

OMA Learning Lab Summer Series

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Presented by:

OMAAAMO
ONTARIO MUSEUM ASSOCIATION
ASSOCIATION DES MUSÉES DE L'ONTARIO



**Webinar 3: Climate Control – What do you
really need?**

Webinar Agenda

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- **Introduction**
 - Mary Collier, PD Program Manager, OMA
- **Presentation and Q&A (55 min)**
 - Fiona Graham, Associate & Conservator, GBCA
- **Q&A with Ministry of Tourism, Culture and Sport (15 min)**
 - Museum & Heritage Advisor Elka Weinstein
 - Questions about the Ministry of Tourism Culture and Sport Conservation standard

Climate Control: What do you really need?



**FIONA GRAHAM, MAC, CAPC, CAHP
ASSOCIATE & CONSERVATOR
GOLDSMITH BORGAL & COMPANY LTD.
ARCHITECTS**

JUNE 27, 2013



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Overview

- Introduction
- What the Standards say
- What research says
- How to monitor it
- How to control it
- Final questions



Introduction

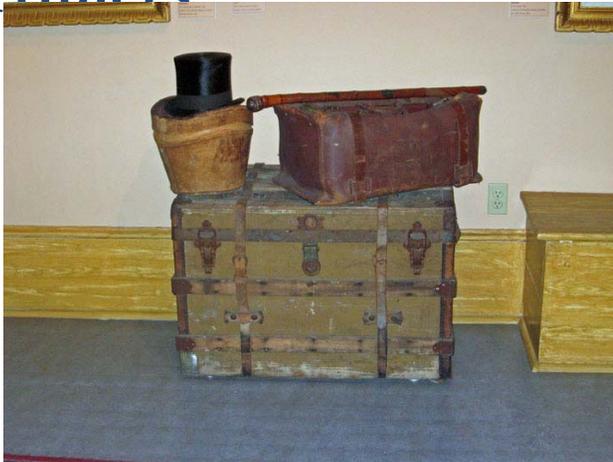
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- **Purpose of webinar**
 - An attempt to clarify one of the most misunderstood aspects of conservation in Ontario's community museums
 - An introduction to current thinking on the matter of climate control in museums
 - Based on responses to Conservation Standard questionnaire and, in part, to Physical Standard and Collections questionnaires
 - We have tried to respond to many of your questions; in some cases we will be referring you to other resources

What does the Conservation Standard say?

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- **6c. Maintaining relative humidity and temperature levels within an appropriate range for museum artifacts⁴**



- **4. An acceptable range is normally 40-60%. This condition applies to all buildings physically capable of maintaining these standards and to all additions to existing buildings or sites. Some buildings, because of structural or historical considerations, may require that this range be adjusted. Such adjustments must be based on individual assessments carried out in consultation with Ministry technical staff.**

What else does the Conservation Standard say?

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- **6g. Implementing a program of regular checking and recording of environmental conditions, with follow up procedures to correct deficiencies.**



What does the Physical Plant Standard say?

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- 3. The museum ensures that each of its buildings meets environmental norms appropriate to its functions.⁵
- 5. Where a museum has yet to fully meet these requirements, the Ministry will accept an implementation schedule outlining the work to be done.

Which agents of deterioration are we talking about?

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- Physical forces
 - Thieves & vandals
 - Dissociation
 - Fire
 - Water
 - Pests
 - Pollutants
 - Light
 - **Incorrect temperature**
 - **Incorrect relative humidity**
- For excellent information on how these agents affect different collection materials, how to control them, and guidelines for levels of relative humidity, etc. go to:
 - www.cci-icc.gc.ca
 - Caring for: Collections
 - ten agents of deterioration

What does research now tell us about temperature and relative humidity's effects on collections?

Inappropriate Temperature

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- **Too high**
 - Increases rate of chemical degradation (half the lifetime for each 5 degree increase)
 - Softens glues and waxes
 - Deforms records, magnetic media
- **Too low**
 - Seldom a problem
 - Do not freeze: encaustic, acrylic and oil paintings; fossils and rocks
- **Fluctuating**
 - Causes RH to fluctuate

NEWS FLASH!!

COLD IS (mostly) OK! COLD IS GOOD!

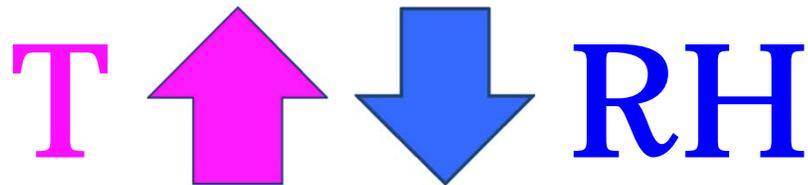


Cold is a mainly a problem when it results in damp conditions.

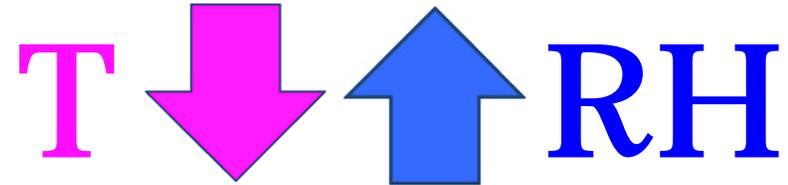
Relationship between temperature and RH

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- When temperature increases, relative humidity decreases



- When temperature decreases, relative humidity increases



What's a good temperature?

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- Human comfort levels (16 – 25C) are appropriate for most materials



Cold storage vault

- Collections that should preferably be stored at temperatures lower than human comfort levels
 - Electronic media
 - Colour photographic prints
 - Plastics including rubber and polyurethane foam
 - Acidic paper
 - Acetate and nitrate films

Inappropriate Relative Humidity

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- **Too high (damp)**
 - 75% - 100% for most materials
 - Mould, metal corrosion, buckling veneers, sticking films and photo prints
- **Special cases**
 - Archaeological metals may need as low as 20%
 - Unstable glass needs 40 – 55%
 - Certain minerals need specific RH
 - Any RH other than the specific one they need is inappropriate
- **Fluctuating**
 - Anything beyond what an artifact can handle
 - Could be +/- 5%, 10%, 20% or even 40%
 - Short term and seasonal
 - +/- 10% OK for most collections



Mould on leather

- **Low humidity**
 - Mostly a problem for handling
 - < 30%

What is an appropriate RH?

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- Most collections in Ontario's community museums will tolerate the following conditions:
 - RH in the range of 30 – 70% (50% +/- 20%)
- Art galleries have different needs
- For practical reasons, we seek to provide appropriate conditions for the collection as a whole, not for one artifact at a time.
- Provide microclimates for:
 - Freshly conserved or newly executed paintings, furniture and other painted and/or wooden artifacts
 - Artifacts freshly arrived from more humid environments, e.g. furniture from England, wooden sculpture from Indonesia
 - Special cases mentioned in Slide 13

Who may ask for tighter controls?

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- Lending institutions
- Federal heritage programs
 - Requirements are gradually loosening in response to global climate concerns as well as awareness of what collections really need
 - Micro-climates are a reasonable alternative to achieving tight tolerances at the building- or room-level



What does YOUR collection need?

Understand your collection

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- Current condition of collection
- Environmental vulnerabilities & risks
- Past exposure & environmental “proofing”
- Future environmental vulnerabilities & risks
- Housing techniques & options
- Access requirements
- Collections management & future growth
- Institutional capacity for stewardship

Excerpted from Michael C. Henry's *Understanding the Building/Climate Relationship: The Building Envelope*

Understand your building: what can it provide?

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- Building envelope & performance limits
- First building use & original envelope function/operation
- Current use & occupant census
- Fabric & material vulnerabilities & risks
- Space use & allocation
- Occupied vs. unoccupied areas
- Systems function & condition
- Institutional capacity for operation & maintenance

Excerpted from Michael C. Henry's *Understanding the Building/Climate Relationship: The Building Envelope*

Space use – fit the collection to the environment

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- If you have different collections with different needs, and different rooms with different conditions, try to match the collection to the right room.
- For example, metal artifacts will not suffer in a hot, dry environment – it's OK to put them in the attic
- Take the archival material OUT of the attic and put it in a cooler room.
- Uneven temperature from one area of the building to another is an issue for staff and visitors, not collections
- Uneven RH from one area of the building to another should not be problematic unless the difference is greater than 40%, which is unlikely; if materials sensitive to RH fluctuations must be transferred between areas of differing RH, wrap them up in buffering layers and boxes and let them acclimatize for a while before unpacking them.

Understand the environmental contexts: what are you up against?

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- Acquire accurate, accessible data
- Include site-specific exterior climate
- Representative interior environment
- Building “compartment” or response
- Thermal energy sources
- Moisture sources, liquid & vapour
- Systems performance or non-performance
- Specific collections risks & building risks posed

Excerpted from Michael C. Henry's *Understanding the Building/Climate Relationship: The Building Envelope*

What are the costs and can your institution manage them?

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- Capital
- Operating
- Availability of skilled maintenance and repair people

Monitoring

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- What conditions do you currently have
- Don't assume - monitor before changing anything (unless there's a really obvious problem like moisture running down your walls)
- Monitoring vs. controlling
- Monitoring = measuring and recording
- Controlling = adjusting temperature and RH
- First monitor, then identify causes, then control by various means
- Example – damp basement: dehumidify or fix the foundation?

Monitoring Equipment – Non-Recording

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- Hygrometers and thermohygrometers: need to check quality against calibrated instruments



- Psychrometers: swing and motorized



- Handheld electronic monitors: expensive, good for spot checks and calibrating other instruments



Monitoring Equipment - Recording

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- **Hygrothermographs:** expensive, need to change charts, no software required



- **Dataloggers:** moderately expensive, remote capabilities, need to download data



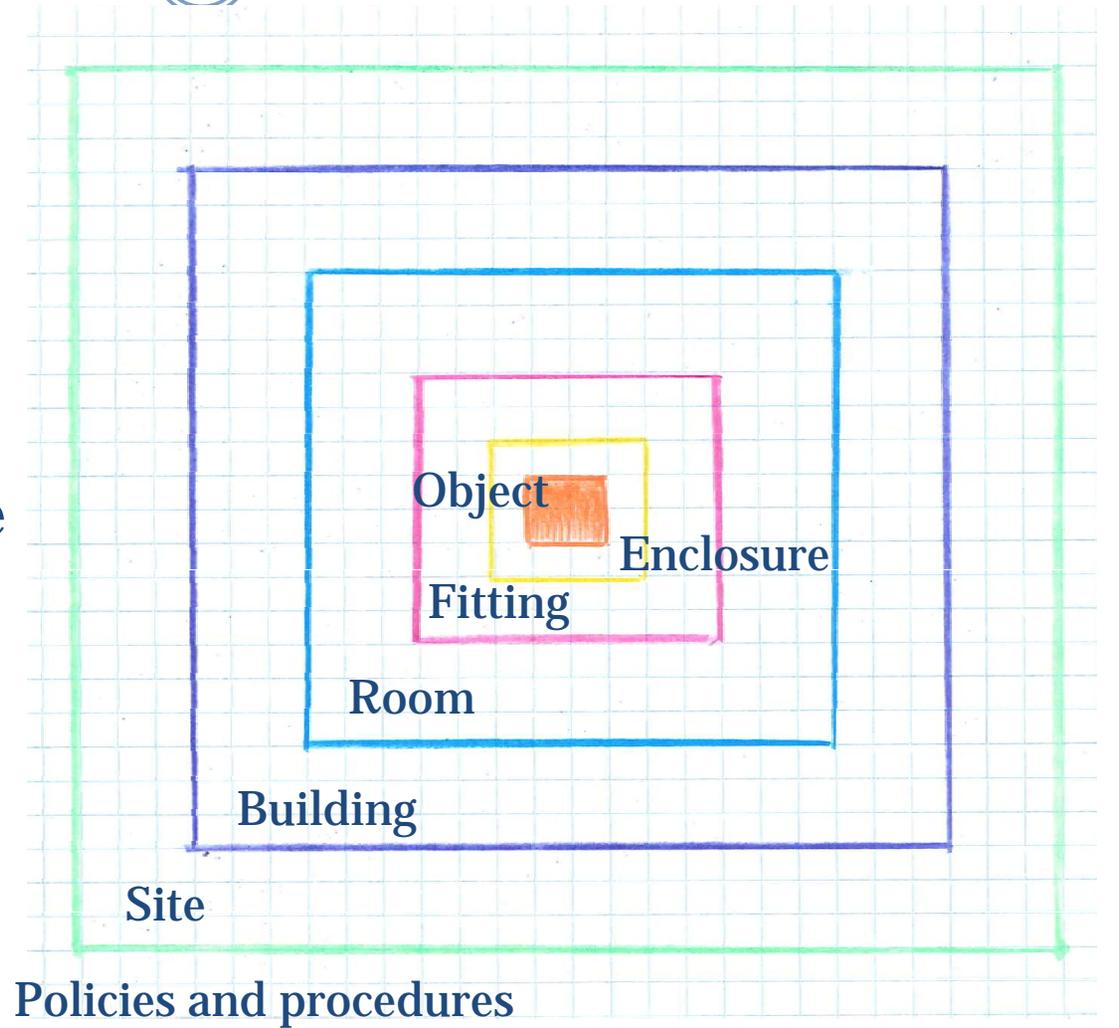
Controlling temperature and RH

Multi-Level Approach

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If there are obstacles to protecting collections at one level, you may be able to intervene at a different level.

If you cannot control the temperature or RH at the building level, try meeting needs at the room or enclosure level.



If relative humidity is too high

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- **Locate the source of moisture**
 - From above: fix gutters, downspouts, flashing, roof membrane
 - From below: fix grading and/or foundation, install French drains and/or vapour barrier at slab
 - From within: repair and maintain plumbing, ventilate kitchens and bathrooms, increase ventilation when large groups are present

If relative humidity is too high, cont.

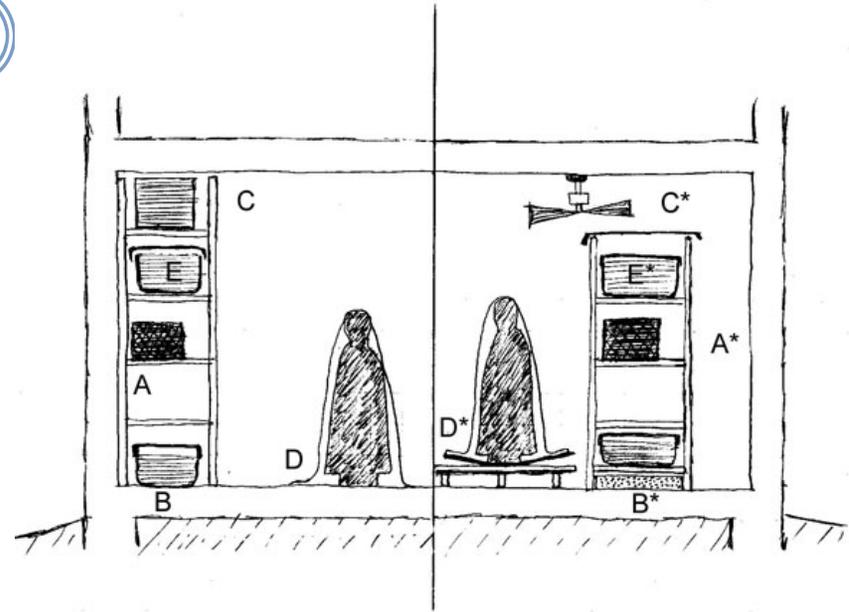
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- “Smart” ventilate - introduce outside air when exterior conditions are drier. This involves connecting the fan unit to a humidistat rather than a thermostat.
- Increase the temperature slightly (humidistatic heating) – winter option for seasonal museums
- Use air conditioning in the summer
- Install dehumidifiers (central system or portable units)

Limiting damage from damp conditions

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- Keep collections away from exterior walls and cold, damp floors
- Keep collections clean – dust and dirt hold moisture against the surface and also provide a food source for mould, increasing the risk of mould growth
- Increase air circulation



- A. Fittings placed near exterior walls
- B. Fittings placed near cold damp floors
- C. Fittings placed near hot dry ceiling
- D. Dust cover draped over damp floor
- E. Semi-airtight packaging

From "Incorrect Relative Humidity" by Stefan Michalski, CCI.

If relative humidity is too low

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- Lower the temperature slightly
- Use paper-based housings that buffer RH changes
- Use microclimates within enclosures
- Use humidifiers (central system or portable units) – use with caution to prevent damage to building envelope

If relative humidity is fluctuating too much

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- Adjust the temperature and/or RH set points on your central system
- Alter operations and activities that are causing fluctuations
- Add vestibules
- Improve insulation value of building envelope including walls, doors, windows, shutters, blinds, etc.

If relative humidity is fluctuating too much, cont.

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- Use paper-based housings that buffer RH changes
- Use buffering material such as paper and textiles inside storage and display enclosures, e.g. store textiles in dressers
- Create active or passive micro-climates in enclosures

Creating micro-climates in enclosures

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- Active



- Passive



Climate control in historic buildings

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- Operate historic buildings they way they were designed to be operated
- Manually open shutters and windows (use screens to prevent pests from entry), and interior doors
- Close blinds and drapes
- Remember to balance the needs of the building and the collection. Read the New Orleans Charter.
 - <http://cool.conservation-us.org/bytopic/ethics/neworlea.html>

Michael C. Henry resources

- http://www.getty.edu/conservation/our_projects/science/climate/paper_henry.pdf
- http://www.ccaha.org/uploads/media_items/understanding-the-building-climate-relationship-by-michael-henry.original.pdf

Richard L. Kerschner resources

- http://libraries.delaware.gov/documents/Kerschner_presentation_accompanying%20text_EnvMgt11.pdf

Note that studies on this subject for buildings in Europe and the tropics are not always relevant for museum buildings in Canada

HVAC Systems

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- **Functions**

- Heating
- Cooling
- Humidification
- Dehumidification
- Ventilation
- Filtration

- **Packaged systems**

- Stand-alone
- a.k.a. CRAC or Liebert

- **Issues**

- Reliability
- Operating costs
- Repair expertise
- Location of sensors
- Data collection, interpretation and distribution
- Constant volume vs. VAV
- Zones
- Choice of set points

References

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- HVAC

- IPI's Guide to Sustainable Preservation Practices (Image Permanence Institute)
- Building Museums: A Handbook for Small and Midsized Organizations (Robert Herskovitz, Timothy Glines, Davide Grabitske)
- Preventive Conservation for Historic House Museums (Jane Merritt, Julie Reilly)

- Cold storage

- http://videopreservation.conserva-tion-us.org/library/cold_storage_v17j.pdf
- <http://www.cdncouncilarchives.ca/Storage%20%20English.pdf>

Final Question

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- **How necessary to preservation is climate control?**
 - It depends...
 - For archival collections in well-maintained buildings with good security and a sprinkler system, climate control may be most important part of your preservation strategy.
 - For a mixed collection in a leaky building with an old electrical system and no sprinklers, it is less of a priority.
 - Taking a risk management approach is the sensible way of preserving your collection. Focus on what matters, not on a list of ideal conditions.
 - The Standards for Community Museums in Ontario are NOT a list of ideal conditions; they are guidelines for basic, professional practice.

Questions for your Museum and Heritage Advisor?

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Read the Standards for Community Museums in Ontario at
http://www.mtc.gov.on.ca/en/museums/museums_standards.shtml

Download the Standards Questionnaires at
http://www.mtc.gov.on.ca/en/museums/museums_reporting.shtml

What's Next?

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- The link to the recording of this webinar and this slide deck will be available on the CMOG Standards Resources page of the OMA website.
- You will receive a link to a short webinar feedback form
- Thank you for your participation!

OMA Learning Lab Winter Series

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Upcoming PD Opportunities

- There are four more webinars coming up:
 - Outcomes-Based Planning & Evaluation for Programs
 - Outcomes-Based Planning & Evaluation for Exhibits
 - NEW! Accessibility in Exhibits
 - Emergency & Disaster Plans and Maintenance Manuals

Presented by:



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ONTARIO MUSEUM ASSOCIATION
ASSOCIATION DES MUSÉES DE L'ONTARIO

Ontario Museum Association
50 Baldwin Street
Toronto, Ontario
M5T 1L4

416-348-8672

1-866-662-8672 (toll-free in Ontario)

www.museumsontario.com