a broad estimation using the result of the survey, approximately 3 percent of materials would require resewing; 17 percent of the collection (an estimated 3,400) would require rebacking (distributed by material: 8 percent vellum, 77 percent leather, 2 percent cloth, and 13 percent paper); and 2 percent would require recasing (distributed by material: 21 percent leather, 1 percent cloth, 14 percent paper, and 64 percent with no binding present but too large to store in an envelope). These priorities should be established in close consultation with the collection's curators. One potential avenue for setting these priorities would be assigning general monetary and curatorial values as items are cataloged. Those items exhibiting a certain level of damage, such as no binding or missing boards, and having a high value assignment would be given top priority for conservation treatment from the uncataloged collection. Even these priorities, however, must be balanced against the significant conservation needs of the cataloged collection.

The results of this survey serve two purposes toward future grant planning. First, the project has assessed and quantified the preservation and conservation needs of the collection. Many granting agencies will not consider a grant application for improving intellectual access to materials if the physical condition of the collection is undetermined, as use of materials will usually increase once intellectual access is improved. Second, it offers cost-effective suggestions for improving physical access to the materials at a relatively low cost that could be included in the budget for an access grant, thus simultaneously improving both intellectual and physical access to the materials.

Conclusions

Through the use of a random sample survey, the Conservation Unit was able to determine a great deal about the condition of the hidden uncataloged backlog in UIUC's Rare Book and Special Collections Library. The data collected have resulted in a clearer understanding of the preservation and conservation challenges in the collection. Through the quantification of

the types of bindings, their usability, and the types and degrees of damage found, the Conservation Unit has been able to move toward establishing guidelines for immediate, basic preservation efforts that can be integrated with future cataloging project for relatively little cost, as well as determining methods for prioritizing future conservation treatments. Due to the nature of the collection, the findings that are not related to the immediate environment (mold and vellum splaying) also can be used by other institutions holding similar backlogs as a general guide to the conservation needs of such collections. While the costs and exact percentages of each type of treatment will differ from institution to institution, the process by which priorities were set also can be applied to other collections. Every rare book collection will have its own acquisition history and individual strengths and weaknesses. This survey can provide a methodology to help others come to terms with the needs of their richest collections, and move the conservation of the nation's cultural heritage forward.

Further Study

This paper does not represent all the data collected in the survey and does not provide any cross-relationships between multiple factors. While these cross-tabulations are useful, they are beyond the scope of this initial study. Further study into the relationships between the date of publication, type of binding, and observed damage may provide results that could lead to a heightened ability to project conservation needs. Additionally, viewing the results of this survey in comparison to the results of a similar survey of RBSCL's cataloged collection would be interesting. Higher use results in greater wear and tear, but also can result in an increased awareness of needs and likelihood of repair. Anecdotal evidence from multiple conservators and preservation administrators indicates that such uncataloged collections show a higher level of disrepair, but no formal studies have sought to prove this as true.

The authors have hypothesized that uncataloged backlogs in other research collections are likely in similar condition. Although the results of this survey may be used by other libraries as a general representation of similar collections, comparing the results of a condition survey of other uncataloged backlogs could establish trends and similarities.

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Appendix: Survey Form

Rare Book Collection Condition Survey

Date Surveyed: Date Surveyed

Damage:
- ☐ 1-not damaged or light damage
- ☐ 2-minor damange - wear or aging, etc
- ☐ 3-prevalent damage
- ☐ 4-significant damage - repair require
- ☐ 5-heavy damage

Usability:
- ☐ 1-can be used without mediation
- ☐ 2-can be read with supports and training
- ☐ 3-requires curatorial mediation for us

Bibliographic Information

Author Name: Author Name

Title: Title

Size: Size

Location: Location

Number: Call Number

Date of publication: Date of publication

Condition

Binding Type
- ☐ Tight Back sewn on cord/tape
- ☐ Limp
- ☐ Hollow back / Publisher Case
- ☐ Library Binding
- ☐ Pamphlet-Bound
- ☐ No Binding
- ☐ Other...

Covering Material
- ☐ Vellum
- ☐ Leather
- ☐ Cloth
- ☐ Paper
- ☐ 1/4 bound
- ☐ 1/2 bound
- ☐ Full bound
- ☐ N/A
- ☐ Other...

Boards
- ☐ Front detached
- ☐ Front missing
- ☐ Back detached
- ☐ Back missing
- ☐ Other...

Spine
- ☐ Partially detached
- ☐ Detached
- ☐ Headcap damage
- ☐ Missing
- ☐ Sewing Broken
- ☐ portions missing
- ☐ Other...

Cover-to-Text Attachment
- ☐ Internal hinge detached Front
- ☐ Internal hinge detached Back
- ☐ Tenuous attachment
- ☐ Weak
  - ☐ covering material
  - ☐ spine lining fabric
  - ☐ pastedown
  - ☐ cords
- ☐ Sound
- ☐ Other...

Cover Condition
- ☐ Discolored
- ☐ Stained
- ☐ Water Damage
- ☐ Molded/Mildew
- ☐ Dirt / grime
- ☐ Faded
- ☐ Leather dry/weak
- ☐ Visibly Brittle
- ☐ Cockled
- ☐ Torn
- ☐ Abraded
- ☐ Insect Damage
- ☐ Active infestation
- ☐ boards splaying
- ☐ spew
- ☐ gouged/slashed
- ☐ missing portions
- ☐ cover otherwise mis
- ☐ cover material unac
- ☐ sticky
- ☐ Other...

Paper Condition
- ☐ Discolored
- ☐ Stained
- ☐ Water Damage
- ☐ Foxed
- ☐ Molded/Mildew
- ☐ Dirt / grime
- ☐ Ink Transfer
- ☐ Cockled
- ☐ Visibly Brittle
- ☐ Torn
- ☐ Detached Pages
- ☐ Insect Damage
- ☐ Active infestation
- ☐ pages stuck together
- ☐ creased (significantly)
- ☐ loss
- ☐ surface deposit
- ☐ burn holes
- ☐ odd colored pages
- ☐ gouged/slashed
- ☐ uncut
- ☐ ragged
- ☐ Vellum pages
- ☐ Atypical spotting
- ☐ Other...

Previous Treatment
- ☐ Inappropriate/Damaging
  - ☐ booktape
- ☐ Enclosure
  - ☐ Library pamphlet folder
  - ☐ Brown paper envelope
  - ☐ Clamshell
  - ☐ slipcase
  - ☐ phase box
  - ☐ mylar jacket
  - ☐ paper wrapper
  - ☐ inappropriate size
- ☐ rebound
- ☐ Cover repairs
- ☐ Spine replacement
- ☐ Paper repairs
- ☐ cover to text attachment
- ☐ Twill tie
- ☐ Binders board supports
- ☐ Harmful inclusions
- ☐ Inappropriate labeling
- ☐ encapsulated
- ☐ Other...

Decoration
- ☐ Clasps/ties
- ☐ Faux tight back
- ☐ Paste paper
- ☐ Painted edges gilt
- ☐ Painted edges all
- ☐ Tooling gilt
- ☐ Tooling blind
- ☐ Marbled pastedowns
- ☐ Gauffering
- ☐ Bookmark
- ☐ Bookplate/provenance marker
- ☐ Other...

Other Notes

Other Notes