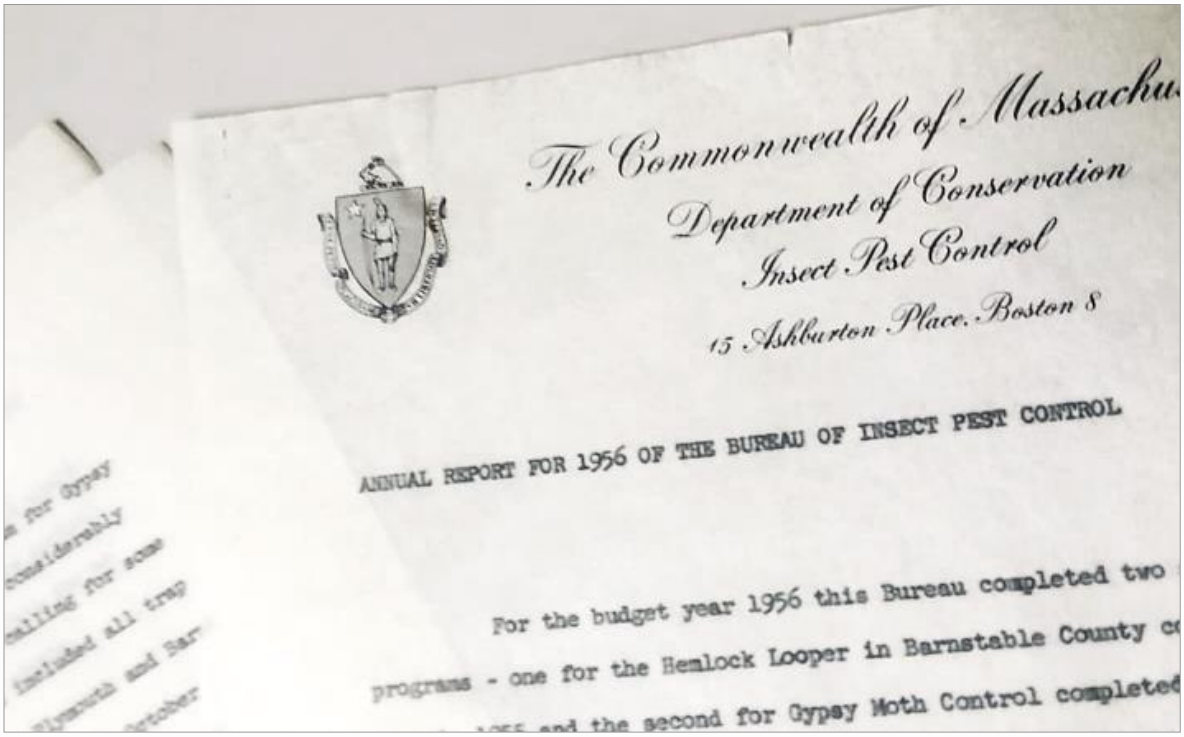
PRESERVATION OF HISTORICAL FOREST HEALTH REPORTS AND DATA IN MASSACHUSETTS

Final Report



FEMC
Forest Ecosystem Monitoring Cooperative

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Preservation of Historical Forest Health Reports and Data in Massachusetts

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Cover image: 1956 Annual Report of the Bureau of Insect Pest Control. Photo taken Matthias Sirch at the Massachusetts Department of Conservation and Recreation Archives in Boston, 2019.

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Summary

Boxes of forest health records are often left in storage as forestry staff move to other organizations or retire after decades of data collection. The state of Massachusetts has undertaken efforts to preserve many of its historical documents, but not all can be archived under this effort. The Forest Ecosystem Monitoring Cooperative (FEMC), in coordination with Sean Fisher, the Massachusetts Archivist of the Department of Conservation and Recreation (DCR), undertook an effort to archive this material that otherwise would not be digitized, dating back to the 1930's. The records primarily take two forms; forest health reports and pest distribution maps.

The majority of the forest health reports were annual summaries of program costs and logistics as well as the status of each major pest across Massachusetts. Occasionally accompanying the reports were pest distribution maps which outline major infestations of gypsy moth, oak leaftier, and hemlock woolly adelgid, among others. These maps were drawn as part of aerial detection surveys typically conducted during mid-summer. While most maps were drawn using polygons to indicate localized infestations, others simply indicate presence-absence of a pest for each town or county across the state.

Annual reports from Massachusetts DCR Archives boxes scanned by the Forest Ecosystem Monitoring Cooperative in 2019.

Methodology

Forest health reports and maps that were identified as valuable by Sean Fisher, the DCR Archivist, were set aside for the FEMC to scan. This material was scanned to PDF using Brother ADS-1700W and HP Photosmart C4599 feeder and table scanners at 300 dots per inch (dpi) resolution. Scanning took place at the DCR building on 251 Causeway St in Boston, Massachusetts.

Archiving Forest Health Reports

For the archiving process, the FEMC developed metadata for each document following Dublin Core specifications (https://www.dublincore.org/, Table 1). This includes summary descriptions as well as publication dates, authors, and keywords for each document. Where no author was documented in the material, we provide the name of the bureau chief.

Table 1: Dublin Core metadata requirements and corresponding text for an example resource.

Dublin Core Requirements	Description	Example
Title	Name of resource	Partial Report of the 1954 Aerial Spray Program
Creator	Author resource or head of department	Harold L. Ramsey
Creator	Entity that originally published the resource	Department of Natural Resources, Bureau of Insect Pest Control
Subject	Topic of the resource	Aerial Spray Program for gypsy moth and forest tent caterpillar in 1954
Description	Description of the resource	This report documents the effort to control or eradicate the gypsy moth and forest tent caterpillar across the state in 1954. Included are the personnel involved and the itemized cost of the project.
Publisher	Entity currently responsible for the resource	Massachusetts Department of Conservation and Recreation/Forest Ecosystem Monitoring Cooperative
Date	Date of the resource; YYYY-MM-DD When only year is available; YYYY-01-1	1954-08-17
Type	Type of resource; text, image, sound, dataset, software, event, or collection	Text
Format	File format, physical medium, or dimensions of the resource	application/pdf
Identifier	An unambiguous reference to the resource	The digital object identifier (doi) of the document
Source	The call number or point of reference of the resource	Data Archivist, Massachusetts Department of Conservation and Recreation
Language	Language of the resource	English – United States (en-US)
Coverage	The spatial extent or temporal topic of the resource	1954 – Massachusetts
Rights	Rights held in or over the resource	CC0 – no copyright, CC BY-SA - Attribution, Share alike

Results and Discussion

Archiving Forest Health Reports

The FEMC archived 78 forest health reports between 1932 – 2010 (Figure 1) which are accessible through the Data Rescue inventory web interface (https://www.uvm.edu/femc/data_rescue). The Dublin Core metadata developed for each document allows users to find specific topics using the Data Rescue inventory's search and keyword functions. In total, we archived over 600 pages of historical forest health reports. The slow scanning speed of the portable scanners accounted for this project requiring two days of scanning at the DCR offices in Boston.

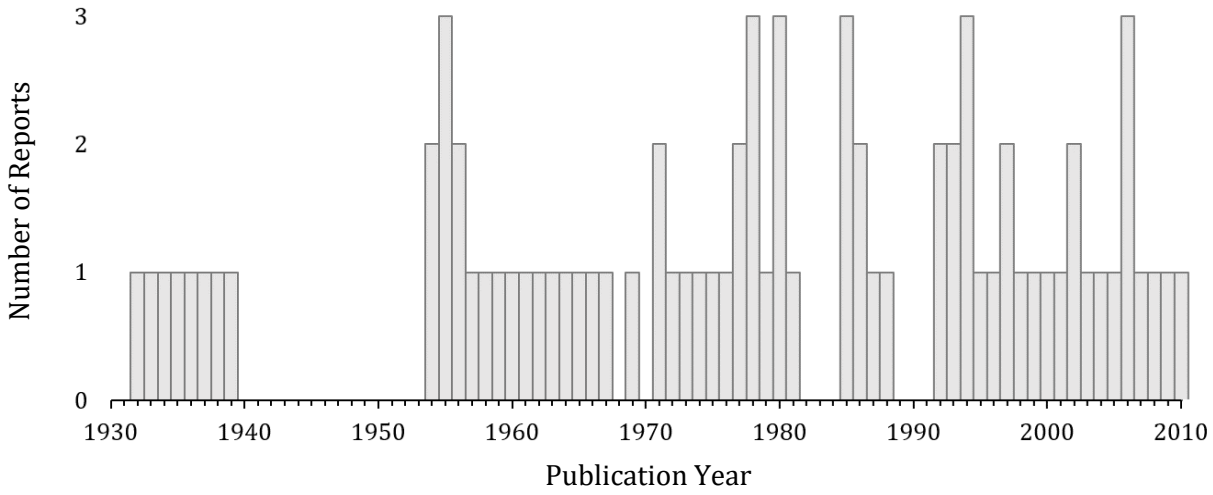


Figure 1: Number of Massachusetts Department of Conservation and Recreation forest health reports scanned and archived by the FEMC between April and December, 2019, by publication year.

Finding Value in These New Resources

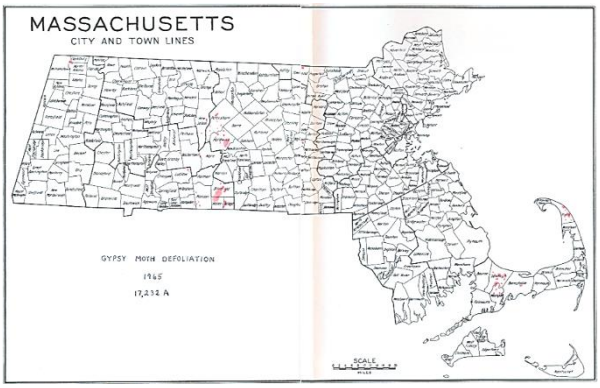
To maximize the value of these resources, the forest health reports and pest detection surveys can be used to supplement or verify our understanding of the Massachusetts forests over the past 100 years.

Northeastern Forest Health Atlas

One way that the FEMC has accomplished this is by comparing the aerial detection surveys set aside by Sean Fisher with pest damage estimates from the FEMC Northeastern Forest Health Atlas (FHA; https://www.uvm.edu/femc/forest-health-atlas), which tracks pest outbreaks over time. The data for Massachusetts was initially digitized by MassGIS and made available online until 2017, when it was taken down. FEMC staff worked to upgrade the coding and recover the dataset, but was limited to the material present in the digitized files as they were created. To establish a proof of concept for improving the FHA dataset, we compared pest detection data for the years 1961–1982.

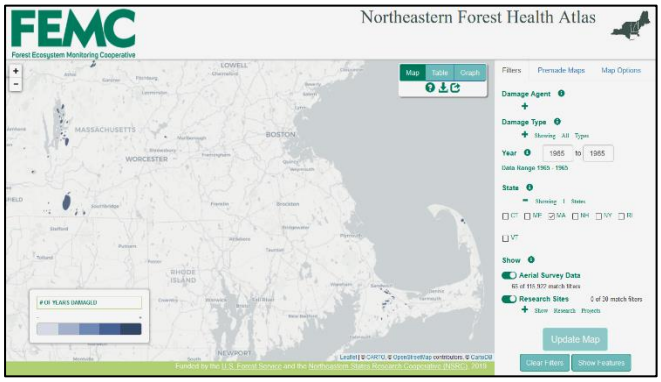
From these comparisons, we were able to identify several discrepancies (Figure 2). For gypsy moth, historically one of Massachusetts' most destructive pests, we recognized more than 3,000,000 acres of defoliation that had not been included in the FHA. In several cases, discrepancies arose from acreage estimates differing slightly between hand-drawn maps vs GIS polygons of the same data. Most notably, the defoliation damage agent had not been attributed to gypsy moth on the web portal because of the coding in the original GIS files from MassGIS.

Massachusetts DCR Archives



Damage Type	Total Acres Damaged
GYPSY MOTH DEFOLIATION	17,232

FEMC Northeastern Forest Health Atlas

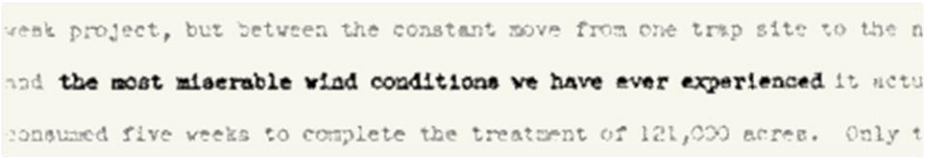


Damage Type	Total Acres Damaged
No Data	**14,977**

Figure 2: An example of damage agent and acreage estimates compared between the scanned Massachusetts Department of Conservation and Recreation Archives maps and the FEMC Northeastern Forest Health Atlas web interface.

Unusual Weather Conditions

Twenty three forest health reports offered comments about unusual weather conditions. This included exceptional temperatures, winds, droughts, floods, or winter damage. Such information is valuable for providing insight into historical forest disturbances and how a forest is able to recover. Additionally, these reports may corroborate references to extreme weather found elsewhere or provide nuanced interpretations to data obtained by meteorological stations. To allow the public to find the forest health reports that contain these unusual weather conditions, we have made this information searchable in the Data Rescue inventory.


week project, but between the constant move from one trap site to the n
nnd **the most miserable wind conditions we have ever experienced** it actu
consumed five weeks to complete the treatment of 121,000 acres. Only t

Example of extreme weather event from the 1956 Annual Report from the Bureau of Insect Pest Control.

Chronology of Leadership Offices and Titles

The FEMC has also prepared a chronology of government leadership personnel and office titles relevant to Massachusetts' pest problem. This was created using information provided by Fisher (see Appendix, Table A1-2). A full chronology which also includes brief descriptions of legislation relating to key changes is available on the archive (https://www.uvm.edu/femc/file/info/9954).

Conclusions

This project enabled the Massachusetts Department of Conservation and Recreation to archive boxes of historical forest health reports and aerial detection surveys. These rescued documents have immediate and real value, as demonstrated by the ability to update existing digital resources with more information, such as the Northeastern Forest Health Atlas where pest information was incomplete. The reports provide additional value by offering interpretations of pest outbreaks and unusual weather events written by natural resources professionals. Through this work, and by archiving this material with Dublin Core metadata, the FEMC has made this information accessible to the broader community.

Gaps and Next Steps

Opportunities to expand on this project include a digitization effort of tables and maps within the forest health reports and aerial detection surveys. Many of the reports include tables of damage extent estimates for pests not included in the aerial detection survey and, therefore, not included in the Northeastern Forest Health Atlas or easily accessible through other documents. To refine the data that already exists, the FEMC will continue to update the Northeastern Forest Health Atlas using aerial detection surveys conducted after 1982. Together, these efforts will provide a more comprehensive view of disturbance across Massachusetts' forests over the past century.

Appendix A – Chronology of MA DCR Structure and Leadership

Table A1: Chronology of government bodies relevant to Massachusetts' forests pest monitoring and control efforts.

Departments	**Years**
Department of State Forester	*1904-1919*
Department of Conservation	*1919-1953*
Department of Natural Resources	*1953-1975*
Department of Environmental Management	*1975-2003*
Department of Conservation and Recreation	*2003-present*
Divisions	
Division of Forestry	*1919-1953*
Division of Forests and Parks	*1953-2003*
Division of Urban Parks and Recreation	*2003-present*
Division of State Parks and Recreation	*2003-present*
Bureaus	
Bureau of Moth Work	*1909-1953*
Bureau of Insect Pest Control	*1953-1985*
Bureau of Shade Tree Management and Pest Control	*1985-1995*
Bureau of Forestry and Fire Control	*1996-present*
Committees and Commissions	
Gypsy Moth Commission	*1890*
Gypsy Moth Committee	*1891-1891*
Commission on Fisheries and Game	*1902-1904*
State Forest Commission	*1914-1914*
Metropolitan Park Commission	*1893-1919*
Metropolitan District Commission	*1919-2003*
Leadership Offices	
Assistant Forester for Moth Work	*1909-1919*
Superintendent, Moth Work	*1919-1926*
Chief Moth Suppressor/Superintendent	*1926-1953*
Chief Moth Superintendent	*1953-1956*
Chief Superintendent, Bureau of Insect Pest Control	*1956-1985*
Chief, Shade Tree Management and Pest Control	*1986-1996*
Program Supervisor	*1996-present*

Table A2: Chronology of leadership personnel relevant to Massachusetts' pest problem.

Leadership Staff	
Leon Howard Worthley	*1909-1912*
George A. Smith	*1912-1919*
Harold B. Ramsey	*1936-1942*
Harold L. Ramsey (son)	*1942-1958*
Charles S. Hood	*1959-1987*
James M. MacArthur	*1987-1993*
Charles M. Burnham	*1993-2010*
Kenneth A. Gooch	*2010-present*

Appendix B – DCR documents preserved by the FEMC.

Table B1: Titles of DCR documents preserved by the FEMC with year of publication.

Document Title	**Year of Publication**
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1932*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1933*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1934*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1935*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1936*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1937*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1938*
Gypsy Moth Defoliation from the Bureau of Entomology and Plant Quarantine	*1939*
A Partial History of Mass Forestry, 1626-1953	*1953*
Annual Report of the Bureau of Insect Pest Control	*1954*
Partial Report of the Aerial Spray Program of the Bureau of Insect Pest Control	*1954*
Annual Report of the Bureau of Insect Pest Control	*1955*
Regional Aerial Spray Program of the Bureau of Insect Pest Control	*1955*
Report on Cape Cod Hemlock Looper Spray Project	*1955*
Annual Report of the Bureau of Insect Pest Control	*1956*
Report of Operation of Dutch Elm Disease Removal Crew Division of Forests and Parks	*1956*
Annual Report of the Bureau of Insect Pest Control	*1957*
Annual Report of the Bureau of Insect Pest Control	*1958*
Annual Report of the Bureau of Insect Pest Control	*1959*
Annual Report of the Bureau of Insect Pest Control	*1960*
Annual Report of the Bureau of Insect Pest Control	*1961*
Annual Report of the Bureau of Insect Pest Control	*1962*

Table B1 - continued: Titles of DCR documents preserved by the FEMC with year of publication.

Document Title	Year of Publication
Annual Report of the Bureau of Insect Pest Control	*1963*
Annual Report of the Bureau of Insect Pest Control	*1964*
Annual Report of the Bureau of Insect Pest Control	*1966*
Annual Report of the Bureau of Insect Pest Control	*1967*
Annual Report of the Bureau of Insect Pest Control	*1969*
Annual Report of the Bureau of Insect Pest Control	*1971*
Major Insect Problems	*1971*
Annual Report of the Bureau of Insect Pest Control	*1972*
Annual Report of the Bureau of Insect Pest Control	*1973*
Annual Report of the Bureau of Insect Pest Control	*1974*
Annual Report of the Bureau of Insect Pest Control	*1975*
Annual Report of the Division of Forests and Parks	*1976*
Annual Report of the Bureau of Insect Pest Control	*1977*
Annual Report of the Division of Forests and Parks	*1977*
Annual Report of the Bureau of Insect Pest Control	*1978*
Annual Report of the Division of Forests and Parks	*1978*
Annual Report of the Division of Forests and Parks	*1979*
Defoliation Report from the Division of Forests and Parks	*1979*
Division of Forests and Parks Oak Leaftier Complex, 1974-1980	*1980*
Oak Leaftier Egg Survey, 1977-1980	*1980*
General Summary - Mass State Forests	*1981*
Annual Report of the Division of Forests and Parks	*1985*
Red Pine Adelgid and Scale Survey from the USDA Forest Service	*1985*
Sugar Maple and the Pear Thrips from Cornell University	*1985*
Annual Report of the Division of Forests and Parks	*1986*
Larvae Spray Graph from the Division of Forests and Parks	*1986*
Annual Report of the Division of Forests and Parks	*1987*
Annual Report Insect and Disease Conditions	*1992*
Annual Report of the Bureau of Shade Tree Management Report	*1992*
Annual Report Insect and Disease Conditions	*1993*
Annual Report of the Bureau of Shade Tree Management Report	*1993*
Annual Report Insect and Disease Conditions	*1994*
Annual Report of the Bureau of Shade Tree Management Report	*1994*
Forest Health Highlights from the Bureau of Shade Tree Management	*1994*
Annual Report of the Bureau of Shade Tree Management Report	*1995*
Annual Report of the Bureau of Forestry	*1996*
Annual Report of the Bureau of Forestry	*1997*
Forest Health Highlights from the Bureau of Shade Tree Management	*1997*
Annual Report of the Bureau of Forestry	*1998*
Annual Report of the Bureau of Forestry	*1999*

Table B1 - continued: Titles of DCR documents preserved by the FEMC with year of publication.

Document Title	Year of Publication
Annual Report of the Bureau of Forestry	*2000*
Annual Report of the Bureau of Forestry	*2001*
Annual Report of the Bureau of Forestry	*2002*
Annual Report of the Bureau of Forestry	*2003*
Annual Report of the Bureau of Forestry	*2004*
Annual Report of the Bureau of Forestry	*2005*
Annual Report of the Bureau of Forestry	*2006*
Annual Report of the Bureau of Forestry	*2007*
Annual Report of the Bureau of Forestry	*2008*
Annual Report of the Bureau of Forestry	*2009*
Annual Report of the Bureau of Forestry North East Region	*2010*
Chronology of Government Bodies Which Managed Massachusetts' Gypsy Moth Problem, 1890-2018	*2018*

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