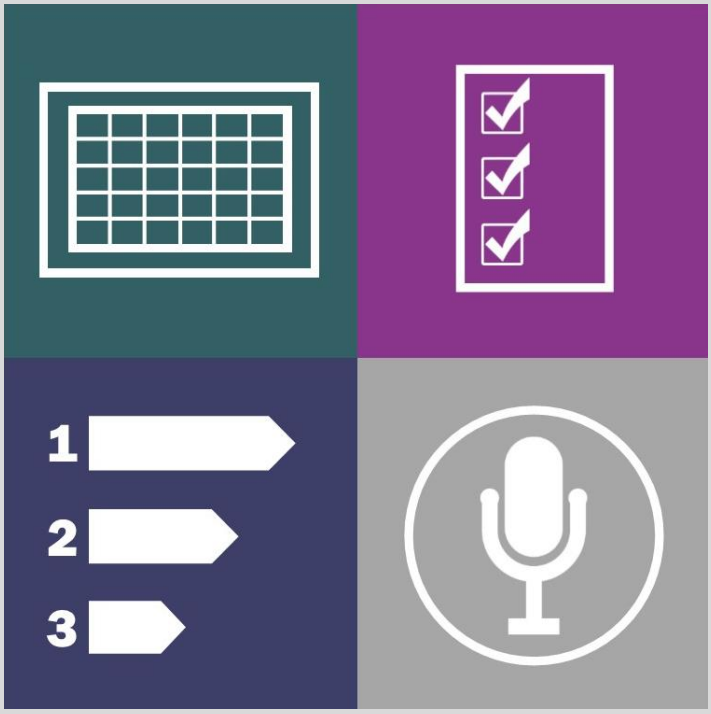
Smithsonian Institution

Audiovisual Preservation Readiness Assessment, 2019

Final Report



Conducted by

The Association of Moving Image Archivists (AMIA) | Community Archiving Collective

Smithsonian Institution

Smithsonian Institution

Audiovisual Preservation Readiness Assessment (AVPRA)

Project Support and Funding: The National Collections Program
Data Collection, Analysis, and Report Narrative: The Association of Moving Image Archivists' (AMIA) Community Archiving Collective - Kelli Hix, Marie Lascu, Moriah Ulinskas
Project Supervision: Alison Reppert Gerber
Final Report Design and Editorial Contributions: Alison Reppert Gerber, Kira Sobers

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1 Executive Summary

1.1 Narrative Summary of Overview and Findings

From December 2017 to May 2019, eleven Smithsonian units participated in an Audiovisual Preservation Readiness Assessment (AVPRA). The purpose of AVPRA was to 1) complete and update the 2016 inventory of analog audiovisual holdings at the Smithsonian Institution; 2) develop and implement a method to prioritize analog audiovisual collections for preservation; 3) evaluate the Institution's current audiovisual preservation practices; 4) determine the risk for permanent collection loss at current preservation rates and establish preservation scenarios which can mitigate that loss.

Smithsonian Institution Archives served as the lead unit for the project under the direction of Alison Reppert Gerber, Preservation Coordinator, and Kira Sobers, Digital Media Coordinator. As the Community Archiving Collective (CAC) under the Association of Moving Image Archivists (AMIA), contracted audiovisual archivists Kelli Hix, Marie Lascu, and Moriah Ulinskas conducted the assessment and prepared the report. Funding for the project was provided by the National Collections Program's Collections Care Initiative (CCI).

Participants

- Archives of American Art (AAA)
- Anacostia Community Museum (ACM)
- Center for Folklife and Cultural Heritage (CFCH)
- National Anthropological Archives | Human Studies Film Archive (NAA-HSFA)
- National Air and Space Museum Archives (NASM)
- National Museum of African American History and Culture (NMAAHC)
- National Museum of American History Archives Center (NMAH-AC)
- National Museum of the American Indian (NMAI)
- National Portrait Gallery (NPG)
- Smithsonian American Art Museum (SAAM)
- Smithsonian Institution Archives (SIA)

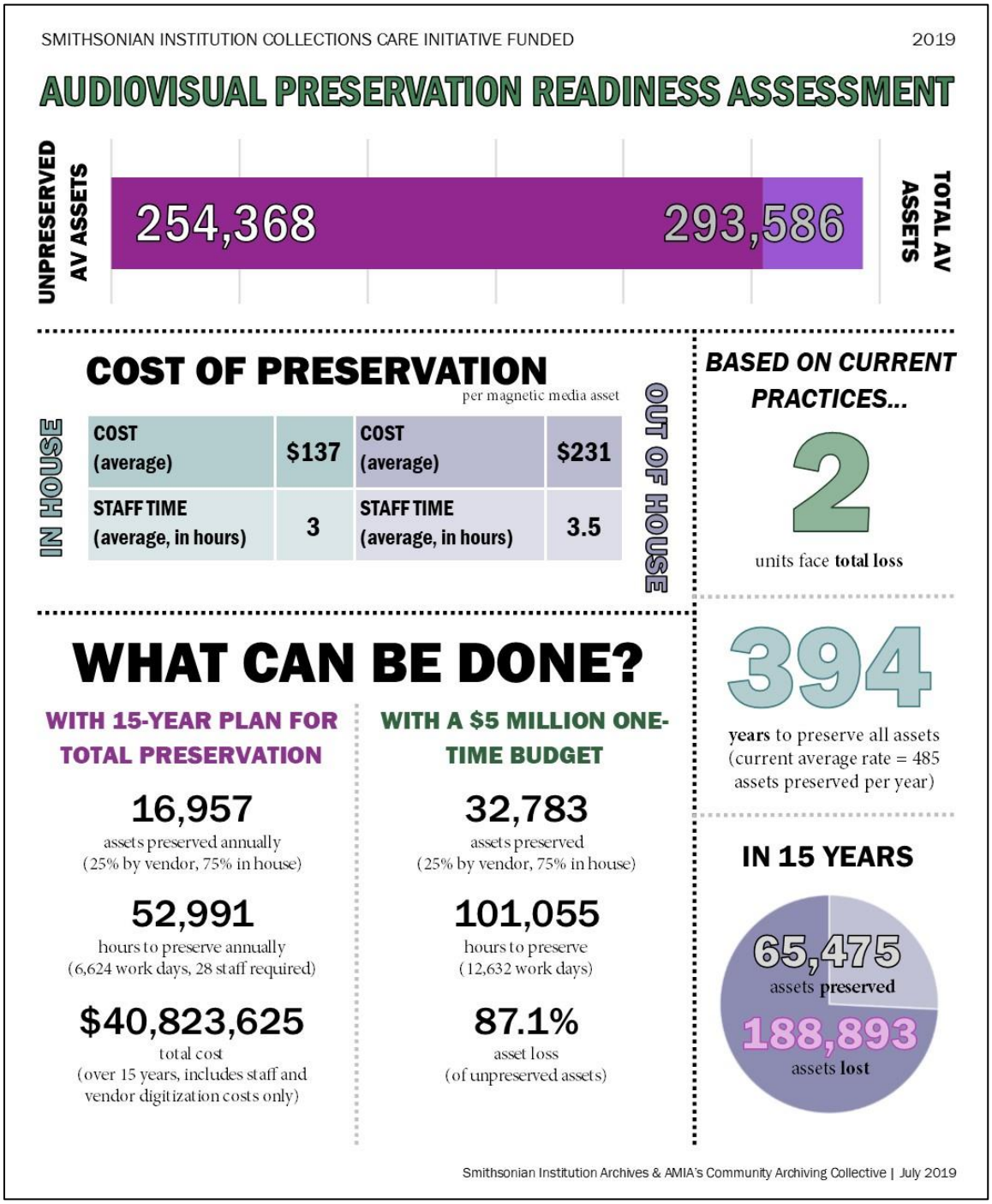
Outcomes and Recommendations

- At current rates of preservation, 188,890 audiovisual collection items will be unpreserved by the year 2034 and face total loss.[1]
- Smithsonian has substantial stores of audiovisual equipment which can support some of its preservation goals; however most of the equipment is not regularly serviced and/or staffed appropriately.[2]
- Staffing expertise and commitment to audiovisual preservation varies widely from unit to unit, which results in inconsistency in the care of and preservation planning for audiovisual collections throughout the Institution.

[1] Some types of grooved media and some types of film elements stored in optimal conditions are expected to remain viable after the 15-year date.
[2] The assessment found that most preservation equipment is either in storage or is staffed about 10% - 20% capacity. The Pan-Institutional Preservation Assessment Report included in this project provides more details about staffing and equipment across SI.

- The most efficient and cost-effective preservation workflow is one that preserves the most common and numerous formats in house. Out-of-house preservation is most efficient and effective for small numbers of rare, unique assets or assets requiring specialized treatments and interventions.
- Collection loss can be significantly mitigated through the creation of a strong preservation plan that follows a prioritization strategy.

1.2 Infographic



2 Project Background

2.1 Pan-Institutional Audiovisual Collections Survey, 2016-2017

The foundation for AVPRA stems from a previous project – the 2016 Pan-Institutional Audiovisual Collections Survey. From December 2015 to January 2017, eight Smithsonian units participated in a year-long comprehensive collections survey. The goal of the project was to support the Smithsonian Institution's mission of excellence in collections care by documenting the scope and breadth of audiovisual collections across the participating units and reporting on areas of greatest strength and need in preservation and conservation practices. The Smithsonian Institution-based audiovisual archivist institutional leadership group, AVAIL, proposed and provided support for the project. Smithsonian Institution Archives served as the lead unit for the project under the direction of Alison Reppert Gerber, Preservation Coordinator. Contracted audiovisual archivist, Kelli Hix conducted the survey and prepared the report. Funding for the project was provided by the National Collections Program's Collections Care and Preservation Fund (CCPF). The final project report is available for public reference here: https://siarchives.si.edu/about/smithsonian-pan-institutional-survey-audiovisual-collections.

Participants

- Archives of American Art (AAA)
- Anacostia Community Museum (ACM)
- Center for Folklife and Cultural Heritage (CFCH)
- The Human Studies Film Archives (HSFA)
- National Air and Space Museum Archives (NASM)
- National Museum of African American History and Culture (NMAAHC)
- National Museum of American History Archives Center (NMAH-AC)
- Smithsonian Institution Archives (SIA)

Outcomes and Recommendations

The survey identified 263,633 physical audiovisual assets held in more than thirty different locations over eight units.[3] Many of these collections are actively deteriorating due to the degradation of media formats and obsolescence of playback equipment. Long-term preservation of these assets requires digitization and adequate storage environments. Without these preservation strategies, collections are at risk of permanent loss.

Some of the **primary concerns** revealed during the survey:

- Improper environmental conditions for audiovisual media.
- Lack of access systems and item-level management systems relating specifically to the needs of audiovisual collections.
- Insufficient funding and staff infrastructure to perform audiovisual preservation.

[3] As the first component of AVPRA, three additional Smithsonian units were surveyed, thus adding to the initial survey data.

In order for the Smithsonian to move forward as a leader in the field, the report **recommended**:

- Developing and initiating a detailed plan for proactive preservation across the units that addresses the prioritization of collections, effective preservation workflows, media lab readiness, and staff roles.
- Investigating and implementing long-term storage spaces for audiovisual collections based on ISO standards for temperature and relative humidity, airflow, and fire suppression.

2.2 Analog Audiovisual Collections at SI

2.2.1 High Priority Collections

The Smithsonian Institution's archival collections contain hundreds of thousands of analog audiovisual assets on dozens of technically complex formats. In addition, many of these audiovisual collections have been recognized nationally and internationally for their cultural value and are included in the National Film Registry or inscribed in UNESCO's Memory of the World Registry. The content includes oral histories and institutional documentation; global scientific studies; narrative and experimental films; rare home movies and vernacular films; documentary and educational films; animal studies in the wild and in captivity; primary documents depicting global human anthropological research; interviews with artists, scientists, and cultural figures; unique recordings of world folk music; and footage documenting important moments in national history.

Figure 1. Audiovisual collections at the National Museum of the American Indian (NMAI) will face comprehensive loss without increased preservation support.

As part of AVPRA, each participating unit worked alongside CAC to provide collection information such as cultural value, format, condition, and use to determine which collections should be deemed as high priority for units to preserve. This information was integrated into a custom system developed by CAC—the Audiovisual Preservation Readiness Assessment Preservation Prioritization System (AVPRAPPS). For complete information about this system, see *Section 3.2. Component Two: Prioritizing Collections for Preservation Using AVPRAPPS*. The following collections were identified as *highest priority*, unpreserved collections at the Smithsonian.

ORAL HISTORY COLLECTION | AAA The largest collection of art-related oral history interviews in the world, AAA's Oral History collection contains audio and video interviews with artists, curators, and collectors dating back to 1958. Unpreserved portions of the collection include oral histories with Judy Chicago and Romare Bearden.

GALLERY COLLECTION | AAA This collection contains recordings produced or collected by significant galleries. It includes early video art from the 1971 exhibition, "Artists' Videotape Performances," one of the first shows to include video art; the publicity archive of the Leo Castelli Gallery, a key gallery during the rise of the art market in the 1980's; and rare recordings of second generation New York School Poets performing at the 98 Greene Street Loft from 1971-1973 in the Holly Solomon Gallery records.

ANACOSTIA COMMUNITY DOCUMENTATION | ACM This collection contains moving images and audio recordings documenting the dynamic history of the Anacostia Community in Washington, DC. Portions of the collection are unpreserved.

BLACK MOSAIC EXHIBIT INTERVIEWS | ACM These interviews and oral histories are associated with the groundbreaking 1994 Black Mosaic exhibit at ACM, which looked at the immigration of people of African descent from Central and South America and the Caribbean to the Washington metropolitan area.

MOSES AND FRANCIS ASCHE COLLECTION / FOLKWAYS RECORDS | CFCH The collection contains the master audio recordings created for Folkways Records, now operated by the Smithsonian Institution as Smithsonian Folkways Records. The recordings document American and International folk music, live readings, and sound recordings. Folkways is best known for its original recordings of artists such as Leadbelly and Woody Guthrie, who shaped American music in their own time and whose work went on to influence the folk and rock movement, and live readings by poets such as African American and Afghan poet Nancy Dupree. In addition, the collection contains a wide range of subject matter from early experiments in electronic music to recordings of a typical 1963 office to the sounds of various insects and animals.

FAST FOLK MUSICAL MAGAZINE RECORDS | CFCH The Smithsonian Ralph Rinzler Folklife Archives and Collections acquired the Fast Folk Musical Magazine Records in 1998, when Richard Meyer donated the collection to the Center for Folklife and Cultural Heritage. The materials date from 1982-2002 and are chiefly composed of audiovisual materials and the paper business records of the company. Audio and video materials include phonograph records, open reel tapes, VHS videotapes, audio cassettes, digital audiotapes, compact discs and miscellaneous audio material. The paper records include press materials related to Fast Folk and Fast Folk recording artists, magazine source materials, recording agreements, lyrics, artist biographies, photographs, financial documents, correspondence, planning for events and other miscellany.

DIXON-WANAMAKER EXPEDITION TO CROW AGENCY, 1908 | NAA-HSFA This collection contains the only known film footage that survives from the 1908 Wanamaker expedition to American Indian reservations. A highlight of the content is the recreation of the Battle of Little Bighorn which includes participants who were in the original battle in 1876.

THE JOHN MARSHALL COLLECTION | NAA-HSFA One of the most significant ethnographic film and video projects, this was the third moving image collection to be inscribed on UNESCO's Memory of the World Registry (2010). The

collection documents the Ju/'hoansi (!Kung) people in Namibia spanning a 50-year period. *The Hunters*, one of the edited films from this collection, is on the National Film Registry. The collection contains both edited films/videos and outtakes.

SPACE TELESCOPE HISTORY PROJECT | NASM This collection consists of the oral history transcripts and related research documentation for the Space Telescope History Project (STHP), which examined the space sciences, predominantly astronomy, viewed through the lens of a particular undertaking, the Hubble Space Telescope, 1970s-1980s.

UNITED STATES AIR FORCE TRAINING AND DOCUMENTARY FILM COLLECTION | NASM This collection contains rare footage documenting Air Force Training procedures.

AFRICAN AMERICAN HOME MOVIE COLLECTION | NMAAHC The wide-ranging content in this collection contains footage from 1920s amateur film of rural Oklahoma black life, such as the Reverend S. S. Jones films, to celebrity / notable figures' home movies, such as the films of Cab Calloway and J. Max Bond. The footage serves to document the African American experience throughout the 20th century. Not all materials are preserved.

MASTER RECORDINGS OF MUSIC PERFORMANCES AND INTERVIEWS | NMAAHC This collection of unique transcription discs includes master session recordings of Charlie Parker, Billie Holiday, and Cab Calloway.

HISTORY OF ADVERTISEMENT COLLECTION | NMAH-AC This popular collection contains footage documenting the history of television advertisement. The collection depicts the "themes and techniques of persuasion" and displays the evolution and increasing sophistication of advertising in our world. Marlboro, Alka-Seltzer, Federal Express, Cover Girl, and Nike are a few of the companies represented in the collection.

THE FARIS AND YAMNA NAFF ARAB AMERICAN COLLECTION | NMAH-AC This collection documents the history of Arab Americans in the United States. Based on a groundbreaking 1962 oral history project conducted by Dr. Alixa Naff, the collection records the emigration and arrival stories of first-generation immigrants. This is a mixed-format collection that includes correspondence, newspapers, photographs, and diaries, while at the collection's core are more than nearly 40 open reel audiotapes and audio cassette oral histories from 1962 to 1994.

NATIONAL CONGRESS ON AMERICAN INDIANS RECORDS | NMAI This collection contains policy materials going back to the 1940s. It includes very important annual meetings where audio was recorded beginning in the 1950s (dictaphone belts), through the 1970s (1/4" open reel), and up to the late 1980s (audiocassettes).

PHIL LUCAS COLLECTION | NMAI Lucas is a contemporary filmmaker working primarily in the mid-1970s. He made a five-part TV series titled "Images of Indians" for PBS. This program covers the topic of racist portrayals of Native Americans in the media. NMAI has a large collection of the source materials from his production company, but does not have the complete final films or the rights to them.

CURATORIAL LECTURES AND TOURS | NPG Recordings of NPG and guest curators provide contextual information on exhibitions and NPG-related topics. It has been copied or digitized, but not to preservation standards.

PORTRAIT PRESENTATIONS | NPG This collection includes audio-only and audiovisual recordings of presentations of portraits in the NPG collection, including Princess Grace's portrait presented posthumously by the Prince of Monaco, as well as those of Colin Powell, Golda Meir, and presidential and first lady portraits.

SMITHSONIAN WORLD | SIA This collection was an educational television series which ran for six years beginning in 1984. It explored people, ideas, and events that shape world culture, blending art, science, history, and the humanities to create an exciting harmony among disciplines. The production was narrated by historian David G. McCullough and co-produced by WETA-TV for broadcast on the Public Broadcasting Service. The series consisted of 6 seasons, each with 5-7 episodes. Each episode ran approximately one hour.

ANIMAL RESEARCH RECORDS | SIA These records were created and maintained by Devra G. Kleiman and document the research and breeding programs at the National Zoological Park. The records include behavioral studies of endangered animals including the giant pandas, Hsing-Hsing and Ling-Ling, and documentation of the Golden Lion Tamarin Release Program.

JOSEPH CORNELL STUDY CENTER MATERIALS | SAAM The Cornell collection consists of ephemeral materials which include some 16mm film elements from a personal collection found in the artist's studio.

ELECTRONIC SUPERHIGHWAY | SAAM *Electronic Superhighway* is one of the most well-known works of Korean artist, Nam June Paik. "Nam June Paik is hailed as the father of video art and is credited with the first use of the term "electronic superhighway" in the 1970s."[4] The work is a "fifty-one channel video installation (including one closed-circuit television feed), custom electronics, neon lighting, steel and wood."

2.2.2 Why Audiovisual Collections are At Risk

Analog audiovisual assets present complex preservation and conservation challenges for archives. Over the last 120 years, a profusion of moving image and audio formats have developed, each created in response to emerging demands in the filmmaking, exhibition, and broadcast communities. Each of these formats has specific requirements for conservation, preservation, and playback, which must be taken into consideration when planning for their long-term viability. Not only must the physical asset be cared for, but the increasingly obsolete playback equipment — most of which is no longer manufactured — must be collected and maintained to view or listen to the content. The obsolescence of much of this equipment, the shortage of replacement parts, and the scarcity of technicians who can maintain and repair the equipment are some of the most notable barriers to the preservation of audiovisual materials.

Many endangered analog formats must be digitized within the next 15 or 20 years before further degradation makes preservation efforts all but impossible.[5]

[4] From the website of the Smithsonian American Art Museum: https://americanart.si.edu/artwork/electronic-superhighway-continental-us-alaska-hawaii-71478

[5] Library of Congress, "Library of Congress National Recording Preservation Plan", (National Recording Preservation Board of the Library of Congress, Council on Library and Information Resources (December 2012), http://www.loc.gov/programs/static/nationalrecording-preservation-plan/publications-and-reports/documents/NRPPLANCLIRpdfpub156.pdf

Seven years have passed since the above statement was made by the National Recording Preservation Board of the Library of Congress, meaning that the expected lifespan for some types of analog audiovisual assets is now closer to 8-12 years. Though different types of audiovisual assets have different lifespans, all analog audiovisual material eventually suffers from physical wear and chemical breakdown.

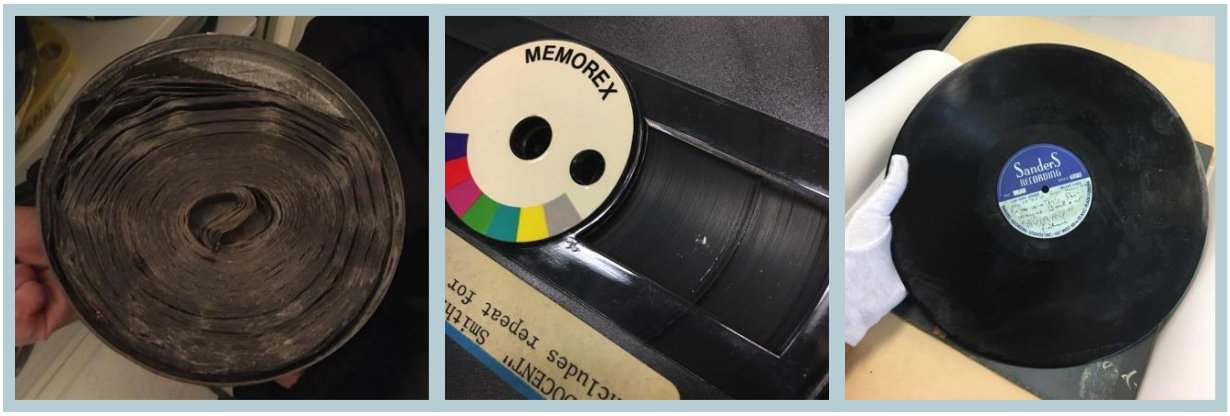


Figure 2. (Left) decayed film at NMAI, (middle) presence of crystallization on video reel at NPG, (left) physical deterioration of grooved disc at SAAM.

For a more complete review of the unique preservation challenges of this media, and why it is imperative to plan for its preservation now, please see the 2016 Pan-Institutional Audiovisual Collections Survey Final Project Report.

2.2.3 Vocabulary and Standards

Best practice standards are referenced throughout this report and refer to a body of accepted collections care methodologies in the field of audiovisual archiving. These standards are defined by archivists and standardizing bodies such as the International Organization for Standardization (ISO), research and documentation organizations such as the Federal Agencies Digitization Guidelines Initiative (FADGI), and the Image Permanence Institute (IPI). Professional organizations, such as the Association of Moving Image Archivists (AMIA) and the International Federation of Film Archives (FIAF) also contribute to defining best practices. Such standards are referenced specifically in the report when they are deemed necessary to provide context or clarification to an observation or recommendation. This report was written with the knowledge that the methodologies for achieving archival standards manifest themselves differently from institution to institution, according to differing mission statements and available resources. The report is not intended to create policy or serve as a comprehensive resource for best practices. Instead, the focus of the report is to document observations and findings, note how these relate to best practice standards, and support self-evaluation and advocacy for progress in collections care and preservation planning.

For the purposes of this report, ***conservation*** describes archival activities which stabilize and treat the physical analog media to increase its physical longevity. Assessment, environmental control, rehousing, and repair are all examples of activities and tools used in the conservation of audiovisual media.

Preservation refers to the process of reformatting audiovisual content at archival best practice standards. In contemporary practice, this reformatting almost always means digitization according to best practice standards for preservation. This report does not provide recommendations for photochemical preservation, though it recognizes that

photochemical preservation for motion picture film remains a form of preservation that some units may choose to pursue in some instances.

Photographs in this report were taken by CAC for use in this report and are of Smithsonian Institution collections, workstations, and equipment.

3 Assessment Components

3.1 Component One: Audiovisual Collections Survey

The first component of the Audiovisual Preservation Readiness Assessment (AVPRA) was the continued surveying of audiovisual collections at the Institution to include three new units, which added to the data gathered in the 2016 Pan-Institutional Audiovisual Collections Survey. By including additional units, the data is more comprehensive and allows for a more accurate narrative about the state of audiovisual collections across the Smithsonian.

Additional Participants

- National Museum of the American Indian (NMAI)
- National Portrait Gallery (NPG)
- Smithsonian American Art Museum (SAAM)

3.1.1 Component One: Deliverables

This AVPRA component produced the following deliverables:

- **Multiple-Choice Questionnaire Results (3) |** Responses from three additional units were added to the previous questionnaire results. Results were delivered via MS Excel spreadsheet.
- **Narrative Interviews (3) |** Staff from three additional units were interviewed and responses were documented in MS Word format.
- **Inventory Spreadsheets (3) |** Inventory and condition assessments were created for three additional units and documented in a MS Excel spreadsheet.
- **Collection Additions (5) |** Units who participated in the 2016 Pan-Institutional Audiovisual Collections Survey were invited to submit collection additions in order to add to the data of the comprehensive survey.
- **Individual Unit Reports (3) |** Narrative reports for the three additional units were produced, which contained a snapshot of major data points and methodologies specific to each unit.

3.1.2 Component One: Methodology

Component One of AVPRA followed the same methodologies as the 2016 Pan-Institutional Audiovisual Collections Survey. These methodologies were outlined in the Final Project Report to clarify the process behind the survey activities and to serve as a reference for other institutions engaging in similar projects. Please see *Section 5. Project Methodologies* in the 2016 Final Project Report[6] for more details about project workflows, timelines, and creating the inventory fields.

[6] https://siarchives.si.edu/sites/default/files/pdfs/SI_AVSurvey_FinalReport_03282017.pdf

3.2 Component Two: Prioritizing Collections for Preservation Using AVPRAPPS

A large part of the challenge in enacting preservation is simply deciding what to preserve first. This is especially true for large collections, like those at the Smithsonian. The purpose of preservation prioritization is to be as efficient as possible and to mitigate the loss of collections that may continue to deteriorate while other assets are being preserved.
As part of AVPRA, CAC developed the Preservation Prioritization System (AVPRAPPS) to support Smithsonian Institution units in prioritizing collections for preservation. Many units already have some method for prioritizing preservation across collections, so the AVPRAPPS Scoring System is intended to:

- Be simple to use.
- Serve as a tool to annually reassess evolving preservation needs.
- Take into account the special needs of audiovisual materials.
- Provide consistency to the prioritization of collections across all units.

Reports generated using AVPRAPPS are intended to serve the following purposes:

- **As a project planning tool for long-term preservation**. Since preservation of analog audiovisual assets always occurs in real time, the process of analog-to-digital preservation is necessarily time-consuming. Even for units with long-term preservation plans, a strong possibility that some assets will deteriorate and result in a permanent loss of content remains. The Preservation Prioritization Report supports the unit's efforts in determining the best order for preservation and mitigates the risk of loss when undertaking a long-term preservation plan.

- **As an advocacy tool**. The Preservation Prioritization Report provides clear recommendations based on internationally-accepted standards and unit-specific goals for preservation, and can be used by the unit in reporting, fundraising and advocacy efforts.

- **As a basis for determining which collections best fit preservation opportunities**. When preservation opportunities arise, the Preservation Prioritization Report provides a starting point for the unit to determine what high-priority assets meet the physical and content requirements of the opportunity.

Understanding and articulating the preservation priorities of an audiovisual collection can be a complex task, especially for large collections, collections that are not fully cataloged, or collections that are not cataloged at item level. We also recognize that preservation opportunities are rarely holistic — a unit requires a method for prioritization that allows them to respond to unique funding opportunities as well as long-term preservation planning. To address these needs, the AVPRAPPS uses a two-part system:

- Part 1: Hard Data based on physical fragility
- Part 2: Narrative Data based on content value and whether or not the material has been preserved at any level

Collections which are a high priority based on both hard data and narrative data will be considered the highest priority for preservation considerations.

3.2.1 Component Two: Deliverables

This AVPRA component produced the following deliverables:

- **Preservation Prioritization Reports (11) |** Each unit received a customized report that contained information about the prioritization of culturally valuable content, collections with highest known physical risk factors, and collections rated at high physical fragility and high cultural value.
- **Prioritized Inventory Spreadsheets (11) |** Each unit received an updated collection inventory spreadsheet, in MS Excel format, that contained an inventory of all assets with their AVPRAPPS score, an inventory selection of assets with highest know physical risk factors, and an inventory selection of priority collections, as determined by unit.

3.2.2 Component Two: Methodology

3.2.2.1 Scoring System

To determine unit priorities, AVPRAPPS considers physical risk factors as well as the content value of each asset. Collections which have a high priority based on both hard data and narrative data are considered the highest priority for preservation. Hard data refers to data about inherent format fragility based on known risk factors and physical deterioration. Narrative data refers to data about collection content, such as cultural value, use, and importance to unit missions.

The AVPRAPPS Scoring System determines the inherent physical fragility of the asset, plus any known outstanding condition issues requiring immediate attention such as mold, high acetic acid decay, or heavy physical wear requiring the intervention of a specialist. Assets or groups of assets are assigned an AVPRAPPS score of 1-5.[7]

TABLE | AVPRAPPS Scoring System Scale

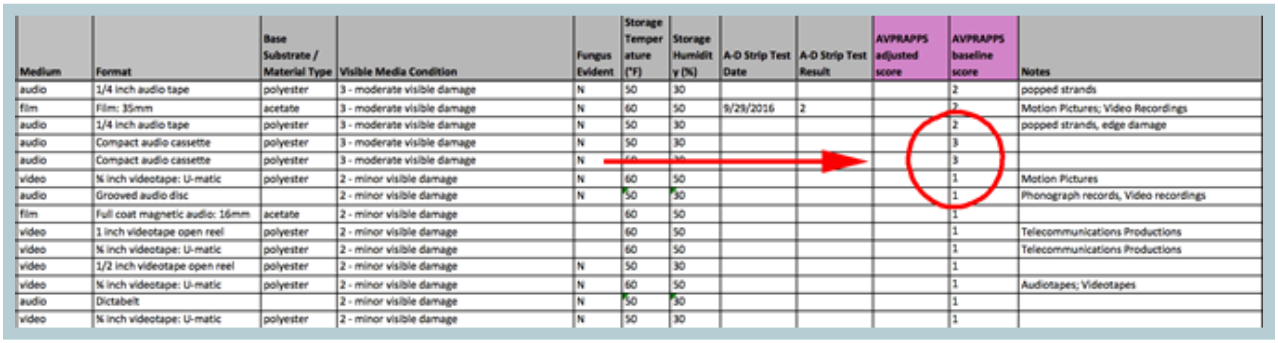
1	highest physical risk
2	high physical risk
3	moderate physical risk
4	low physical risk
5	lowest physical risk

Step 1. Each asset receives a base score[8] which reflects the expected fragility rate for the format. The scoring system used to create the base score for each format is below.[9]

[7] The scoring system was developed using the following sources of reference: Recommendations and accepted best practice standards in the field from institutions including the Library of Congress, The Image Permanence Institute, and Association of Moving Image Archivists; Professional experience and feedback from project stakeholders and the Community Archiving Collective (CAC) team; and The MediaScore System developed by AVPreserve (AVP).
[8] The scoring system takes into account expected inherent fragility of the assets. It is created based on standards in the field, the experience of the CAC team, the experience and input of SI staff; it references scoring systems used by SI staff, including the SIA preservation scoring system and the AVP MediaScore system used by NAA-HSFA.
[9] This information is also available as an addendum in an MS Excel spreadsheet.

TABLE | AVPRAPPS Scoring System - Baseline Scores

Level 1 Highest Risk	**Level 2** High Risk	**Level 3** Moderate Risk	**Level 4** Low Risk	**Level 5** Lowest Risk
1-inch audio tape	¼-inch audio tape	8-Track audio cassette	Grooved audio disc (pressed disc; vinyl, etc.)	Film: 35mm, 16mm (new polyester preservation materials)
1-inch videotape open reel	8mm video: Hi8, Digital-8, Video8	Audio cylinder	HD Cam	
½-inch audio tape	Betamax	Betacam Digital (Digibeta)		
½-inch digital audio tape	Film: 70mm, 35mm, 16mm, 8mm, Super-8mm (acetate or polyester base)	Betacam SP, Betacam		
½-inch videotape open reel	Film Strip	Compact audio cassette		
¼-inch audio cartridge	Grooved audio disc (base unknown)	Grooved audio disc (shellac)		
Nagra SN (SNN) [non-paper base or unknown base]	Microcassette, Mini-cassette	Laser Videodisc		
¼-inch audio tape, paper base	Minifon cartridge			
2-inch audio tape	VHS, S-VHS, VHS-C			
2-inch videotape open reel	Videodisc			
¾-inch videotape: U-matic, U-matic S, U-matic SP				
ADAT				
Betamax PCM1				
D1, D2, D3, D5				
D9 / Digital S				
DAT				
Dictabelt				
Digital Linear Tape				
DTRS / DA-88 / DARS (Hi-8 multitrack audio)				
DVCAM				
DVCPRO				
Echo-matic cartridge				
Film: nitrate base or 28mm				
Full coat magnetic audio: 16mm, 35mm				
Grooved audio disc (lacquered, aluminum, glass)				
MII				
MiniDV				
NAB cartridge				
U-matic 1600; 1620; 1630				
Video Floppy Disk				
Wire Recording				



Medium	Format	Base Substrate / Material Type	Visible Media Condition	Fungus Evident	Storage Temperature (°F)	Storage Humidity (%)	A-D Strip Test Date	A-D Strip Test Result	AVPRAPPS adjusted score	AVPRAPPS baseline score	Notes
audio	1/4 inch audio tape	polyester	3 - moderate visible damage	N	50	30				2	popped strands
film	Film: 35mm	acetate	3 - moderate visible damage	N	60	50	9/29/2016	2		2	Motion Pictures; Video Recordings
audio	1/4 inch audio tape	polyester	3 - moderate visible damage	N	50	30				2	popped strands, edge damage
audio	Compact audio cassette	polyester	3 - moderate visible damage	N	50	30				3	
audio	Compact audio cassette	polyester	3 - moderate visible damage	N	50	30				3	
video	¾ inch videotape: U-matic	polyester	2 - minor visible damage	N	60	50				1	Motion Pictures
audio	Grooved audio disc		2 - minor visible damage	N	50	30				1	Phonograph records, Video recordings
film	Full coat magnetic audio: 16mm	acetate	2 - minor visible damage		60	50				1	
video	1 inch videotape open reel	polyester	2 - minor visible damage		60	50				1	Telecommunications Productions
video	¾ inch videotape: U-matic	polyester	2 - minor visible damage		60	50				1	Telecommunications Productions
video	1/2 inch videotape open reel	polyester	2 - minor visible damage	N	50	30				1	
video	¾ inch videotape: U-matic	polyester	2 - minor visible damage	N	60	50				1	Audiotapes; Videotapes
audio	Dictabelt		2 - minor visible damage	N	50	30				1	
video	¾ inch videotape: U-matic	polyester	2 - minor visible damage	N	50	30				1	

Figure 3. AVPRAPPS baseline score is applied to every entry within each unit's inventory spreadsheet, reflecting inherent risk of the physical format.

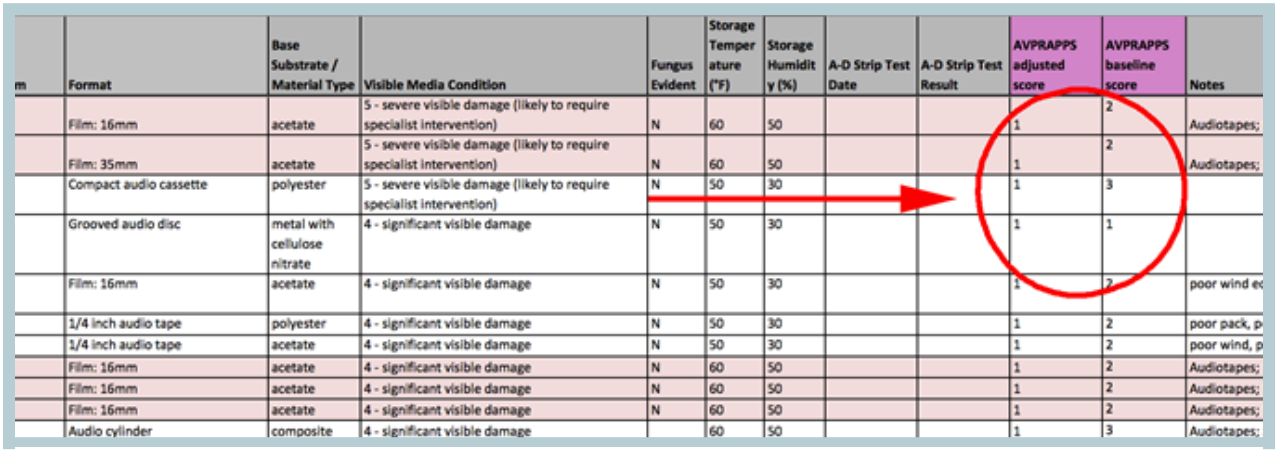
Step 2. Baseline scores may be modified to produce an Adjusted AVPRAPPS Score as a result of other existing factors. Data is first sorted to advance entries with the highest Visible Media Condition score and lowest AVPRAPPS baseline score. Any asset listed as having a Level 5 Visual Media Condition score[10] is automatically assigned an AVPRAPPS Score of *1—highest physical risk*. Scores are adjusted (lowered no more than two points total) for each of the following factors:

Known Extreme Environment

- Assets are stored in an environment with no controlled temperature and/or relative humidity.
  OR
- Assets are stored in any other extreme condition (to be determined by staff and CAC), such as wrapped in plastic or mixed with known moldy collections.

Level 4 Visible Media Condition

- This accounts for physical decay beyond expected format degradation, including mold, broken carriers, extreme decay, A-D test strip result, etc.



m	Format	Base Substrate / Material Type	Visible Media Condition	Fungus Evident	Storage Temperature (°F)	Storage Humidity (%)	A-D Strip Test Date	A-D Strip Test Result	AVPRAPPS adjusted score	AVPRAPPS baseline score	Notes
	Film: 16mm	acetate	5 - severe visible damage (likely to require specialist intervention)	N	60	50			1	2	Audiotapes;
	Film: 35mm	acetate	5 - severe visible damage (likely to require specialist intervention)	N	60	50			1	2	Audiotapes;
	Compact audio cassette	polyester	5 - severe visible damage (likely to require specialist intervention)	N	50	30			1	3	
	Grooved audio disc	metal with cellulose nitrate	4 - significant visible damage	N	50	30			1	1	
	Film: 16mm	acetate	4 - significant visible damage	N	50	30			1	2	poor wind e
	1/4 inch audio tape	polyester	4 - significant visible damage	N	50	30			1	2	poor pack, p
	1/4 inch audio tape	acetate	4 - significant visible damage	N	50	30			1	2	poor wind, p
	Film: 16mm	acetate	4 - significant visible damage	N	60	50			1	2	Audiotapes;
	Film: 16mm	acetate	4 - significant visible damage	N	60	50			1	2	Audiotapes;
	Film: 16mm	acetate	4 - significant visible damage	N	60	50			1	2	Audiotapes;
	Audio cylinder	composite	4 - significant visible damage		60	50			1	3	Audiotapes;

Figure 4. The AVPRAPPS baseline score is adjusted to reflect additional data informing prioritization, including storage condition and narrative data from interviews.

[10] The Visual Media Condition score was applied during the 2016 Pan-Institutional Audiovisual Collections Survey. It is a numeric system from 1-5. One (1) is the best condition, and five (5) is the worst condition, based only on a cursory visual inspection.

The AVPRAPPS base line score and Adjusted AVPRAPPS score are included in the unit inventory. This provides the unit with a set of flexible, raw data that can be filtered and sorted by format and level of physical risk.

3.2.2.2 Collection Content Prioritization

The Preservation Prioritization Reports take into account content and known preservation status of collections. Information regarding known content and preservation status was gathered during the staff interview. The objectives of the AVPRAPPS interview were:

- To create a list of the collections with known highest cultural value or which best represent the unit's mission.
- To document the general level of preservation of the unit's collections with known high cultural value.
- To create a brief narrative explaining current preservation prioritization methods and how they are successful or can be improved upon.
- To create a brief narrative noting barriers to preservation, including lack of detailed documentation such as item level asset tracking and intellectual rights issues.

Interview questions were emailed to unit points of contact and delivered pre-filled with a list of collections already known to be of cultural value based on previous unit interviews from the 2016 Pan-Institutional Audiovisual Collections Survey. Once the unit point of contact returned the completed interview, CAC conducted follow-up phone interviews to review and engage in further dialogue to expand on unit responses.

The primary objective of the interview was to produce a list of high value audiovisual content in the unit's collections. Interviewees were encouraged to use the existing list included in each interview sheet as a starting point. Unit points of contact were encouraged to review all existing available documentation of collection content and other available resources to prepare a list of priority content from their collections. All methods for gaining a better understanding of priority collections were encouraged, including but not limited to:

- Reviewing AVPRA inventory (format and technical data-focused)
- Reviewing high content value collections included in unit's interview
- Reviewing unit collection management system and/or catalog(s)
- Reviewing past preservation and digitization projects
- Conducting a physical walk-through of collection spaces
- Reviewing past consultant reports
- Considering off-site collections
- Collaborating with other staff and curators

Many units do not track audiovisual assets at an item level, so the preservation status for assets are not always known in detail. Units were asked to describe the level of preservation for high value collections using one of the following terms:

- **Not Preserved** / *highest priority*
- **Copied or Digitized, but not to preservation standards** / *high priority*

- **Photochemical Preservation Only** / *medium priority*
- **Preservation in Process**[11] / *low priority*
- **Preserved** / *not a priority*

A list of preservation priorities is never finite and requires continued evaluation. Prioritization should be re-evaluated on a schedule — annually, if possible. The following factors may affect how priorities change over time:

- **The existence of undiscovered or unknown collections**. Collections may be discovered which were not fully cataloged or not previously known to exist and may become priorities once they are brought to the Institution's attention.

- **Lack of item-level cataloging that would track generation and instantiations**. This is essential to any audiovisual prioritization plan, but not all institutions are able to track at this level of granularity. NOTE: Ideally, the preservation copy should be made from the best extant copy of the content. Best extant copy is the highest quality copy with the most complete content. The following factors can affect which copy is the best extant:

    - Physical decay of the original asset
    - Differing content or versions of the same title (e.g. copies with burned in timecode, differing on-screen titles, "director's cuts," etc.)
    - Existence of copies at other institutions
    - Previous transfer for preservation that did not follow current best practice standards or the transfer standards are unknown

- **Changing cultural value and institutional mission**. It is inevitable that perceived cultural value, access, demands, and even institutional mission will evolve over time. Re-evaluating prescribed content value should happen at regular intervals throughout the lifespan of a collection or asset.

- **Staff turnover within a unit**. Information loss is inevitable when long-term staff members leave or when there is high turnover in specific positions or departments. This results in institutional information loss, which endangers audiovisual collections and assets.

- **Individualized subjectivity**. This can also affect how staff may apply prioritization to some collections or assets over others.

- **Changing legal status of recordings**. Content may move into the public domain, or new information regarding the rights of the unit to screen or stream the footage may be discovered as collections are requested and/or researched.

[11] The collection or asset is currently being preserved and has a known project completion date.

- **Changing opportunities for use and access**. Partnerships with artists, researchers, and screening venues or the installation of new institutional streaming platforms with specific content directives can affect the timing of preservation.

- **Prioritization of audiovisual collections within the wider priorities of the unit**. Institutional priorities can fluctuate, especially in cases where large-scale or mass digitization efforts are initiated for specific collections and/or format types.

- **Changing physical condition of collection and equipment obsolescence**. As materials age and degrade, and as equipment becomes more obsolete, formats will move from low to high risk.

- **Changing environmental conditions of collection storage spaces**. Collections which are moved into improved storage or into less ideal storage may be considered at lower or greater risk for loss, respectively.

- **Fluctuating funding opportunities**. The directives or selection criteria of funding opportunities and grants will influence the type and content of audiovisual material preserved at any given time.

3.3 Component Three: Preservation Readiness Evaluation

The purpose of the third component of AVPRA is to review and assess the Smithsonian's ability to meet its goals for audiovisual preservation. This component reviews audiovisual preservation practices at the unit level and Institution-wide, and it recommends improvements that will help each participating unit to meet best practice standards. This component also outlines a plan for cohesive, pan-institutional preservation. This plan can serve as a road map for the Institution as it considers how to best meet its audiovisual preservation goals on a large scale. It is also intended to be customizable — taking into account the reality of shifting resources, funding, and unit priorities.

This component meets the following goals:

- To assess the current preservation workflows at the unit and pan-institutional level and make recommendations for improvement.
- To gather data which will support preservation planning, such as time and cost to preserve.
- To determine if the Smithsonian Institution is on track to meet its preservation goals.
- To assess the risk for loss of collections under current preservation approaches.
- To present two preservation scenarios which will estimate the time and cost to preserve collections and serve as a starting point for pan-institutional preservation planning.
- To recommend next steps for the Smithsonian Institution to engage in increased preservation and/or a pan-institutional preservation project

NOTE: Preservation scenarios are customizable and scalable, and they can serve as a road map for the Smithsonian Institution as it considers how to best meet its audiovisual preservation goals at a pan-institutional scale.

3.3.1 Component Three: Deliverables

This AVPRA component produced the following deliverables:

- **Unit Preservation Assessment Reports (11) |** Each participating unit received a customized assessment report that contained information about their current preservation practices and provided recommendations to optimize workflows.
- **Unit Preservation Questionnaires (11) |** Staff from each unit were interviewed about in-house and out-of-house digitization practices and responses were documented in MS Word format.
- **Unit Equipment Inventory Checklists (11) |** An inventory of all known equipment related to audiovisual preservation, including capture computers, signal conversion equipment, playback decks, and inspection and cleaning equipment, was documented in MS Excel format.
- **Pan-Institutional Preservation Assessment Report |** An assessment of current audiovisual preservation practices at a pan-institutional level, aggregating data from the unit assessment reports, was generated.
- **Pan-Institutional Preservation Risk and Preservation Scenarios Report |** This report provides estimated costs and times to preserve the Smithsonian Institution's analog audiovisual collections.
- **Pan-Institutional Equipment Checklist |** All equipment utilized for audiovisual preservation was documented in an inventory spreadsheet, in MS Excel format, to facilitate appropriate resource allocation.

3.3.2 Component Three: Methodology

To assess preservation practices and to estimate the time, cost, and rate of preservation at each Smithsonian unit, CAC developed and administered a questionnaire to unit points of contact. The questionnaire was administered by CAC via in-person and via Skype.[12]

To understand the breadth of preservation equipment at the Smithsonian Institution, an equipment checklist was created for each unit and an inventory of all known equipment related to audiovisual preservation was created in cooperation with unit contacts.

Preservation Assessment Reports for each unit were created using information gathered in the unit questionnaires and equipment checklists. The Unit Preservation Assessment Reports contain an overview of practices that each unit engages in, recommendations tailored for each unit, and general recommendations which can serve as a baseline for any preservation workflow. The purpose of the recommendations is to provide guiding philosophies and practices for the Institution, and to point out areas that the unit and Institution can revise to meet their preservation goals and best practices. The recommendations also point units to resources within the Smithsonian, including existing preservation manuals or free training. However, the recommendations in the reports are not a substitute for a preservation manual, staff training, or on-staff expertise. Nor are they intended as a comprehensive guide to collections care.

[12] Skype interviews were conducted in cases in which the 2019 government shut-down prevented or delayed on-site interviews.

The numerical data for determining time and cost of preservation are based on the information provided by the units and the Smithsonian Institution regarding pay scales, hourly rates, and number of unpreserved assets. They are also based on averages of cost estimates provided by real vendors during the project. These numbers are intended as a starting point for the unit when engaging in preservation planning. They provide a broad overview and a big-picture of the unit's preservation needs and practices. Estimates will change as staff salary changes, as vendor costs change, as equipment is improved, and as the staff discover and document more granular data about their collections (such as running times). These estimates are not intended to replace the need for item-level cataloging or replace the need for a budget for preservation. Units engaging in preservation can use these estimates to begin their preservation planning and should create more detailed budgets once their plans are in place. Below is a list of the formulas used in the Preservation Assessment, Risk, and Scenarios Reports:

How salaries and hourly wages are approximated:

- *Annual salary*: The 2018 General Schedule (GS) grade salary for the staff is used, assuming a Step 5 with an additional 30% added for benefits. If the grade is unknown, GS-5 level is used.
- *Hourly salary*: Annual salary (with benefits) divided by 2,080.
- *Work year*: Forty-eight (48) weeks with five (5) eight-hour work days per week (i.e. 240 work days/year).

NOTE: Salaries are rounded up to the nearest whole dollar. If more than one staff member works on a project, the two wages are averaged to determine the cost per hour of the work.

Figure 5. (Left) Parallel audiovisual preservation stations for digitizing audio at the Center for Folklife and Cultural Heritage, Ralph Rinzler Folklife Archives and Collections. (Right) Video preservation station at the Smithsonian American Art Museum. Pictured: Time Based Media Conservator Daniel Finn.

How the cost to preserve an average hour of content in house is estimated per unit:

(hours to prepare asset x hourly wage) + (hours to digitize asset x hourly wage) + (hours to QC and administer project x hourly wage)

Using staff-reported answers from the questionnaire, hourly wages are determined by identifying the staff responsible for each task and calculating their hourly wage based on their GS level. The time for asset preparation, digitization, quality control, and administrative tasks is also determined using staff questionnaire responses. If staff is unsure about the amount of time it takes to preserve an hour of content in house, three (3) hours is used as a baseline.[13]

How the cost to preserve an average hour of content out of house is estimated (for magnetic media) per unit:

*(hours to prepare asset x hourly wage) + (average cost for vendor digitization of **1 hour** of content) + (hours to QC and administer project x hourly wage)*

How the cost to preserve an average hour of content out of house is estimated (for film and grooved media) per unit:

*(hours to prepare asset x hourly wage) + (average cost for digitization of **30 min.** of content) + (hours to QC and administer project x hourly wage)*

The time for asset preparation, digitization, quality control, and administrative tasks is also determined using staff questionnaire responses. If staff is unsure about the amount of time it takes to preserve an hour of content out-of-house, two (2) hours is used as a baseline.[14]

One of the key factors in planning for preservation is the running time of the media. This is because — in almost every case — media must be preserved in real time. Determining running time is one of the main challenges of this project. No unit has comprehensive data on the running time of every asset in their collection. Certain types of media, especially magnetic media, can have a running time of 1 minute to 6 hours, with no way to confirm the running time by visual assessment. CAC assumed an estimate for the running time of magnetic media, film, and grooved media. This is not intended to replace the need to track running times of collection assets. Instead, it provides a starting point for preservation planning.

Estimated format running times:

- *Magnetic media*: 1 hour
- *Film*: 30 minutes
- *Grooved media*: 30 minutes

[13] This includes one hour for preparation, one hour for digitization, and one hour for performing quality control.
[14] This includes one hour for preparation and one hour for performing quality control.

How vendor costs are estimated:

Quotes for preservation were gathered from established and trusted vendors. These quotes help to provide a clear picture of the cost of out-of-house preservation. Quotes from different vendors were averaged to create the following baselines. It is important to note that vendors generally discount the per asset cost of large-scale digitization projects.

- *Magnetic media*: Average vendor cost for magnetic media asset (1 hour) = $100
- *Film*: Average vendor cost for 16mm film asset (30 minutes) = $200
- *Grooved media*: Average vendor cost for grooved disc asset (30 minutes) = $60

How average time and cost to digitize in house and out of house is estimated at an Institutional level:

*(sum of 11 units' average **times** for digitization **in house**) / 11*

This formula was repeated to determine the average cost to digitize in house, the average time to digitize out of house, and the average cost to digitize out of house.

How the estimated percentage of unpreserved assets across all units is estimated:

(sum of unpreserved assets across 11 units) / 293,586 total audiovisual assets

4 Recommendations and Findings

4.1 Component One: Audiovisual Collections Survey

TABLE | Total Audiovisual Assets in Participating Units by Medium

TOTAL, Audiovisual Assets	**293,586**
TOTAL, Audio	**151,577**
TOTAL, Film	**70,987**
TOTAL, Video	**71,022**

PIE CHART | Total Audiovisual Assets By Medium, Percentages

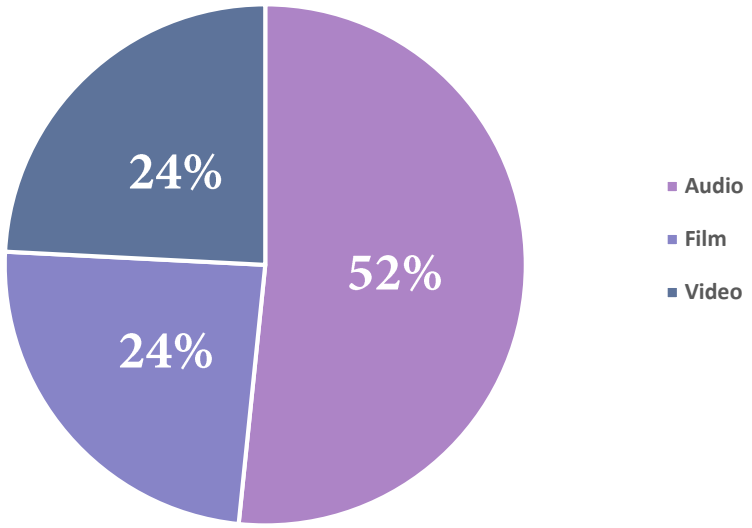
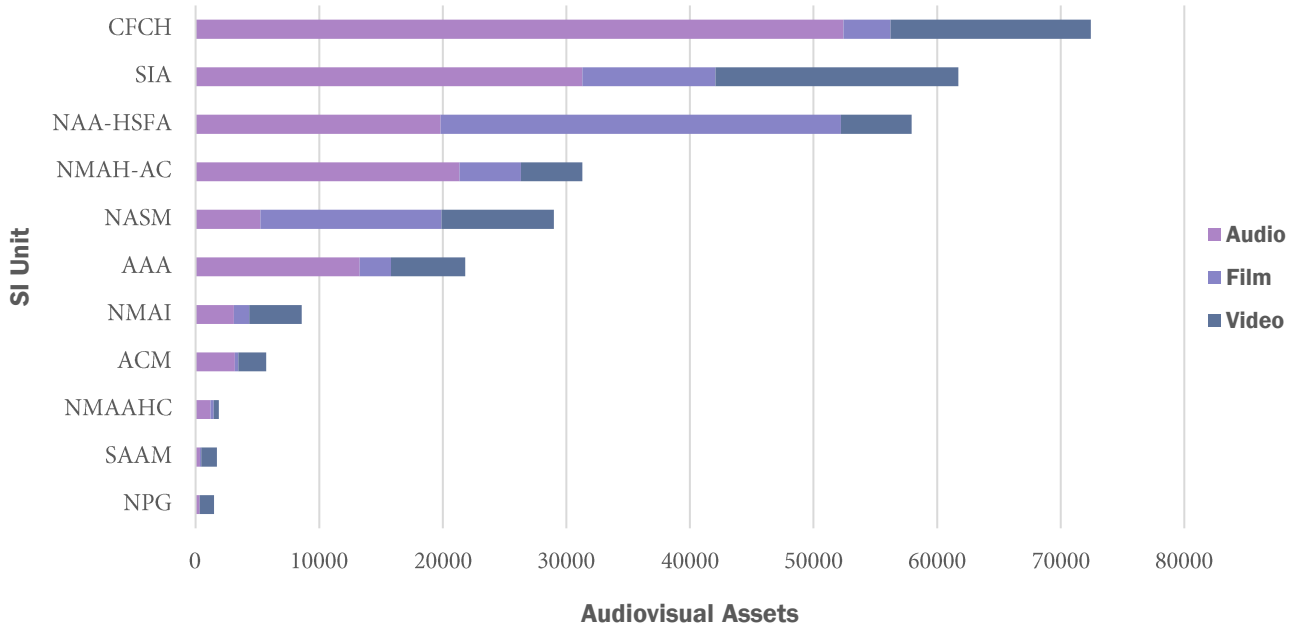


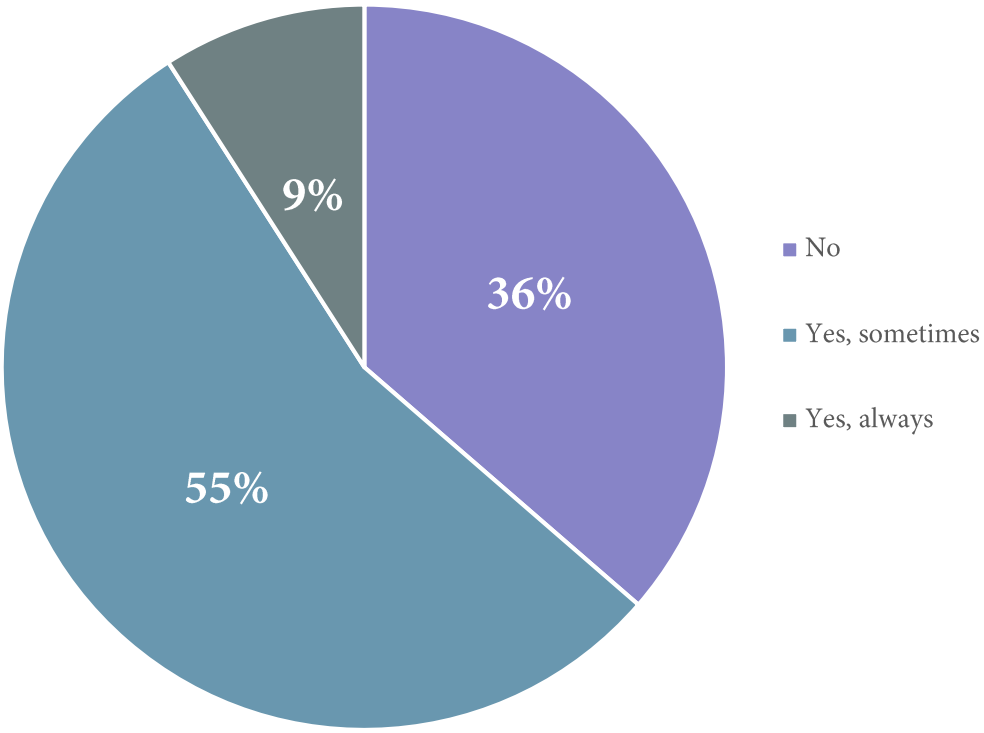
TABLE | Total Audiovisual Assets by Unit and Medium

UNIT	AUDIO	FILM	VIDEO	TOTAL
CFCH	52,410	3,811	16,213	72,434
SIA	31,282	10,786	19,659	61,727
NAA-HSFA	19,823	32,391	5,712	57,926
NMAH-AC	21,359	4,958	4,980	31,297
NASM	5,259	14,654	9,076	28,989
AAA	13,280	2,520	6,008	21,808
NMAI	3,096	1,251	4,233	8,580
ACM	3,177	273	2,265	5,715
NMAAHC	1,211	259	405	1,875
SAAM	363	84	1,291	1,738
NPG	317	0	1,180	1,497
TOTAL	151,577	70,987	71,022	**293,586**

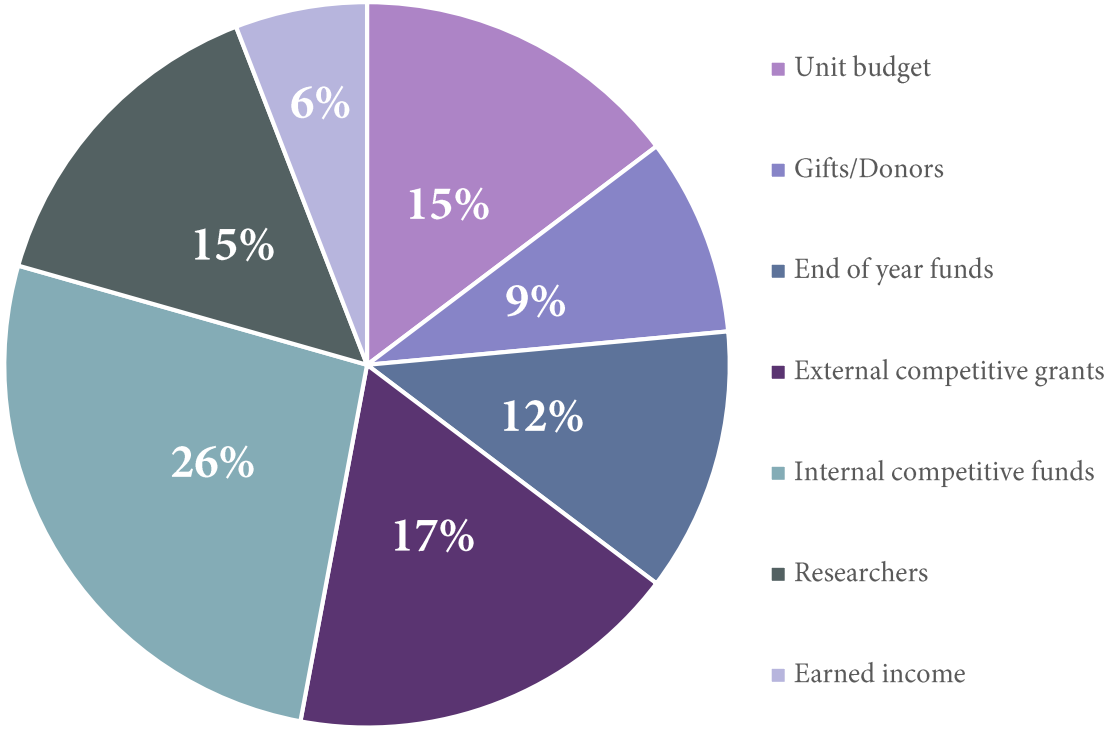
BAR GRAPH | Total Audiovisual Assets by Unit and Medium



QUESTIONNAIRE RESPONSE | Do you digitize audiovisual materials for preservation in-house?



QUESTIONNAIRE RESPONSE | Where does your unit get funds for digitization of audiovisual collections? (select all that apply)



4.2 Component Two: Prioritizing Collections for Preservation Using AVPRAPPS

A list of priorities is only a starting point for preservation planning, as evinced by the challenges listed above. This prioritization methodology guide makes the following recommendations to address and mitigate these challenges:

- **Weigh the pros and cons of mass digitization for entire collections**. In some instances, it is cost- and time-effective to preserve an entire collection rather than attempt to determine what might be of the greatest institutional value. However, if this approach is taken, unnecessary digitization may occur for materials that the institution does not have the legal right to provide access to. It may also create duplicate materials and materials that can be considered for repatriation or redistribution. On the other hand, once digitized, the quality and content of the collections, as well as their legal status, can be more easily and safely reviewed. When planning for mass digitization, it is important to note that prioritization is still necessary in order to mitigate collection deterioration or loss that can occur while assets are in queue for preservation.

- **Re-evaluate preservation priorities annually.** Preservation priorities and standards change, necessitating a regular revaluation of preservation priorities. These changes take place when collections are preserved, discovered, age or incur damage, as standards change, and as the cultural values and mission statements of institutions shift.

- **Track audiovisual assets at the item level and track generations and instantiations of content**. Audiovisual preservation standards favor the prioritization of source material and first generation recordings; however, degradation of original formats can influence prioritization choices. Additionally, subsequent copies of recordings can contain changes which reflect shifts in content or artistic intention, which should be prioritized. NOTE: This is simplified if mass digitization is an option. It is much easier to playback the digital file than the analog component, and this method of access is better for the longevity of the asset.

- **Track when an asset has been digitized.** Tracking what items have been digitized is key to creating an accurate prioritization list. Metadata regarding the digitization process (date, time, equipment used, quality control measures, file types, etc.) should also be tracked.

- **Review the special considerations for each format**. The AVPRAPPS spreadsheet contains a column of special considerations for each format that should be taken into account when prioritizing preservation.

4.3 Component Three: Pan-Institutional Audiovisual Preservation Assessment

The goal of this assessment is to determine, through qualitative and quantitative data, the ability of the Smithsonian Institution to preserve its audiovisual collections according to its stated goals and mission. This report also provides an assessment of the audiovisual preservation practices and workflows of the Smithsonian Institution.

The data in this report was gathered during interviews with unit contacts and on-site visits to each unit by the Community Archiving Collective (CAC) during January and February 2019. Each participating Smithsonian unit received a Unit Preservation Assessment Report and an Equipment Checklist as a part of AVPRA, documenting the unit's existing audiovisual preservation equipment. Data from those reports was aggregated to create this pan-institutional assessment.

This readiness assessment articulates the ability of the Smithsonian Institution to preserve analog audiovisual media according to both best practice standards and its own internal standards. This report does not focus on the long-term care of digital files or preservation of complex media and born digital media.

This report provides recommendations for improving preservation practices across all units. The purpose of the recommendations in this report is to provide guiding philosophies and practices. The recommendations point to available resources within the Institution, such as existing preservation manuals and workflows or educational opportunities. The recommendations are not a substitute for comprehensive preservation management or staff training and expertise, nor are they intended as a comprehensive guide to collections care. Instead, they highlight areas of strength and weakness, and provide a starting point for the Smithsonian Institution to improve on existing resources and increase its ability to meet preservation goals.

The quantitative and narrative data from this report will be used to outline ideal audiovisual preservation strategies and scenarios for the Smithsonian Institution. When this report refers to collections at the Smithsonian Institution, it is referring to the eleven (11) units participating in the assessment.

4.3.1 Quantitative Findings

4.3.1.1 Cost of Preservation: In-House versus Out-of-House

IN-HOUSE COST (PER ASSET)	USD
Average reported cost	**$137.00**
Highest reported cost	$161.00
Lowest reported cost	$120.00

OUT-OF-HOUSE COST (PER ASSET[15])	USD
Average reported cost	**$231.00**
Highest reported cost	$560.00
Lowest reported cost	$131.00

Findings: On average, unit staff report that the cost to preserve one audiovisual asset in-house is $97 less than preserving the asset out-of-house.

Note: This cost reflects current workflows and practices. It does not include the cost of equipment and equipment maintenance, since much of the equipment is already on-site and cost of equipment cannot be accurately measured per asset with the current data. Vendor costs, per asset, are likely to go down when preserving large quantities at once.

4.3.1.2 *Time for Preservation: In-House versus Out-of-House*

IN-HOUSE STAFF TIME (PER ASSET)	HOURS
Average reported time	**3**
Highest reported time	3.5
Lowest reported time	3

OUT-OF-HOUSE STAFF TIME (PER ASSET)	HOURS
Average reported time	**3.5**
Highest reported time	10
Lowest reported time	0.75

Findings: On average, unit staff report that the time to preserve one asset in-house is .5 hour less than preserving the asset out-of-house.

Note: Time to preserve out-of-house includes administration of project; handling, packing and shipping of assets; and quality control procedures. Cost of magnetic media was used to create this average, since this is the format most units are preserving in-house, and film presents many cost variables.

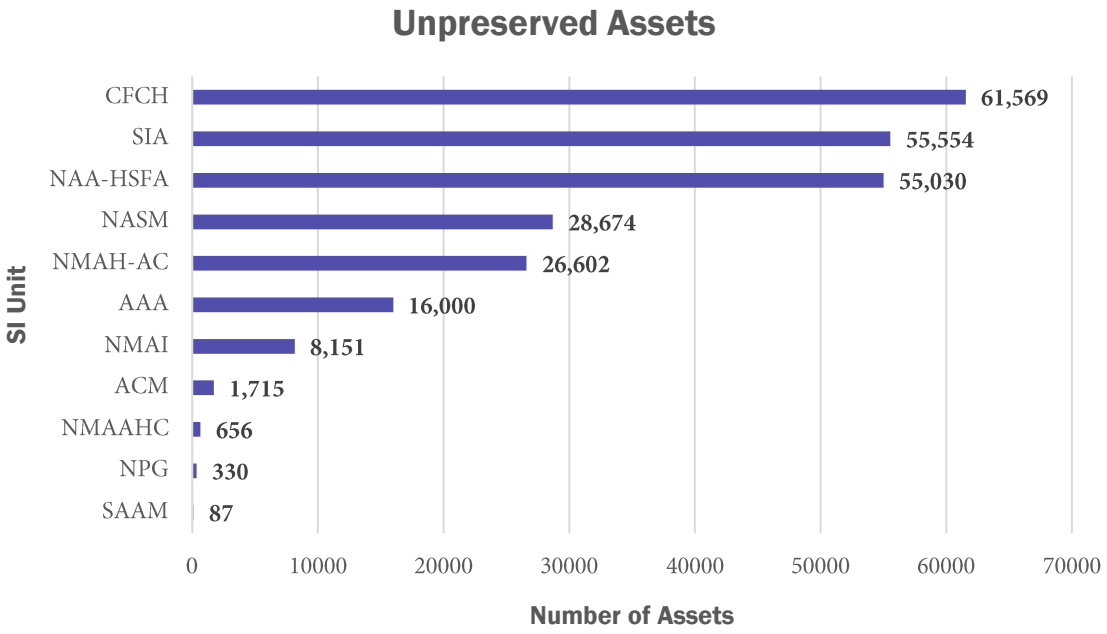
4.3.1.3 *Preservation Rates: Number of Audiovisual Assets Preserved Annually*

ASSETS PRESERVED (PER YEAR)	NUMBER OF ASSETS
Total, all units	**4,365**
Highest reported preservation rate per year	2,880
Lowest reported preservation rate per year	0
Average preservation rate per year	485

Note: The average preservation rate per year is based off the total number of assets preserved per year divided by nine units. Two units reported that they are not performing any audiovisual preservation so they were excluded when determining the average rate.

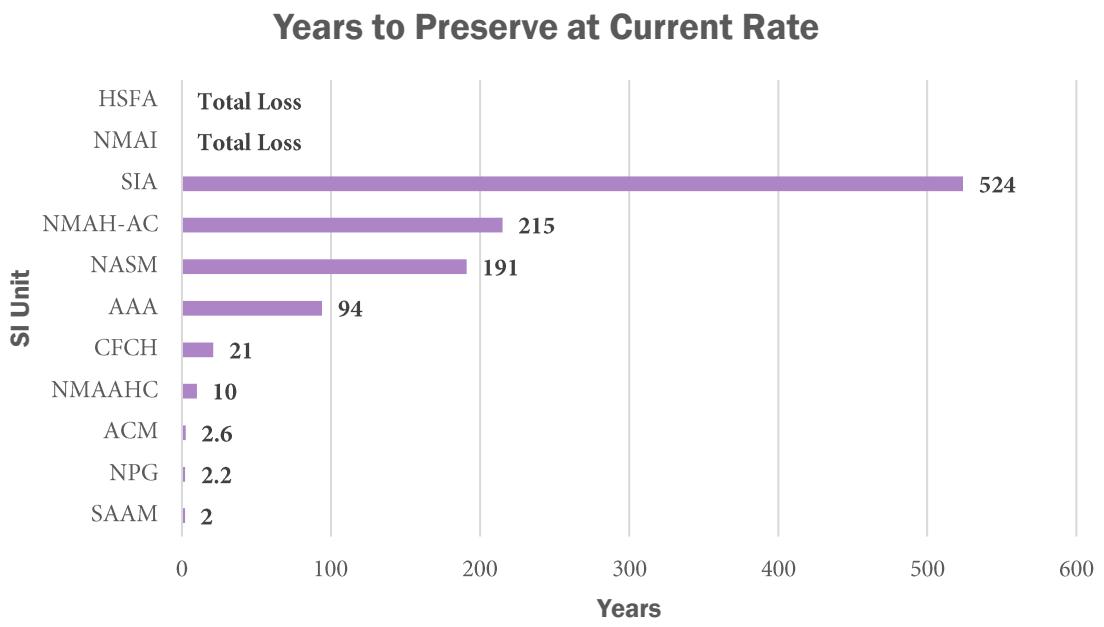
[15] Magnetic media was used as the format type to estimate out-of-house costs.

4.3.1.4 Assets: Number of Unpreserved Audiovisual Assets at the Smithsonian



UNPRESERVED ASSETS	NUMBER OF ASSETS
Total, all units	**254,368**
Highest reported amount of unpreserved assets	61,569
Lowest reported amount of unpreserved assets	87
Average percentage of unpreserved assets per unit	86%

4.3.1.5 *Time: Years to Preserve at Current Rate of Preservation*



TIME TO PRESERVE, AT CURRENT RATE	YEARS
Greatest time to preserve	524
Least time to preserve	2
Average time to preserve	118

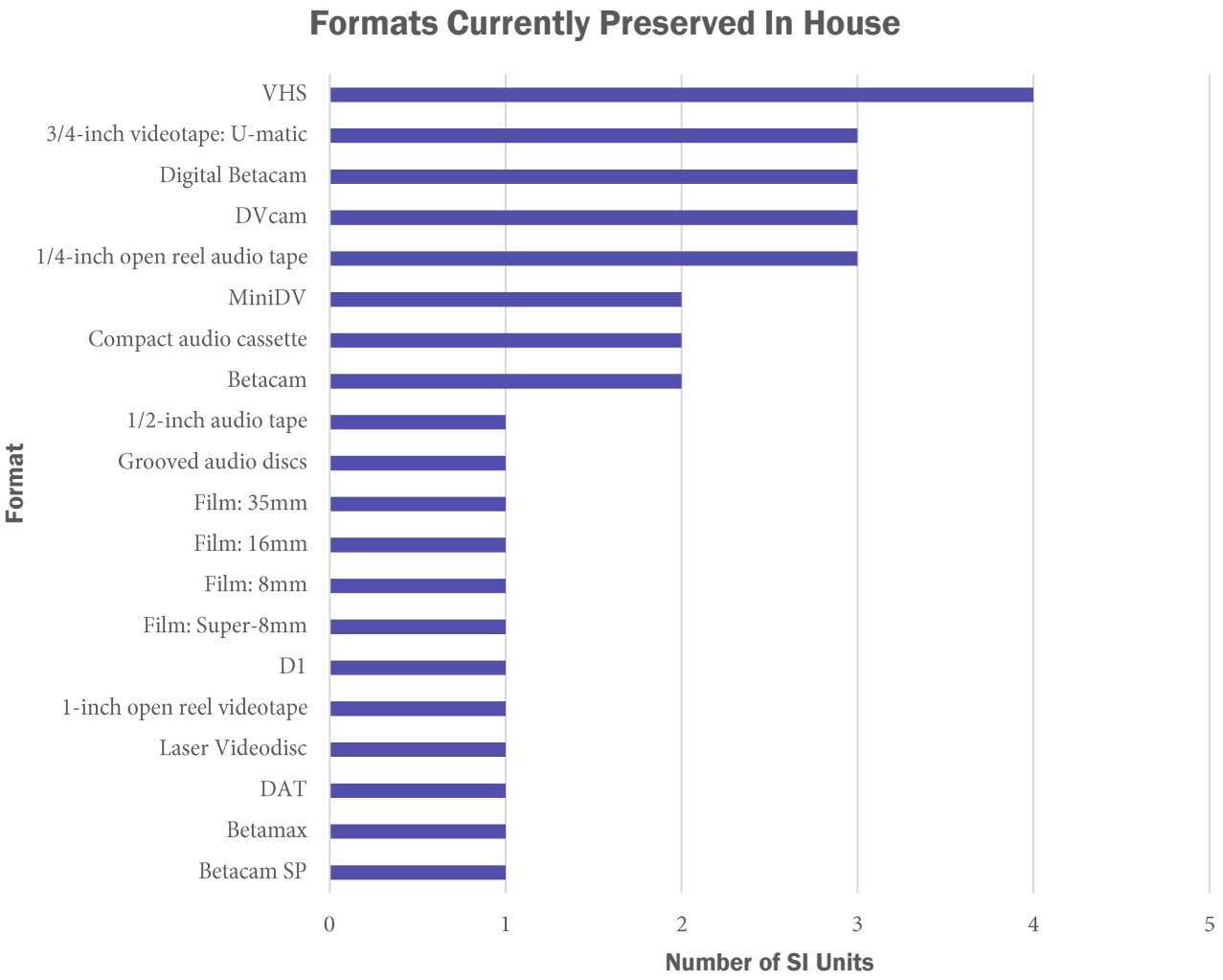
Note: No data is available for two of the units, which are not performing any audiovisual preservation, and this number does not reflect the two units. **If these two collections are considered, the number of years necessary to preserve the overall collections would rise significantly.** At current rates of preservation, those units will lose **63,181 assets.**

4.3.1.6 *Formats: Most Interested in Preserving*

TABLE | Top Ten Formats Units are Interested in Preserving

FORMAT	NUMBER OF UNITS
3/4-inch videotape: U-matic	10
Compact audio cassette	7
1/4-inch open reel audiotape	6
VHS	6
Film: 16mm	6
MiniDV	3
Grooved audio disc, lacquer	3
Film: Super-8mm	3
Film: 8mm	3
Betacam	3

4.3.1.7 Formats: Institutional In-House Capability

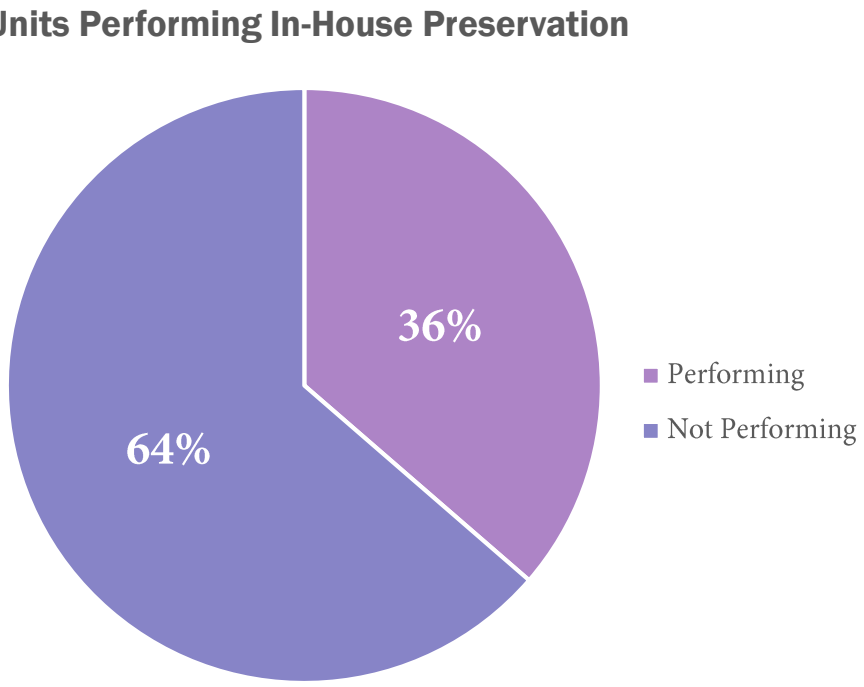


Findings: At least one unit has the capacity to preserve each of the formats that all units report being most interested in preserving. The number of units that can preserve magnetic media cassette formats is higher than other types of formats such as film, grooved discs, open-reel audio, and open-reel video.

4.3.1.8 Equipment Sharing: Pan-Institutional Preservation Efforts

Findings: All units show an interest in sharing equipment or contributing equipment towards pan-institutional efforts. Most units report that permission from unit leadership would be required. Please see *Appendix G. Pan-Institutional Equipment List* for a better sense of available preservation equipment across the eleven Smithsonian units.

4.3.1.9 Preservation: In-house Unit Performance



IN-HOUSE PRESERVATION	NUMBER OF UNITS
Total units performing in-house preservation	4
Total units not performing in-house preservation	7

Findings:

Why units choose not to perform in-house preservation (of the seven units not performing in-house preservation):

- One unit is not performing in-house preservation because their collection is nearly preserved.
- One unit performs very little in-house preservation because their collection is nearly preserved.
- One unit does not perform in-house preservation because the unit does not believe in-house preservation is an effective preservation method and they lack the appropriate staff.

Why units who wish to perform in-house preservation cannot (of the seven units not performing in-house preservation):

- Five report lack of staffing as a significant reason.
- Five report lack of staff training in preservation workflows as a significant reason.

This report includes details regarding barriers to preservation in *Section 4.3.4.3 Barriers to Preservation: Staffing and Training*.

4.3.1.10 Preservation: Current In-house Staff Performance

NUMBER OF STAFF	% OF TIME SPEND DIGITIZING COLLECTIONS
1	5
3	10
2	50
1	100

Findings: Of all the Smithsonian staff who play a part in audiovisual preservation, only seven of those are responsible for in-house digitization of collections. Furthermore, of those seven staff members, only one spends 100% of their time performing preservation-level digitization.

4.3.2 Preservation Workflow Assessment

This section provides an overview of current preservation practices at the Smithsonian Institution. These narratives are based on the eleven unit interviews and culled from each unit's individual preservation assessment report.

4.3.2.1 Available Preservation Equipment

Unit equipment checklists, provided for each unit, document equipment in-use or not-in-use for preservation and access digitization. The AVPRA Final Project Report contains *Appendix G. Pan-Institutional Equipment List*, which documents audiovisual preservation equipment currently stored at the Smithsonian Institution.

EQUIPMENT MAINTENANCE AND CLEANING

Overview of Current Practices

Each unit reports different practices regarding equipment maintenance and cleaning. Units are inclined to clean, calibrate, and repair equipment as needed, rather than on a determined schedule. Many units report that they use an institution-wide funding pool to maintain equipment

General Recommendations

- Equipment used for in-house preservation should have a determined schedule for cleaning, calibration, and other maintenance in accordance with the use of – and wear and tear on – the equipment. This includes playback machines, waveform and vectorscope monitors, and CRT monitors. Ideally, decks and scopes would be professionally serviced once per year, while monitors can be calibrated in house by trained staff. Tape deck paths and film scanner paths should be cleaned between each digitizing pass of an asset.
- Staff performing cleaning of decks and film scanners should be trained in best practices. Staff should avoid the use of commercial "cleaning" tapes, which shorten the life-span of video deck heads[i], as well as commercial cleaning fluids which are not designed to be used with such equipment and will cause damage to both equipment and media assets. 70% isopropyl alcohol should be used for cleaning deck heads and other relevant metal parts with medical grade wipes or cotton swabs (read: no floating fibers). All cleaning materials should be thoroughly researched to ensure no damage is done to equipment or assets.

- Training for basic video deck cleaning requires hands on instruction – this report recommends at least 2-4 sessions – to ensure clarity of procedure and instill confidence in carrying the task forward. After proper instruction, staff should produce a manual and determine a cleaning schedule for in-house use.
- Budgeting for reactive equipment maintenance can be challenging, since each year can vary widely. It is recommended that units preserving audiovisual materials in-house have secured and consistent funding for equipment maintenance to be responsive to break downs or issues with playback equipment.
- Actively pursuing the purchase of additional equipment and parts is advised but should be coordinated with regard to both projected needs and the potential for pan-institutional sharing. This is especially important because most analog playback equipment is no longer manufactured, and breakdowns are likely to occur.

Recommendations for Smithsonian Institution

This report recommends that all units plan for scheduled cleaning, calibration, and maintenance of equipment. The Institution should consider adding funds to develop guidelines and recommendations for equipment maintenance to its funding pool. This would be especially helpful to units which do not have audiovisual archives staff.

4.3.2.2 Staffing Levels for Audiovisual Preservation

IS THERE ENOUGH STAFF TO OPERATE IN-HOUSE EQUIPMENT AND ACCOMPLISH PRESERVATION GOALS?

Overview of Current Practices

The majority of units wishing to pursue in-house preservation do not have enough staff to operate preservation equipment consistently. One unit is no longer pursuing analog preservation because most of its collections are preserved. One unit does not wish to pursue in-house preservation.

General Recommendations

- All preservation stations should be consistently staffed in accordance with the unit's stated preservation goals. Consistent staffing increases efficiency and is more cost effective in the long run. For example, if a preservation station is consistently staffed, setting up the station for the day's work will be faster and inconsistencies in the operations of the station will be less frequent. Staff will not forget and need to re-learn the operation of equipment, as they will if they operate it only occasionally. A dedicated preservation staff person will have the capacity to troubleshoot the equipment quickly and efficiently because they will be trained to do so and be aware of past issues and their solutions. Consistent staffing also means the staff member is more likely to preserve formats in batches, which leads to greater efficiency in equipment set-up and preservation workflow, and a greater consistency of quality across collections.
- Units that are staffed inconsistently, such as those who rely on short-term contractors for preservation efforts, are more likely to see a loss of institutional knowledge and best practices, inconsistency in quality of preservation files, and neglect and disuse of equipment and resources.
- A common problem in achieving preservation goals is saddling a staff member who is already contending with multiple other responsibilities with the additional task of preservation work that requires focused labor. Having dedicated staff for preservation stations relieves curatorial and archives staff of responsibility of preservation activities they are not trained for.

Recommendations for Smithsonian Institution

Adequate and dedicated staffing is critical for in-house preservation. This report recommends that the Institution staff existing preservation equipment full-time to make the most of its existing resources and meet its preservation goals. Consolidation of preservation equipment provides the opportunity to relocated idle equipment to dedicated preservation stations which can be staffed at an optimal capacity.

4.3.2.3 Skill and Skill Building

IS STAFF TRAINED IN PRESERVATION-LEVEL DIGITIZATION?

Overview of Current Practices

The majority of Smithsonian Institution staff are not fully trained in audiovisual preservation. Six units do not have staff trained in current audiovisual preservation practices. Two units have staff with some training in audiovisual preservation practices, but report that further training is needed. Three units report that they have staff fully trained in audiovisual preservation practices.

General Recommendations:

- Having a staff member who is trained and experienced in audiovisual preservation is recommended. Trained staff who are up-to-date on audiovisual preservation best practices can implement the most efficient and successful workflows for in-house preservation.
- A permanent staff member with audiovisual archiving training allows the unit complete control of the production of digital preservation files. Adequately-trained staff can identify errors or inconsistencies in the preservation process, and to mitigate those errors by treating the tape, cleaning the deck, or adjusting the signal flow. A well-trained staff member provides the unit with the potential for producing the highest quality —and most consistent— digital preservation files. Whereas a vendor may prioritize efficiency (less time per asset) when completing a job, an in-house staff-member is focused on creating the highest quality preservation file possible. A dedicated and adequately trained staff member would be able to devote most, if not all, of their time to this process and meeting the unit's needs.

Recommendations for Smithsonian Institution

This report finds that most staff are not fully trained in audiovisual preservation practices. Audiovisual preservation is complex and often requires a team of experts. For example, an expert in the process of digitization may not be an expert in digitization of every known format. They may not be able to re-construct a broken deck or operate a complex data management system. For this report, "fully trained" is defined as staff working in audiovisual preservation who have essential knowledge of current practices, including basic conservation skills, basic knowledge of digitization workflows and target file formats, and a basic understanding of quality control procedures. Within this skill set, deeper expertise will be necessary to perform specific tasks. Many of the staff were found to have a high expertise in conservation, a working knowledge of digitization and file format types, but lack technical expertise and hands-on experience in digitization. This is essential for communicating with labs as well as performing in-house preservation.

IS TRAINING AND ONGOING TRAINING AVAILABLE FOR STAFF WHO OPERATE IN-HOUSE EQUIPMENT?

Overview of Current Practices

One unit is not pursuing in-house preservation and therefore is not concerned with training. One unit does not have formalized training but has almost completed its goal of analog preservation. Three units participate in ongoing audiovisual preservation training. Six units do not participate in ongoing training in audiovisual preservation.

General Recommendations:

- Ongoing training in audiovisual preservation best practices is imperative for staff engaged in the preservation of audiovisual assets. Workflows and standards for audiovisual preservation are constantly being developed. New, more efficient file types and compression codecs are emerging, and hardware, software and preservation workflows for audiovisual assets are constantly being revised.
- Awareness and implementation of emerging workflows and technology can save the unit storage space, create more efficient workflows, and lower the cost of preservation. This is also essential to avoiding the obsolescence of hardware, and the obsolescence and corruption of software and digital files.

Recommendations for Smithsonian Institution

This report finds that Smithsonian staff are not participating in adequate ongoing training in audiovisual preservation. Access and dedicated time for staff to participate in consistent, continuing education opportunities in audiovisual preservation should be provided by the Smithsonian. This report recommends that all units participate in available training and are versed on resources provided by AVAIL, NMAAHC, through professional conferences, and with the support of visiting/contracted trainers. Since there is little formalized training in this field, units may also wish to work with their engineers and colleagues to develop training courses in specific topics relevant to their needs.

4.3.2.4 Pre-Digitization Workflows

ASSET PREPARATION

Overview of Current Practices

Asset preparation practices vary across units. All units have some practice for asset preparation, often depending on the availability of staff or contractors to complete a project.

General Recommendations

- Preparing assets at item level is recommended before preservation. The level of asset preparation is dependent upon many factors, including whether preservation is performed in or out-of-house, and in the case of film preservation, whether the lab will be inspecting, cleaning, and repairing film. The unit may wish to prepare all assets at once, before batch digitization, or save specific tasks to occur before each item is digitized, at the time of digitization.
- The purpose of preparing an asset is to streamline and inform the preservation process and to ensure each asset is identifiable and in an ideal state for digitization. During preparation, the unit may wish to set aside assets with special problems, such as physical damage, mold, or serious visible decay. These assets can be repaired and treated in-house or sent to a vendor or specialist department that can handle advanced issues.

- **Recommended practices for film:** Physical preparation for film can vary widely. If the film is being preserved in-house, the unit may wish to conduct a complete film inspection and perform all necessary repairs. The unit may wish to clean the film by hand or using an ultrasonic cleaner. If the film is being sent out of house for preservation, the unit should consult with the lab. The lab may wish to perform repairs at its facility, and may re-do tape repairs, making the work of the unit redundant.
- **Recommended practices for grooved discs:** Physical preparation for grooved discs include cleaning according to best practices and re-housing discs that are in good condition, and noting issues such as physical damage, flaking, or substrate migration.
- **Recommended practices for preparing magnetic media:** Physical preparation for magnetic media includes inspecting cassettes for breakage, removing record tabs to prevent overwriting content, performing a visual inspection that notes odors, poor winds, the presence of mold/ crystallization, or other notable damage. Hydrolysis, commonly known as "sticky shed syndrome," is a common issue with magnetic media and a direct result of exposure to high levels of humidity. Any signs of humidity-related damage, such as water stains on a case or a moldy odor should be noted so that the asset can be treated before playback is attempted. Re-housing is not usually recommended for video cassettes, since their lifespan is relatively short, preservation level housing is not usually available, and funds to purchase such housing may be better directed towards preservation activities. The unit may decide to re-house at its own discretion.
- **Recommended practices for open reel magnetic audio:** Physical preparation for open reel magnetic audio includes performing a visual inspection that notes any tape deformation (ex: wavy lines in wind), edge frilling, brittleness, shedding, a poor pack, odors (specifically vinegar-like), the presence of mold, or other notable damage.

Recommendations for Smithsonian Institution

In general, preparation practices at all units are strong and staff understands essential conservation practices, which tend to overlap with preservation practices. If engaging in a pan-institutional preservation effort, a manual for preparation would increase consistency among units.

ASSET INVENTORYING

Overview of Current Practices

There is a variety of inventorying practices for audiovisual assets at the Smithsonian. Some units create finding aids, then inventory assets at item level before preservation or before sending to a vendor. Some units only inventory assets at item level. One unit has no standardized cataloging or inventorying practice.

General Recommendations

- An item-level inventory of assets, ideally with unique identifiers and notes on condition, is recommended before digitization. Creation of an inventory before digitization has the following benefits:
- Items with complex issues can be triaged to be sent to a vendor or specialized unit for advanced treatment, thus increasing the efficiency of the digitization.
- Item location is always trackable.
- Unique identifiers can be used in file naming and included in metadata.
- Individual assets can be noted as preserved or unpreserved, creating valuable documentation to be used in future preservation planning.

- Items with individualized metadata allow the preservation technician to be prepared for any issues or special considerations the asset may have and can prepare the workflow accordingly.

Recommendations for Smithsonian Institution

This report recommends inventorying assets at an item level according to the general recommendations. If the Institution explores pan-institutional preservation activities, it should create a standardized inventory process that all units use in preparation for preservation.

4.3.2.5 In-House Digitization Workflows

MONITORING DIGITIZATION

Overview of Current Practices

Most units report that they monitor in-house digitization. Practices in monitored digitization varies. Several units noted that using or reading scopes is challenging.

General Recommendations

- Digitization of analog audio and video assets should be monitored in real time using video waveform and vectorscope monitors and audio levels monitors, and the staff member's analysis of the image on the video monitor and/or the sound from the audio monitor. This allows the staff member to identify if there are any artifacts or errors in the digital preservation file as they arise, focusing troubleshooting efforts, rather than after an incorrect transfer is completed. Monitoring by staff also builds in-house knowledge regarding the content of the collection and creates valuable institutional knowledge.

Recommendations for Smithsonian Institution

This report recommends standardizing the use of scopes for preservation, and training for all preservation staff in their use. If the Institution explores pan-institutional preservation activities, it should create standardized monitored digitization practices in the production of digital preservation files.

RESPONDING TO ERRORS DURING DIGITIZATION

Overview of Current Practices

The units who perform in-house preservation generally respond to errors by stopping the transfer, finding the source of the error, and restarting the digitization pass. Response to errors is left to the technician and varies widely, depending on expertise.

General Recommendations

- When encountering an error during digitization, the staff member should identify whether this is an asset error (something wrong with the physical asset, like a crease in a tape), a deck error (such as head clog), or a signal error (such as improper white balance), and determine the best way to mitigate. There are multiple variables regarding mitigating problems during a transfer, and the technician or technicians responsible need hands-on training to build the critical thinking necessary to navigate troubleshooting hardware and software that was not necessarily designed for preservation purposes.

- Responding to errors during digitization allows the staff member to stop a preservation pass, mediate the issue, and begin again- creating the best possible quality digital preservation file.
- All encountered errors and subsequent troubleshooting methods should be documented – to note preservation actions related to an asset, and to document potential steps for future incidents and staff members in a more general troubleshooting document. All such documentation is relevant to in-house manuals, which should be updated accordingly.

Recommendations for Smithsonian Institution

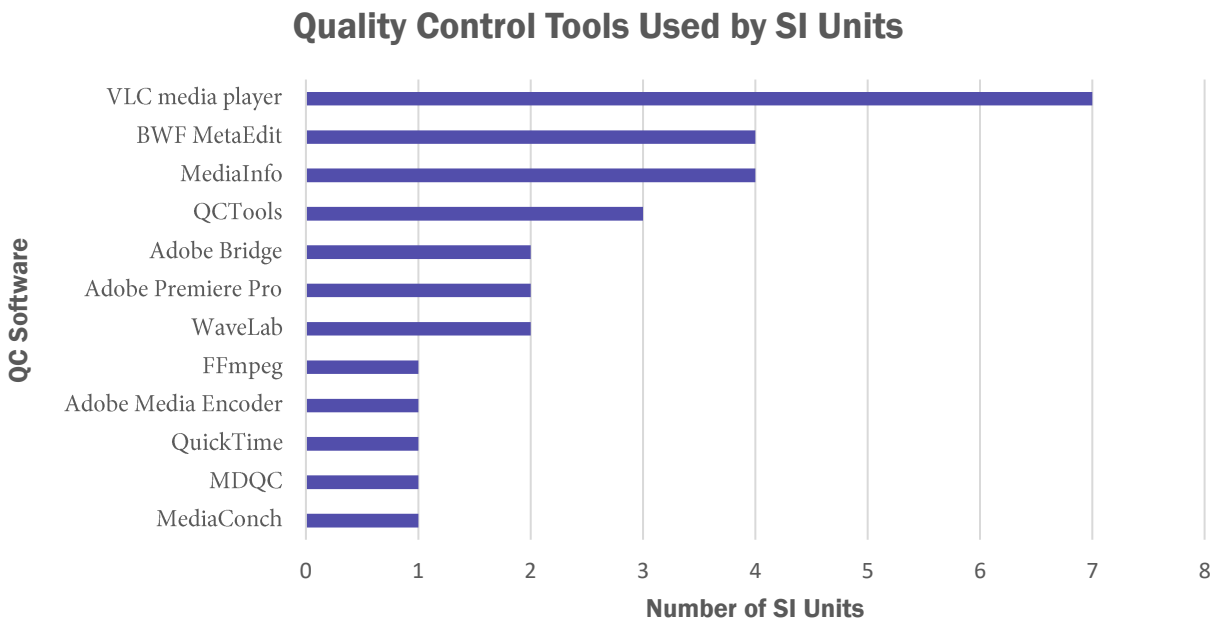
In addition to the general recommendations, this report recommends training on identifying the source of errors, use of tools like QCTools, and stronger written policies and workflows to support preservation staff in responding to errors.

4.3.2.6 Post Digitization Workflows

QUALITY CONTROL OF PRESERVATION WORK

Overview of Current Practices

Quality control procedures vary widely among the units surveyed. Two units report that they do not have the staff or expertise to conduct quality control measures at all. Many units do not have any written policies for quality control and leave the scope of quality control in the hands of the individual staff member performing the work. Several units reported that they could strengthen their procedures if staff were trained in using available software, such as QCTools.



General Recommendations

- Quality control procedures should be adopted and consistently applied across all preservation projects.
- Quality control actions should take place within a reasonable window of time, following preservation transfer, to allow unit to request mediation- ideally no less than 30 days. Digitized files that remain unreviewed for a long

period of time introduce the possibility of file corruption and reduce the possibility of mitigating errors and negotiating with vendors. Such procedures may vary from unit to unit. They include:
    - Viewing or listening to the preserved material in at least three spots, beginning, middle, and end.
    - Checking for correct aspect ratio.
    - Checking file naming for consistency.
    - Using software, such as MediaInfo, to ensure the file type, wrapper, and other specifications are correct.
    - Checking for correct speed of film materials.
    - Using software, such as QCTools, to analyze files for artifacts and errors and identify mechanical or asset problems.
    - Checking for correct embedded metadata.
    - Especially in the case of film, the unit should decide if a preservation file will contain any level of color correction or scratch reduction. The unit may decide to only include such alterations in reference or production files.
- There should be procedures in place to follow up on any problems found during the quality control stage. If the file has an unstable signal, the original asset can be checked to see if the problem is in the asset or in the transfer. Other issues may require re-digitizing the asset. If the unit is working with a vendor, the issue should be documented and reported to the vendor, who may need to re-transfer the asset.

Recommendations for Smithsonian Institution

Quality control measures are an area that SI can focus on for improvement across the board and should consider the creation of Institution-wide guidelines which can standardize procedures or assist units which may be struggling with how to best perform quality control. Most unit's practices are defined by the capacity of individual staff, and the knowledge and practice are not retained at an institutional level. Every preservation project plan, in and out of house, should include staff and time dedicated to completing quality control procedures for all files. Further training for staff should be provided in using quality control tools such as MDQC and QCTools. Also see comments and notes in the section "managing vendor errors" for more on how quality control affects out-of-house preservation projects.

4.3.2.7 File Naming Conventions

Overview of Current Practices

Almost all units surveyed have strong, consistent file-naming procedures. One unit reports that it does not have a file-naming procedure.

General Recommendations

- All units should have a consistent file naming convention applied to all files.
- In general, a good file name includes no special characters other than underscores or dashes, has a unique numeric component (especially one tying it back to the original analog asset), a human-readable component (if desired), and a note on the file use type (example: "ref" for reference, "pres" for preservation, etc.)
- File names should NOT attempt to replace cataloging fields or require extensive research (such as a publishing date) to create, as this can slow down the file naming process and lead to inaccuracies.
- The Office of Central Information Officer (OCIO) does not currently have file-naming guidelines, but the creation of such guidelines is being explored at the time of this report.

Recommendations for Smithsonian Institution

All units should have consistent, written file naming procedures that follow recommended guidelines. The DAMS team is currently creating internal guidelines, and this report recommends staff follow closely as these procedures develop.

4.3.2.8 Delivering Files to the DAMS

Overview of Current Practices

Most units report that they upload preservation files to the Digital Asset Management System (DAMS). However, there is not a mandated institution-wide standardized process.

General Recommendations

- Preservation and access files should be uploaded to the DAMS per the DAMS Team requirements.
- The SI DAMS team has a "Quick Start" guide and a "DAMS One Sheet" guide available to all units describing the DAMS upload process. Those documents are attached to this report for reference.
- While the DAMS is available to all units, there are differences among how units use the DAMS, and their understanding of how DAMS checksums work. The DAMS team is working on further documentation in this area.
- This report recommends a formal conversation between units and the DAMS Team to ensure that all staff understand how to use the DAMS and follow internal best practices.

Recommendations for Smithsonian Institution

Preservation and reference files should be stored on the DAMS according to institutional practices. Files should not be stored on stand-alone hard drives only. In cases in which units are unclear how to use the DAMS, units should review the DAMS workflows and policies, be sure they understand how DAMS checksums work, and meet with OCIO if procedures are unclear. DAMS policies are attached to this report.

4.3.3 Working with Audiovisual Preservation Vendors

4.3.3.1 Asset Shipping

Overview of Current Practices

Units use a combination of vendor couriers, shipping by driving the assets to vendors, and use of Fed Ex or other private shipping companies. One unit expressed concern over the ethics of shipping unique assets off-site at all. Units have differing understanding of institution-wide policies regarding insuring assets when shipping.

General Recommendations

- Often vendors will provide a courier service to pick up and drop off assets. If using a courier, ensure that the courier has insurance and will require a signature for delivery.
- If a unit uses a shipping service (UPS, USPS, FedEx, DHL) they should always use an expedited service with insurance and require a signature at delivery. Shipments should never be delivered to an unattended site.

Recommendations for Smithsonian Institution

The challenge of shipping can be a major hindrance as many units struggle to determine the most secure shipping method for assets and are unclear on institutional insurance protocols. This report recommends the development of Institution-wide guidelines to assist units in making decisions regarding how to ship their assets and what shipping services to use. Additionally, units should receive an update on current insurance protocols.

4.3.3.2 Asset Packing

Overview of Current Practices

Asset packing varies from unit to unit but is generally in keeping with recommended practices.

General Recommendations

- Assets should be packed tightly so they do not shift around while in transit. Extra padding at the bottom and sides of a shipping box will help prevent any damage to the assets, and a small amount of padding, such as a single sheet of bubble wrap, between assets is preferred.
- Do not use paper or other fiber-based materials as they introduce debris which can get into cassettes or reels and negatively impact preservation transfers.
- It is generally recommended assets are not wrapped in plastic, as this can introduce and trap moisture, but if wet weather is an issue it can be considered for the short-term period the assets are in transit.

Recommendations for Smithsonian Institution

No further recommendations.

4.3.3.3 Asset Tracking

Overview of Current Practices

Assets are generally tracked at item level before being sent to a vendor.

General Recommendations

- The unit should always know where individual assets are, what process of preservation they are in, and what processes of preservation have been successfully completed. If the unit does not have a database or tracking system, an item-level inventory —captured in a spreadsheet– suffices.

Recommendations for Smithsonian Institution

No further recommendations.

4.3.3.4 Reliance on Vendor Expertise

Overview of Current Practices

Many units cited some level of reliance on vendors, particularly for film preservation and 1 inch open reel video. Two units reported that they rely 90%-100% on vendor expertise. One unit also noted that they do not feel confident in suggesting how vendors can perform better when a problem arises. One unit noted that they rely more on the expertise of their SI colleagues than on the vendor's expertise. One unit remarked that when using a vendor, there is such heavy

reliance on that vendor that it takes control away from the unit. Units tend to use standard vendor contracts that they tweak for each project, a practice which is likely to increase consistency and efficiency. One unit pointed out that the stronger their vendor contract is, the less vendor errors they tend to find in the preservation files.

General Recommendations

- When working with a vendor, units should have clearly documented expectations including: project timeline and budget, shipping, tracking and insurance of assets, and lines of communication regarding treatment of tapes (example: communicate added cost and time if assets need to be cleaned, baked, re-housed, etc.).
- Unit should provide the vendor with technical specifications outlining file formats for preservation and access files. This should include file format, codec, bit rate, aspect ratio, frame rate, scan type, chroma subsampling, audio format, audio bit rate, audio channels, audio sampling rate, and audio bit depth.
- Contract should clearly outline the amount of time unit has to review digitized files and communicate any issues that may arise.
- Unit staff should be well-versed on common artifacts and errors[4] that arise in audiovisual preservation and be prepared to negotiate with the vendor when these errors were either introduced during digitization or were able to be mediated, but ultimately were not.
- Additionally, a contract should outline how long the vendor will maintain a copy of digital files so that the unit can review files and upload them to the DAMS while there is redundancy to the files.

Recommendations for Smithsonian Institution

Units vary greatly in how much they rely on the expertise and advice of a vendor to perform preservation. Staff that depends heavily on vendor expertise are in a poor position to set expectations, create technical specifications for projects, and negotiate with vendors on projects, as well as communicate issues regarding quality of preservation work. Staff that do not depend heavily on vendor expertise are the best advocates for the assets they are stewards of. This report recommends that all staff managing preservation projects receive training in the topics in which they feel the most need, so that they can adequately communicate with vendors.

4.3.3.5 Managing Vendor Errors

Overview of Current Practices

Three units report they have not found vendor errors. Of those three, one unit does not review files for quality control, one unit is not engaged in audiovisual preservation, and one unit very rarely uses vendors. Two units report that they have a backlog of files to review and are not able to identify vendor errors at this time. The rest of the units respond to vendor errors by contacting the vendor, finding the reason for the error, and having the work re-done if needed.

General Recommendations

- Digitized assets received from a vendor should be reviewed immediately (recommended window is 30 days) in the event that any errors are discovered. Receiving staff members should check for the correct number of files, correct codecs and wrappers, and perform a quality control review of each file. This can consist of viewing the file or running it through a program such as QCTools.
- Vendor errors to note include sync issues not present in the original asset, maladjusted chrominance/luminance, discreet audio channels that have been mixed, misidentified or improperly attributed file names, missing files, etc.

- Errors that can be mediated —but have not— include head clogs, video dropout, flagging, vertical roll, and tracking errors.
- Errors need to be clearly documented to communicate them to the vendor. If the error in question is related to specifications established with the vendor prior to the project's initiation (file capture preferences, requested derivatives), this documentation should be referenced when communicating discovered errors with the vendor.
- Generally speaking, vendors have a window of time in which they need to be made aware of errors which will allow for re-transfers free of charge. It is recommended that the unit discuss error procedures with a vendor before the project begins.

Recommendations for Smithsonian Institution

This report recommends that units receive training that equips them with the communication necessary to resolve error issues with a vendor in a timely and effective manner. See *Section 4.3.3.4 Reliance on Vendor Expertise* for further recommendations.

4.3.4 Conclusion

4.3.4.1 Is the Smithsonian On Track to Meet Its Audiovisual Preservation Goals?

The most important finding of the report is that the Smithsonian Institution is not currently on track to meet its pan-institutional preservation goals for analog audiovisual material. At the current rate of preservation, it would take an estimated 394[16] years to preserve its audiovisual collections. This total does not include 63,181 assets held by units which are not currently performing any audiovisual preservation. These 63,181 assets face total loss under current practices.

Since magnetic media is not expected to be viable for more than 15 years, such a rate of preservation is not adequate to preserve these assets before they degrade beyond ability to play back, restore, or digitize. Even film assets in cool and cold storage—the portion of the analog audiovisual collections expected to have the greatest longevity—would be unlikely to survive as cultural heritage assets for future generations. It is impossible for us to know what audiovisual preservation, or even playback ability, will look like in the future. The current timeframe for audiovisual preservation at SI is simply so long that it cannot provide a tangible reference point.

While the institution is not on track to meet its audiovisual preservation goals, each unit is at a different stage in its individual path to meet its own preservation goals. The Unit Assessment Reports document this in detail, and the following provides a brief overview. Two units report being nearly complete with the preservation of their analog audiovisual materials (SAAM and NPG). One unit, ACM, is on track to complete preservation in two (2) years at their current rate of preservation. Four units are performing preservation but are still not on track to meet their preservation goals. Four units are performing little to no preservation and face critical collection loss under current preservation conditions.

[16] This total is derived from the total estimated number of unpreserved assets across all units (254,368), minus the 63,281 for the two units not doing preservation work (191,087), divided by the average number of assets preserved per year (485), which amounts to 394 years.

4.3.4.2 Out-of-House Versus In-House Preservation

A primary theme of this report is the advantages and disadvantages of preserving audiovisual assets in-house versus out-of-house. It is important to consider how the goals of the project can be best met, and to review the hard data regarding the cost, time, and efficiency of in-house versus out-of-house preservation. It is also vital that the Institution review its own philosophies and ethics regarding audiovisual preservation. The Smithsonian Institution is a highly visible repository of national importance and is a model for other institutions around the world. SI should consider how its preservation workflows reflect its institutional values and how it can better serve as a model for other institutions which will invariably look to it for guidance as they embark on the development of their own preservation practices.

Audiovisual preservation is a complex task requiring a variety of skill sets: from equipment repair to management of digital files. We should first review the unique challenges that the process of audiovisual preservation presents. It is a process quite different than other forms of museum preservation work. Much of the necessary equipment is obsolete. Parts are no longer made for some essential equipment. The technicians who can service the equipment are few and far between and are rapidly aging out of the workforce—often technicians must be flown in from other parts of the country to repair or assess equipment. In addition, those technicians often have a background in broadcast media or technical services rather than museum or preservation work. Standards and workflows for audiovisual preservation are in constant development and change as technology advances or obsolesces.

Ongoing training is necessary to perform best practice audiovisual preservation. Though the need is great, there is little formal training available, particularly around hands-on technical practices. The Association of Moving Image Archivists (AMIA) lists only three graduate programs focusing on audiovisual preservation in the United States – at New York University (NYU), University of California, Los Angeles (UCLA), and the University of Rochester. In recent years, the UCLA program was folded into a traditional Master of Library Information Science degree as an area of specialization. There are an additional six such graduate programs listed internationally, and five audiovisual specific certifications are available[5]. It is more common for archivists and other museum staff to learn audiovisual preservation on the job than to have dedicated their studies or careers to this type of preservation practice. Ongoing training in audiovisual preservation practices should be factored into all institutional planning if important cultural heritage recordings are to be preserved and made available for future generations.

Hard data from this report suggests that preserving assets in-house is more time and cost effective than using a vendor – it shows an average of 0.5 hours less to preserve in-house, and an average cost savings of $97.00 per asset. In-house preservation also has advantages that are not so easy to quantify. It builds staff expertise at a leading world institution which serves as a model for other preservation projects. It builds invaluable knowledge about the content of the collections, because preservation staff must observe all footage in real time during preservation. It avoids shipping fragile assets off-site. It puts the control of the preservation quality in the hands of the institution rather than a vendor with less investment in the long-term care of the collection (even if they are a trusted vendor).

Most units surveyed for this report express interest in performing at least some in-house preservation. The unit point of contact at NMAAHC expressed the point of view that it is unethical for a federal agency to use taxpayer funds to send rare collection assets off-site in mass quantities when they can preserve them in-house and build stronger federal agencies and internal skill sets by doing so, rather than supporting a commercial enterprise. NMAH-AC noted that the procurement process is so complex that it inhibits preservation (though it should be noted this unit does not wish to

pursue in-house preservation). CFCH remarked that when outsourcing, project management and quality control is very difficult and time consuming and does not give the unit full control over the process. This unit has established the capacity to digitize in-house because there is better monitoring, increased institutional knowledge, higher quality work, and better metadata generated.

This report recommends a preservation approach that combines both in-house and vendor preservation: mass digitization of common formats done in-house, with rare formats and assets with high levels of decay requiring specialized treatment done out-of-house. The purpose of such an approach would be to create efficient workflows for preservation of the largest numbers of assets at the Smithsonian Institution. This combined workflow would also put the Institution's existing preservation equipment to greater use—equipment that the institution has invested in, but that now sits largely un-staffed and under-used.

This report is not intended to denigrate the use of and services provided by vendors. There are advantages, as listed above, to performing preservation out-of-house. Vendors can provide excellent quality service, and many offer a great deal of expertise. The recommended preservation plan would focus on keeping large-scale preservation within SI, while keeping more boutique work – such as the transfer of wax cylinders or the care for moldy collections – in the hands of vendors who work on such unusual challenges on a regular basis and have the infrastructure in place to do so. This approach has the added benefit of establishing SI as a leader in the field of audiovisual collection preservation and could provide enormous opportunity to educate not only its existing workforce but create education opportunities for students and the public.

Based on the data in this report, this approach is already showing successful results on a small scale within CFCH, the unit with the highest rate of preservation. Their 1/4-inch open reel audio tape preservation project uses a combination of highly experienced staff, staff with less experience, and interns to perform preservation. Inexperienced staff and interns receive training by the more experienced staff within the unit. Rates of preservation are high, and the unit reports significant savings in time and cost.

4.3.4.3 Barriers to Preservation: Staffing and Training

The Smithsonian Institution has the equipment necessary to perform in-house preservation. Most of the units surveyed have an interest in pursuing preservation both in-house and out-of-house. Low preservation rates are due to lack of staff and lack of training. Existing equipment often sits unused, despite an articulated need for preservation activity, for as much as 80-90% of the time. Decisions made regarding preservation are often defined by the comfort level of existing staff with specific preservation practices. Conservation, processing, and administrative staff – the majority of which are not adequately trained in audiovisual preservation -- are often expected to operate digitization equipment on the side of other duties. Two units reported that they paid to have preservation equipment set up, but it was then subsequently dismantled due to lack of staffing.

Under-staffing is a challenge faced by all units. In several cases, preservation workflows were set up a decade or more ago with the intention of responding quickly to individual research requests. However, the Institution's needs have changed and providing occasional access to individual assets is clearly not enough to meet preservation goals. Workflows initially intended for one-off preservation or access copies must be reviewed to meet the Institution's current primary need of moving to proactive batch digitization for preservation before the irreversible degradation of collections. Digitization

workflows which create one-off reference copies without creating preservation copies need to be re-evaluated immediately. If an asset will be played back and digitized, the most efficient approach is to perform digitization at a preservation level, then create a reference copy from the preservation master file. This report recommends fully staffing existing in-house preservation work stations in each unit where appropriate. Pan-institutional efforts should be geared toward the development of pan-institutional preservation stations. This would consolidate equipment and focus the assignment of dedicated staff trained in hands-on preservation-level digitization.

The Smithsonian is an institution with a staff that tends to be well educated in conservation workflows and museum best practices, though they report a lack of expertise in audiovisual preservation practices. As stated earlier in this report, formal training in hands-on audiovisual preservation is simply rare or non-existent. This is a challenge for many institutions, because the solution is not always as simple as taking a course or attending an existing program. Since formalized training in audiovisual preservation is hard to come by, the Institution should consider taking a proactive, creative approach. This report recommends the Institution consider the following:

1) Creating training programs where they do not already exist—for example, reaching out to the technicians and consultants that it already works with to develop training courses in topics requested by staff.
2) Hiring staff with expertise and experience in different areas of preservation so that skill sharing and building can be strengthened.
3) Sharing of resources between units, including workshops and written documentation or workflows.
4) Creating Institution-wide guidelines for audiovisual preservation which educate staff and support preservation without completely taking away each unit's autonomy or ability to make decisions using their own expertise.

4.3.4.4 Planning for Preservation

The prospect of preserving over 250,000 assets is daunting. Large scale preservation forces any institution to evaluate, review, and reference its priorities, its mission, and its public obligations. To approach this challenge with intention, focus, and efficiency, this report recommends that the Smithsonian Institution develop and implement a large-scale preservation plan for its analog audiovisual collections. Strategies for preservation planning are offered as part of this report and can be used by the institution as a starting point in the creation of a detailed long-term preservation plan.

Prioritization of preservation is essential when facing a project of this scale. Prioritization allows the Institution to tackle the greatest need first, and to minimize collection loss. However, it can be difficult to decide how to prioritize cultural content for fear of prioritizing one culture, idea, or collection over another. This report recommends the use of a methodology for prioritization that prioritizes content that is most rare, contained on the most fragile carriers, and meets the mission of the unit and Institution. It recommends periodic re-evaluation of priorities as new collections come in and as missions change. The AVPRAPPS prioritization system and the corresponding Unit Prioritization Reports included in this project may be used as a guideline for prioritization.

4.3.4.5 Resources at the Smithsonian Institution

The Smithsonian Institution has rich internal resources that can support preservation at the unit level and the institutional level. This report recommends that units take advantage of existing internal resources. The following resources were noted during the creation of this report.

1) All units reported willingness to share preservation equipment if permission is granted.
2) Periodic training in audiovisual preservation is offered by NMAAHC, possibly by CFCH, and it was reported that the AVAIL group may begin free workshops and training that staff can attend.
3) Many units have written preservation workflows and policies that can be adapted by other units. Other units may use these as templates for their own workflows, thus significantly reducing the amount of time necessary to create workflows from scratch.
4) OCIO and the DAMS team provided documents, attached to this report, which outline use of the DAMS. That department is also working on file-naming convention guidelines.

While these resources alone cannot substitute for increased training, staffing, and the implementation of a preservation plan, using them to their fullest extent will support the Institution's goals for preservation. Importantly, time must be made for staff to participate in training efforts. If the Institution is to make a commitment to increasing staff capacity, it must also re-assess participating staff job descriptions and relieve staff of some existing responsibilities so that time for training can be allocated on a regular basis.

As the Institution looks at the preservation of its audiovisual collections from a pan-institutional perspective, it should decide to explore areas where more collaboration and institution-wide standards can be increasingly implemented. Each unit has its own needs and requires some autonomy. However, because all staff are or will be using the DAMS, institution-wide guidelines and standardization of practices are already occurring organically. Some level of pan-institutional standards for preservation is certainly part of the future of the Institution. The Institution should consider how it will drive and develop such standards.

4.4 Component Three: Pan-Institutional Preservation Scenarios and Strategies

The purpose of this section is to support the Smithsonian Institution in creating a pan-institutional strategy which meets the preservation goals of all units and mitigates collection loss. This document provides an assessment of current risk for loss, an overview of the time and cost of two preservation scenarios, and recommendations and considerations for developing a preservation plan.

The report is based on the findings of AVPRA. The *Section 4.3 Pan-Institutional Audiovisual Preservation Assessment* contains data and findings supporting the recommendations in this section. It also contains more detailed recommendations for improving preservation workflows.

Now is an excellent opportunity for the Smithsonian Institution to make necessary strides in meeting its goal to preserve its collections -- and to be a global leader in the field of audiovisual preservation. Though its preservation rates are currently not high enough to meet those goals, it is uniquely positioned to do so. The Institution has existing preservation equipment that can be used to establish many preservation workflows, pan-institutional resources such as written preservation workflows, a dedicated staff, and a vibrant collection of audiovisual assets vital to American and world heritage.

4.4.1 Summary

CURRENT WORKFLOW

- Estimated number of assets preserved: 65,475
- Estimated assets lost: 188,893
- Estimated time to preserve: approximately 394 years

SCENARIO ONE SUMMARY: 15 YEARS TO PRESERVE ALL UNPRESERVED ASSETS

- Estimated number of assets preserved: 254,368
- Estimated assets lost: 0
- Estimated time to preserve: 15 years
- Estimated cost to preserve: $40,823,625

SCENARIO TWO SUMMARY: PRESERVATION WITH A $5 MILLION BUDGET

- Estimated number of assets preserved: 32,783
- Estimated assets lost: 221,585
- Estimated time to preserve: to be determined by Institution
- Estimated cost to preserve: $5,000,000

4.4.2 Risks and Considerations

The Preservation Scenarios in this report provide estimated costs and times to preserve the Smithsonian Institution's analog audiovisual collections. Those numbers are based on current practices. Such practices may change over time. The scenarios provide a broad overview of what mass preservation could look like — they are not a substitute for detailed preservation planning.

Below are considerations that the reader should keep in mind when reviewing these Preservation Scenarios.

4.4.2.1 Cost Considerations

- Cost is likely to rise with inflation and cost of living changes.
- Cost to preserve is likely to rise as assets become more decayed.
- Equipment maintenance is not included in the scenarios.
- The purchase of additional equipment is not included in the scenarios.
- Staff training is not included in the scenarios.
- The time and cost to create a preservation plan is not included in the scenarios.
- Vendor costs tend to go down if the vendor is working with a very large group of assets—this is not accounted for in these scenarios.

4.4.2.2 Staff Considerations

The preservation scenarios in this report estimate the number of staff necessary to complete the preservation work. Below is a list of potential roles and duties of those staff. Some of these roles can be covered by existing staff and some will require new hires. When creating a preservation plan, these roles should be clearly defined.

- Administration Staff, in-house preservation
  - Coordinate and maintain schedules
  - Coordinate movement of assets between departments

- Administration Staff, out-of-house preservation
  - Develop and create contracts with vendors
  - Procurement of purchase orders (POs)
  - Track outsourced project progress
- Asset Preparation Staff
  - Asset inspection and assessment
  - Audio, video, and film inspection and preparation (See *Section 4.3.2.4 Pre-Digitization Workflows* for more on asset preparation and pre-digitization duties.)

- Digitization Staff
  - Operate playback and digitization equipment
  - Troubleshoot issues with preservation
  - Essential equipment maintenance and cleaning
  - Troubleshoot common workflow challenges

- Quality Control Staff
  - Perform quality control on files
  - Ensure proper file naming
  - Upload to DAMS

- Bench Technicians (on-staff or contracted)
  - Highly technical equipment repair
  - Advise on purchase of and refurbishing of equipment

NOTE: The preservation scenarios in this report focus on batch preservation of prioritized audiovisual collections. They do not account for responding to individual requests for footage that will continue to come in from researchers and the public. This report recommends that any preservation plan also include a plan to accommodate immediate research requests without interrupting the larger preservation project. This type of workflow should create preservation copies and access copies.

4.4.2.3 Risk Assessment

COLLECTION LOSS

The Smithsonian Institution is not currently on track to meet its preservation goals. At the current rate of preservation, it will take the nine units that are currently engaged in preservation activities, approximately 394 years to preserve their analog audiovisual collections. Two units are not preserving audiovisual assets and are not included in this timeframe, as they will lose 63,181 assets. Because the media's actual lifespan is much less than 394 years, what this number demonstrates is that large portions of the Smithsonian collections will not be preserved before they decay past a point of recovery.

The projected timeframe is so long that it does not tell us enough about what actual collection loss potential is. To more accurately understand what loss rates might look like for the Institution, we also need to know how long we have to

preserve the assets. Unlike artifacts made from glass and stone, many audiovisual assets are physically and chemically unstable. Their lifespan is relatively short and different media have different expected lifespans. However, many factors besides the format type affect the expected lifespan of an asset. Those factors include but are not limited to:

- The quality of the original manufacture (the tape stock, plastics, and dyes used)
- The quality control of the batch of assets from the factory
- The quality of the original recording
- The physical wear on the media (how many times it has been played, whether it was damaged in playback, etc.)
- Storage conditions in the asset's past
- Current storage conditions
- Availability of playback equipment
- Availability of technicians to service playback equipment

This report uses a timeframe of 15 years in which it is estimated that collection items will no longer be viable for playback. This is based on the *Library of Congress National Recording Preservation Plan*[17] for magnetic media. Though that report is now seven years old, this report uses it as a starting point for understanding risk in a collection of mixed media, some of which is expected to live beyond the 8 to 15 year timeframe, and some of it which will not be viable in 8 to 15 years.

At current rates of preservation, the Smithsonian Institution faces an estimated total loss of 188,893 assets, or 74% of its unpreserved collections.

- [Total assets to be preserved] - [number of assets preserved annually x 15]
- [254,368][18] - [4,365 x 15] = 188,893

NOTE: Some film assets in best practice storage conditions may be an exception, as will some grooved disc media.

FINANCIAL LOSS

The longer an asset sits unpreserved, the more likely the cost to preserve the asset is to rise. This is because, as assets degrade, they are more likely to require special treatment and intervention to be preserved. Such intervention is costlier than preserving healthy assets. Examples of such treatments include film "re-plasticizing," baking of degraded magnetic media, cleaning and treatment of mold, treating of lacquer disks with flaking, frequent cleaning, and increased repair needs of equipment due to flaking tape particles, overall longer asset preparation time and digitization time, all of which results in more cost for and time in staff labor. Additionally, as time goes by playback equipment continues to degrade and become more expensive to acquire and maintain.

Cost to preserve will rise significantly for the most fragile formats as time goes by. The best time to perform digitization to get the best product at the lowest cost is before the asset is degraded.

[17] https://www.loc.gov/static/programs/national-recording-preservation-plan/publications-and-reports/documents/NRPPLANCLIRpdfpub156.pdf
[18] This is the estimated number of unpreserved audiovisual assets at the Smithsonian. This is 87% of the overall collections.

4.4.3 Preservation Scenario One: 15 Years to Preserve All Unpreserved Assets

SCENARIO ONE: OVERVIEW OF PRESERVATION SCENARIO

This section of the report provides an overview of a preservation scenario intended to preserve all audiovisual assets over the course of 15 years.

SCENARIO ONE: GOALS OF THE SCENARIO

- Preserve 254,368 assets in 15 years (16,958 assets annually)
- Preserve most common formats in house[19] (estimate about 75% of the unpreserved collections)
- Preserve rare formats and formats requiring specialized intervention out of house (estimate about 25% of the unpreserved collections)

SCENARIO ONE: NUMBERS USED IN THE SCENARIO

The numbers for time and cost of preservation used in this scenario are from unit reports, as aggregated in *Section 4.3 Pan-Institutional Audiovisual Preservation Assessment*. Below is an overview of key numbers used in this scenario:

- Estimated time to preserve one asset in house: 3 hours
- Estimated time to preserve one asset out of house[20]: 3.5 hours
- Average cost to preserve one asset in house: $137
- Average cost to preserve one asset out of house: $231

SCENARIO ONE: RATE OF PRESERVATION

- Total number of assets to preserve in house: (75% of the unpreserved collections): 190,776 assets
- Total number of assets to preserve out of house (25% of unpreserved collections): 63,592 assets
- Number of assets to preserve in house per year: 12,718 assets
- Number of assets to preserve out of house per year: 4,239 assets
- Total number of assets to preserve per year: **16,957 assets**

[19] During the survey, units reported the following formats were in their top ten interest in preserving due to the large quantities present in their collections: 3/4-inch videotape: U-matic, compact audio cassette, 1/4-inch open reel audiotape, Film: 16mm, Mini DV, grooved audio disc (lacquer), Film: Super 8mm, Film: 8mm, and Betacam. These formats are good candidates for in-house preservation because it is likely to be more cost effective due to the availability of equipment and sheer quantity of assets when weighed against the current vendor digitization rates. More rare formats, such as wax cylinders and dictabelts, are excellent candidates for vendor digitization specializing in these formats.

[20] This is an estimate for SI staff time only and does not include vendor digitization time.

SCENARIO ONE: TIME TO PRESERVE

Parallel workflows, preservation stations, and quality control stations would be required to complete the project.

- Estimated time to preserve 12,718 assets in-house each year: [12,718 assets x 3 hours] = 38,154 hours or (4,769 work days[21])
- Time to preserve 4,239 assets out-of-house per year: [4,239 assets x 3.5 hours] = 14,837 hours (1,855 work days)
- Total time to preserve annually: **52,991 hours** (6,624 work days)

SCENARIO ONE: COST OF PRESERVATION

- Estimated number of full-time staff: **28**
  [In-house: 4,769 work days / 240 work days per staff person= 20]
  [Out-of-house: 1,855 work days / 240 work days per staff person= 8][22]
- Estimated annual cost to preserve 12,718 assets in house each year for 15 years: $1,742,366
- Estimated annual cost to preserve 4,239 assets out of house each year for 15 years: $979,209
- Estimated annual cost to preserve in and out of house: $2,721,575
- Estimated total cost over 15 years to preserve in and out of house: **$40,823,625**

4.4.4 Preservation Scenario Two: $5 Million Budget

SCENARIO TWO: OVERVIEW OF PRESERVATION SCENARIO

This section of the report provides an overview of what could be preserved given a one-time allotment of 5 million dollars. While this budget is not enough to preserve all collections, it could potentially fund a pilot project that would test audiovisual workflows or a project to preserve some of the highest priority assets.

SCENARIO TWO: GOALS OF THE SCENARIO

Since this scenario would not be sufficient to preserve all assets, such a scenario could have two potential goals:

1) To preserve portions of the highest priority assets as documented in the AVPRAPPS preservation prioritization methodology
2) To test a 2-3 year preservation workflow with plans to increase or continue rates of preservation

SCENARIO TWO: NUMBERS USED IN THE SCENARIO

The numbers for time and cost of preservation used for this scenario are from unit reports and are aggregated in *Section 4.3 Pan-Institutional Audiovisual Preservation Assessment*. Below is an overview of key numbers used in this scenario.

[21] A work year in the United States is calculated at 48 weeks with five 8-hour work days per week, or 240 total work days.
[22] This work and other preservation may be done by existing staff, depending on the workflow. Not all positions are likely to be new hires.

- Estimated time to preserve one asset in-house: 3 hours
- Estimated time to preserve one asset out of house[23]: 3.5 hours
- Average cost to preserve one asset in-house: $137
- Average cost to preserve one asset out of house[24]: $231
- If 75% of the budget is used for in-house preservation, the in-house preservation budget is: $3,750.000
- If 25% of the budget is used for out-of-house preservation, the out-of-house preservation budget is: $1,250,000
- Total estimated assets that can be preserved: **32,783**
- Total estimated assets that would be unpreserved: **221,585**

SCENARIO TWO: RATE OF PRESERVATION

- Estimated total number of assets that could be preserved in-house for $3,750,000: 27,372 assets
- Estimated total number of assets that could be preserved out-of-house for $1,250,000: 5,411 assets
- Estimated total number of assets that could be preserved on a $5 million budget: **32,783 assets**

SCENARIO TWO: TIME TO PRESERVE

The time used to complete the project is variable in this scenario since the budget is the constant variable in this scenario. The Smithsonian Institution could spend the funds at any rate it saw fit. This report recommends proactive preservation at a rate of about 16,957 assets preserved total per year, which is based on the rate necessary to preserve most collections items in about 15 years. Parallel workflows, preservation stations, and quality control stations would be required.

- Estimated time to preserve 27,372 assets in-house: 82,116 hours (10,265 work days)
- Estimated time to preserve 5,411 assets out-of-house: 18,939 hours (2,367 work days)
- Estimated time to preserve all assets: **101,055 hours** (12,632 work days)

4.4.5 Next Steps

If the Smithsonian Institution moves forward with a pan-institutional audiovisual preservation effort, this report recommends the creation of a Preservation Plan and a Pilot Workflow.

The Preservation Plan should include:

- Budget (for staffing, buildout, and two-year pilot)
- Staffing proposal
- Protocol for prioritization of preservation activities
- Proposal for building a pan-institutional preservation center to perform the work

[23] This is an estimate for SI staff time only and does not include vendor digitization time.

[24] This number is determined by averaging the units' cost to preserve one asset out of house. The cost includes the hourly wage for staff to administer a project and complete quality control measures. It also accounts for average vendor cost to preserve these assets. The vendor cost was developed based on estimates provided by vendors in 2019 for use in this project.

The Pilot Workflow should include:

- Development of workflow for asset preparation
- Digitization workflow
- Quality control workflow
- Periodic check-ins and workflow adjustment

Deliverables from the Pilot should include:

- A plan for implementing the full preservation program based on pilot outcomes
- Finalize preservation workflows and expected preservation times
- Finalize prioritization of collections and order of preservation

5 Appendices

A. AVPRAPPS: Unit Narrative Reports (11)
B. AVPRAPPS: Unit Spreadsheets (11)
C. AVPRAPPS Scoring System Spreadsheet
D. Unit Preservation Assessment Reports (11)
E. Unit Preservation Questionnaires (11)
F. Unit Equipment Checklists (11)
G. Pan-Institutional Equipment List
H. DAMS Guidelines