

## **Environmental Conditions: Data Collection**

### **Environmental Conditions: Data Collection**

The overall environment in historic house museums affects both the objects in the house and the surrounding structure. Monitoring and analysis of the data ensures a better understanding of the overall conditions. The data analysis that results from monitoring allows staff to adjust control systems to mitigate damage to objects and structures from extremes of high and low relative humidity. It also allows equipment to be evaluated and redesigned to improve environmental conditions. The following guidelines outline the process required to collect the environmental data.

### **Data Collection Guidelines**

- The overall goal is long-term monitoring of average temperature and humidity in spaces. Continuity of monitoring is critical. Tracking daily fluctuations is less important
- Maintain an inventory of all data loggers.
- Data collected needs to be compared to other data collected at different times. To ensure that data remains consistent and relevant:
  - Data loggers should stay in their assigned locations, and never be removed from site once deployed.
  - One staff member should be assigned download all the data loggers.
- Data from the loggers should be downloaded and batteries should be changed at consistent intervals.
- Data loggers should collect one reading every hour to maximize battery life while still recording sufficient readings.
- Data should be converted into the appropriate format immediately after processing.

## Environmental Conditions: Data Collection

### Data Collection Technical Information

*The overall goal is long-term monitoring of average temperature and humidity in spaces. Continuity of monitoring is critical. Tracking daily fluctuations is less important.*

- Downloading data on a daily or weekly basis is not necessary for the long term understanding of environments.
- The majority of objects in the houses can withstand daily fluctuations as well as seasonal fluctuations.
- Exceptions might be made when daily readings will add to the general understanding of conditions and their control.
  - Eg: Daily monitoring of a new HVAC system to ensure its operation is satisfactory when first installed.

*Maintain an inventory of all data loggers.*

- A master inventory list of all deployed data loggers should be maintained
  - Inventory list should be maintained as an excel spreadsheet
    - Log in the serial number, model, location, last download, and the date batteries were last installed.
  - Master copy currently located in Property Care's Network Drive\Preservation and Maintenance\Hobo\Location\Hobo list

*Data collected needs to be compared to other data collected at different times.*

- Data loggers should stay in their assigned locations, and never be removed from site once deployed.
  - There are data logger location sheets for each house identifying the data loggers' location on a floor plan with a photo and a description of the location.
    - Copies of the location sheets should be kept both on site and in a central digital file to be updated.
  - When new or additional data loggers are added to a house the location sheet should be updated.
- To retain consistency one person should be assigned download all the data loggers.

*Data from the loggers should be downloaded and batteries should be changed at consistent intervals.*

- The interval should be maintainable and achievable.
  - A three, six or twelve month collection interval should be considered.
  - The interval period is dependent on the need for data analysis or for replacing batteries.
- Batteries should be replaced annually to ensure no loss of data.
- Equipment: U-Shuttle

### Environmental Conditions: Data Collection

- The device is used to download data from Onset brand dataloggers while on site, allowing the dataloggers to never leave a house. The device accommodates downloading data and the changing the batteries.
- If there is no staff person dedicated for downloading data:
  - The most important thing is the collection of the data.
  - Downloads should take place twice a year: January and June.
  - Data is to be saved to the office computer immediately.
  - Someone then needs to be responsible for converting the data for use.
- Data logger launching:
  - Two different Onset programs are used: HOBOWare Pro and BoxCar Pro
  - Launching screens will look a bit different but still contain the same information.
    - Description should read: serial number-House-location
    - Logging interval should be 1 hour or 60 minutes
      - Concerned with long term changes not every fluctuation at the site.
      - Taking readings shorter than 60 minutes will provide too much unnecessary data and fill up the data logger's memory faster.
    - Launching options: Now, Delayed, or Trigger (only HOBOWare Pro has this launching option)
      - Now: allows the logger to be launched immediately.
        - This would be preferred, allowing for the most amount of accurate data to be collected
      - Delayed: allows for the exact day and time to be set making sure the logger will be in place before it starts logging.
        - Next best option because sometimes the loggers do not get put in place until after the loggers have stated logging, collecting inaccurate data.
      - Trigger: will start logging once the small brown button on the front of the logger is held for 3 seconds.
        - Problematic because people forget to press the button or do not hold it long enough resulting in lost data.
- Data logger downloading:
  - Currently data is being placed into property care P:Drive\preservation and maintenance\hobos then in the folder for its corresponding site and location.
    - Hobos should be downloaded in place. This way the hobos can collect more data then if they were removed from site.
      - Allowing them to be started instantly, leaving little or no breaks in data.

### Environmental Conditions: Data Collection

- Hobos should not go more than 6 months between downloads
- Use the U-Shuttle to download
  - The process is straight forward- the shuttle walks you through the steps to download
  - The Hobo never has to leave the site
  - The shuttle holds the data until it can be downloaded at the office
- If a computer is used to download
  - Stop logger from logging when retrieving data.
  - File name should read: Serial number-house-location-month-day-year.
- Data should be placed in the corresponding house and location file on P: Drive\Preservation and Maintenance\Hobos. If another member of staff downloads the data, a copy should be emailed to the data collector. To ensure the data is kept up to date.
- Battery levels should be checked when downloading and they should be changed if necessary.

Data should be converted into the appropriate format immediately after processing.

- Data should be converted to a text file for maximum flexibility.
- If numbers appear abnormal, the data collector should bring it to the attention of property care, collections, the preservation manager and the site manager to see what can be done.
  - Computer programs used in analysis of data:
    - BoxCar Pro: Is the original program designed by Onset to work with the data loggers, to download and analyze data. This program is used for the older loggers like the H8 or H14 (LCD), it also works with U10. But a new program has been created.
    - HOBOWare: This is an updated version of BoxCar Pro that works with the newest design, and the U10 which used to use BoxCar Pro. This program is used to manage the U-Shuttle, downloading, deleting data and checking battery levels.
    - Climate Notebook: Created by Image Permanence Institute is being used to track and analyze the data collected. The program makes analyzing the data easier than before. There are added tools like a mold growth calculator, collection deterioration calculator, dew point calculator and graph comparison.
    - PEMdata: Also created by Image Permanence Institute, it is an internet based program that stores data. This site has similar tools and option for analyze of data as those of Climate Notebook but allows multiple users to access the data over the internet. This program also has the ability to download weather data from the closest weather station to the house.