# Assessing the Condition of the National Book Collection



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# **Project Teams**

# "Science Group"

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# "Retention Group"

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# Retention Group Work

### Withdrawal Practices Survey (2015)

- ARL and Oberlin Group Libraries
- 99 respondents
- Presented at 2015 Charleston Conference

### Shared Print MOU Survey (2016)

• Less formal review of MOUs

### Everything Not Saved Will Be Lost (C&RL News, Nov. 2019)

• Call to arms

### Assessing the Physical Condition of the National Collection

- Amount Awarded: \$540,000
- Duration Jan 2019 ~May 2022
- Mellon Foundation Funding
- Description:

The research project will provide data to objectively assess the condition of the books held in the United States by performing an in-depth scientific analysis on a representative sample.

The physical, chemical and optical data will help ensure that large-scale withdrawal of materials does not compromise the overall robustness of cultural heritage collections, informing the shared print, preservation and digitization communities.

• Scope: monographs published between 1840-1940

# **Research Library Partner Institutions**

- Cornell University
- University of Miami
- University of Washington
- Arizona State University
- University of Colorado at Boulder



UNIVERSITY of

WASHINGTON





Analyze the same 500 volumes from all partners

NationalBookCollection.org overview background methodology timeline 500+ books contact



# **Preservation of Large Physical Collections**

Impact of:

- Use (handling)
- Environment







• Material

# What can we find out from Data Analytics?

What factor(s) contribute most or have a greater influence on the current state of the text block?

• The inherent properties of the paper and paper composition?



- Impact of Environment
- Usage

Data suggests a 5% loss in condition from collection use (twenty additional checkouts)\* Using molecular weight data to measure reduction in strength can provide information about when a collection item is no longer fit for purpose

\*EAST (Boston Consortium)

# Visual Assessment

- How are we determining the condition of our collections in a standard / consistent way that allows us to know how our collection compares to another?
- Are we effectively using our knowledge to make retention decisions?
- Do we know what is the "*same*" volume?
- Can we trust our catalog information?

### $\leftrightarrow \rightarrow c$ admin.prtd.app/anc/book/10012 PRTD Admin View an ANC Book SAMPLES 🗮 ANALYSES 🔳 GO BACK D EDIT < > Assessing the National Collection Project Details

Book ID	Catalog ID	Institution ID	Batch as Received *					
book:10012	catalog:10016	institution:00002	1	<b>*</b>				
(Read only)	(Read only)	(Read only)	From Partner (Require	Catalog De	ails			
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10016: Trelawny pa	ipers (1853)	*	ASUL: Arizona Sta	ASUL: Arizona Sta				
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Trelawny papers			Author					

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Visual Assessment: Description

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# Description

	Descriptio	n > Bin	ding								
	Leaf Attachm	nent	Material	Fo	ormat		Ove	erall Color	Otł	ner	
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	O Metal Fit	tings	🔿 Paper	С	) None		0	Gray	<u>~</u>	Collection of V	olumes
				С	) Missing		0	Brown			
							0	Multi			
							0	Red			
							0	Orange			
<	- > C (	admin.p	rtd.app/anc/b	ook/100	12						
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Binding Notes bound with 10011, 10013 Library rebinding, with new blank endpapers. Perfect binding replaces stitching. Retrimmed. Sticker, bottom p iii:  37 01/00  36 ASU XL3  30-010-00  2240 GBC  ICI INFORMATION	<b></b>
bound with 10011, 10013 Library rebinding, with new blank endpapers. Perfect binding replaces stitching. Retrimmed. Sticker, bottom p iii:  37 01/00  36 ASU XL3  30-010-00  2240 GBC  ICI INFORMATION	Binding Notes
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Note especially attempted repairs that might have compromised the book's integrity. e.g., the use of adhesive plastic to 'protect' the cover.

### $\leftarrow$ $\rightarrow$ C admin.prtd.app/anc/book/10012

### Visual Assessment: Condition

Condition > Lendable? Deteriorating?

Yes, the library would lend this book.This book's condition is stable.

### Condition > Cover

Damage	Damage (cont.)	Partially Detached	Other
Worn Edges	Damaged Spine	Front	🗹 Obvious Repair
Damaged Corners	Broken Spine	Back	🗹 Label
Torn	Warping	Spine	Notations
Delaminating	Loss		
Discoloring	Pastedown Lifting		
Staining	Powdering		
Repair: rebound, see co	over description.		

# Condition (Cover)





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Condition > Textblock	<		Condition (Textblock)
Physical	Structural	Visual	Event Traces
Brittle or Crumbling	Textblock Separation	Staining	Obvious Repair
Corners Damage	Tight Binding	Foxing	Water Damage Water based to be the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the two of the second of the number of the second of the numbe
	Uncut	🗹 Paper Edge Discoloring	Insertions Insertions
Pages	Untrimmed Pages	Paper Color	Marginalia, Inscription, Ex Libris
Loose (Free)	Non-Uniform Textblock Edges	O Granm	Written Annotations
Torn	Ink Changes	O Cream	<b>o</b> None
Dartial Loss	Fading	Apparent Overall Yellowing	O Minor
	Strike-Throughs		O Major 160 THE PRIMA DOSNA. Intire land, it may be imagined with what enthusiany CHRISTINE NILSSON. 161
Complete Loss	Transfor		she was received. Nothing like it had been seen since the time of Jenry Lind. Her first appearance among the friends of her youth was marked by an interesting incident. A
			village hall was going on, and all the young men were segger to dance with the visitor from another and greater world, who yes hy formor associations, as by still existing sympathies, belonged to them.
Missing Pages	Missing Partial Pages		"I connot dance with you all, bail I can phy to you all," soit I con phy to phy to all the synce- sion and all the first with which all the expres- sion and all the first with which all so sings Swelish national songs. A visit to America is now an event in the lie of every famous prime douma; and Mille. Nisson has
Enter as a space delimited list, e.	g.: 12 38 98 Enter as a space delimited list	, e.g.: 6 47 129	made more than one American tour, and stavays with the greatest possible success. Once, moreover, in her life the prime down, as a vile, gets married; and Molle. Nilsson, like Madame Patti and Malame
Textblock Condition Notes		Lecea (but in a more regular manner), has been married twice. Her first husband was M. Auguste Rouzaul (nephew of Admiral Rouzaul), a capital shot aud an amiable, gentlemanly man. Stock-	
Repair: textblock backing	replaced with perfect binding, re-trim	med.	broker by occupation, and sportsman by taste, no succeeded more in the latter than in the former character. He killed large gams in America, and
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# What does "identical" look like?







# What is the best volume to keep if we can't keep every one?

- How to make a well-informed decision?
- Annotations –add value to the volume??

school of platting many set of the soldiers whose names are now written upon an imperishable page as the heroic defenders of their country against the internal agitators who so rashly sought to Iroccurs to me that Bent. Logan is too hasty. destroy it. He tells us that the South furnishes half of the Volunteers engaged in the War with Mafice. War is the best School, for it is a practical lefton to the Regular officer, Doldier, and Volunteers Amilitia. The South profited by the lefson, to our Cost. ale kinds given - down to a fishier couff?



# Multiple Paper Types in One Volume

### Linking Visual (subjective) Assessment with Lab Testing

Visual Assessment

ANC Book ID	10001
Published	London: The Camden Society, 1840. (180 years old.)
Double Fold (<=10)	10
General Book Notes	matches catalog record rebound collection of books
Cover Description	(hardcover) (cloth) (sewn leaf attachment) (green overall color)
Textblock Description	black ink normal paper letterpress
Overall Condition	lendable
Cover Condition	label
Cover Damage	damaged corners
Textblock Structural	non-uniform edges
Textblock Visual	paper color: yellowing edge discoloring
Textblock Event Traces	marginalia

# Analytical Tests (miniaturized)

- Smallest sample required a strip (10mm\* x 100mm) taken from the replicate volumes for all the destructive (invasive) and |non-invasive tests
- Mini tensile test
  - The strength of the paper



# • Acidity - pH

• Mini-pH test requires 3 hole punches of sample compared to usual 2.5 g (1-2pgs)

# • Size exclusion chromatography (SEC)

• The chain lengths of cellulose in paper can indicate loss of physical integrity - molecular weight (1mg sample size)



# Analytical Tests (*miniaturized*)

# Non-invasive

- Infrared Spectroscopy (IR)
  - Looking at IR data to see how it can be linked, integrated and correlated with the collective physical, chemical and optical measurements
- Ultraviolet / Visible spectroscopy (UV/VIS)
  - Optical measure of the difference between volumes held in different locations, (potential for moving towards completely non-invasive)







# Fourier Transform Infrared Spectroscopy(FTIR)



Wavenumber (cm-1)

# Fiber Optic Reflectance Spectroscopy (FORS)



Wavelength (nm)

### $\equiv$ PRTD Admin

### **Compare Books**

VIS. ASSESS. PHOTO DOC. PH TENSILE SEC SPOT XRF FORS FTIR CHROMATICITY COLORIMETRY SAMPLE NOTES

### Paper:10000

Rag, c.1994, PAP00892c Composition: Cotton Rag Aging: Room, natural aging Source: Unknown

### Paper:10001

Rag, c.2007, PAP00891c Composition: Cotton Rag Sizing: Starch Buffer: Buffered Aging: Room, natural aging Source: Stonehenge

### Paper:10002

Newsprint, c.1979, PAP00880c Composition: Wood Pulp Aging: Room, natural aging Source: Unknown

Paper:10003 Wood Pulp, c.1994, ISR5C0103b

### ISR: 1

Composition: 100% Bleached Northern Softwood Kraft Sizing: Alum/Rosin Aging: 5°C, natural aging Source: ASTM

### Paper:10004

Wood Pulp, c.1994, ISR5C0302b ISR: 3 Composition: 100% Softwood Bleached Chemithermomechanical Pulp Sizing: Alum Aging: 5°C, natural aging Source: ASTM

### Paper:10005

Rag, c.1994, ISR5C0503b ISR: 5 Composition: 100% Cotton Rag Sizing: Alum/Rosin Aging: 5°C, natural aging Source: ASTM

### Reference Paper Notes

### Paper:10006

Wood Pulp, c.1994, ISR5C0702b ISR: 7 Composition: 20% Bleached Northern Softwood Kraft / 80% Slush-soft Ground Wood Sizing: Alum Aging: 5°C, natural aging Source: ASTM

### Paper:10007

Wood Pulp, c.1994, ISR5C1102b ISR: 11 Composition: 50% Bleached Northern Softwood Kraft / 50% Bleached Northern Hardwood Kraft Buffer: Na2CO3 Aging: 5°C, natural aging Source: ASTM

Paper:10008 Wood Pulp, c.1994, ISR5c1502b

### ISR: 15

Composition: 50% Bleached Northern Softwood Kraft / 50% Bleached Northern Hardwood Kraft Sizing: Internal and external starch Buffer: Na2CO3/CaCO3 Aging: 5°C, natural aging Source: ASTM

### Paper:10009

Rag, 2019, PAP00931a Composition: Cotton Rag Sizing: Gelatin Buffer: Unbuffered (Ca might have been used during production) Aging: Room, natural aging Source: University of Iowa, Center for the Book

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### Paper Classification from Pulp Concentration (Chemometrics and FTIR)



# Using results for On-site Evaluations/ "Stack Tests"

- This project is developing field evaluations or "*stack tests*" designed to assess the relative condition of monographs in the stacks, without requiring them to be brought to the laboratory
- Stack tests have three constraining factors:
  - inexpensive, so can be readily available at multiple sites
  - quick, so that results can be useful in decision making, and
  - Simple, so they can be performed by available staff



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### Query Analyses



pH



For the books received to date, it is almost as likely that the paper will be strongest in the vertical direction as it is in the horizontal. i.e., that books in this period are not necessarily bound to make best use of the papers' machine direction

# Correlating Double Fold to Other Measurable Parameters



Assessing the Physical Condition of the National Book Collection:

# 500+ books...

The five hundred (plus) books selected for the project:



# Summary

- Objective scientific assessment of the physical condition of books to aid developing a national shared print plan that supports access and long-term preservation
- Compare characteristics of the same titles and editions across five research libraries in distinct regions of the United States to determine quantifiable risk
- Many institutions are currently making withdrawal and retention decisions based upon subjective and incomplete information
- The data will assist in ensuring that large-scale withdrawal of materials does not compromise the overall robustness of cultural heritage collections, informing the shared print, preservation and digitization communities
- Creating a comparable and reliable decision-making method to avoid disposal of materials that may be crucial to a national preservation effort
- The ultimate goal is to fill gaps in our knowledge to guide the community

# Acknowledgements

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- Jake Nadal
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- Institution Partners
- PRTD Staff (Andrew Davis, Chris Bolser, Amanda Satorius, Jamie Shetzline, Kelli Stoneburner, Emin Voloder)
- Multiple amazing interns...

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