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The Collection Survey:
Linking observation to cause across disparate collections

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The Palaeontology Department of the Natural History Museum is undergoing a refurbishment programme from 2002 to 2004. This provided an opportunity to survey the collections and produce baseline information on their condition. The survey uses a novel data surveying & handling technique that allows us to quantitatively compare and contrast the condition of different collections. The same survey will be repeated at regular intervals to monitor the effect of remedial and preventive conservation projects. This allows us for the first time to compare or combine condition data across disparate collections and hence spot trends and prioritise conservation work. The survey works by focussing on **observable indicators** that can be directly related to **agents of deterioration**. E.g. *observable* pyrite oxidation *indicates* a high RH. Different indicators are used for different types of specimen to ensure the most accurate reporting of the agents of deterioration.

Agents of deterioration

Current research defines nine or ten agents of deterioration. These are listed as:

- direct physical force
- thieves, vandals and displacers
- fire
- water
- pests
- contaminants
- radiation
- incorrect temperature
- incorrect humidity
- custodial neglect.

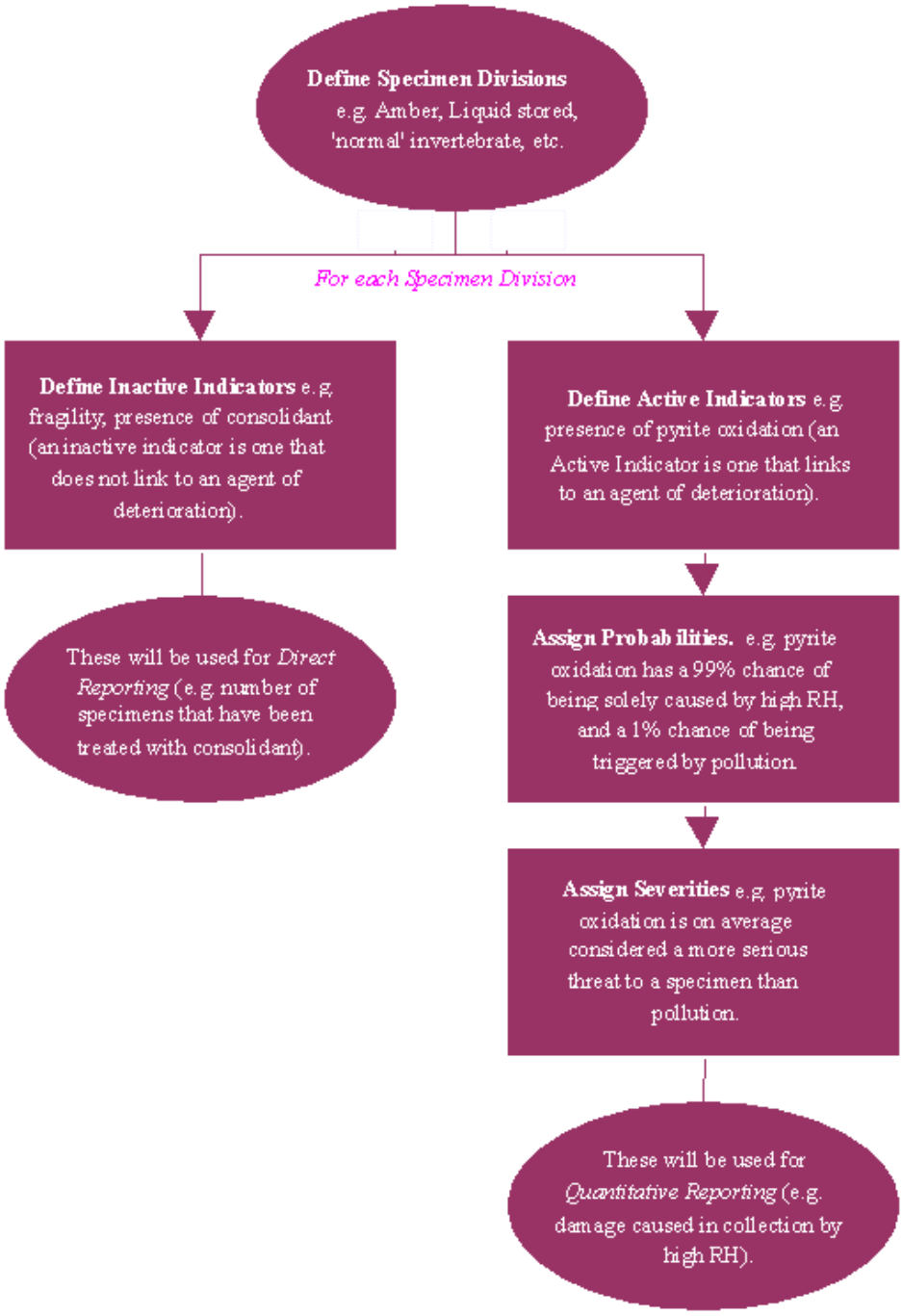
Observable Indicators

Indicators are the observable manifestation of the action of agents of deterioration. Examples include:

- breaks- related to poor storage and/or handling (physical force)
- label damage- related to pests and/or exposure to UV radiation.
- surface pollutant- related to exposure to contaminants
- pyrite decay- related to incorrect humidity
- poor condition of coating- related to incorrect temperature and/or exposure to UV radiation.

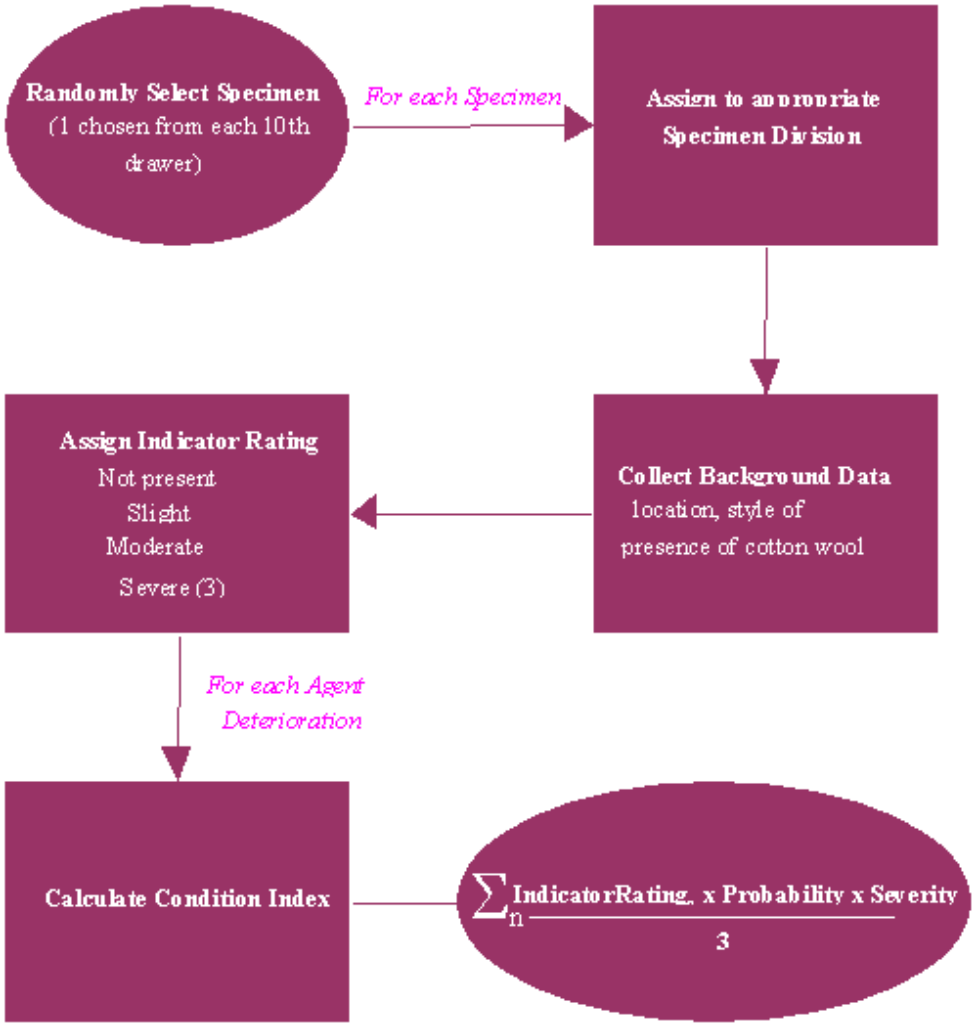
Linking indicators & agents

We link indicators to agents of deterioration through **probabilities** and **severities**. Each specimen division has its own set of indicators with appropriate probabilities. E.g. delamination of sub-fossil bone strongly links to low RH, whereas delamination of a mollusc has a weaker link



Calculating the Condition Index

For each specimen we survey, we produce a set of condition indices – there is one index for each agent of deterioration. The index is a measure of the damage that that agent has caused to the specimen over time.



E.g. the condition index for High RH for a 'normal invertebrate' with slight delamination and moderate pyrite oxidation is:

$$\frac{1 \times 30 \times 1.6}{3} + \frac{2 \times 99 \times 2.2}{3} = 161.2$$

Interpreting the results

Condition indices give a quantitative measure of the amount of damage caused to a specimen by an agent of deterioration that is independent of the type of specimen surveyed. As the index makes no judgement on when damage occurred to a specimen it is not correct to look at it in isolation – i.e. we cannot look at a single result and say if it is 'good' or 'bad'. Rather, all indices must be examined in comparison to an appropriate reference collection. For general work, we use a reference collection of specimens that are judged to have no current storage problems and do not contain iron pyrites (hence are not subject to pyrite oxidation). This approach means we can combine and compare results for specimens composed of entirely different materials (e.g. insects in amber with molluscs preserved in limestone). This can either be done on an index by index basis (e.g. damage caused by high RH) or a combined condition index can be created which gives an at-a-glance indication of the condition of a collection. The figures below give some sample results.

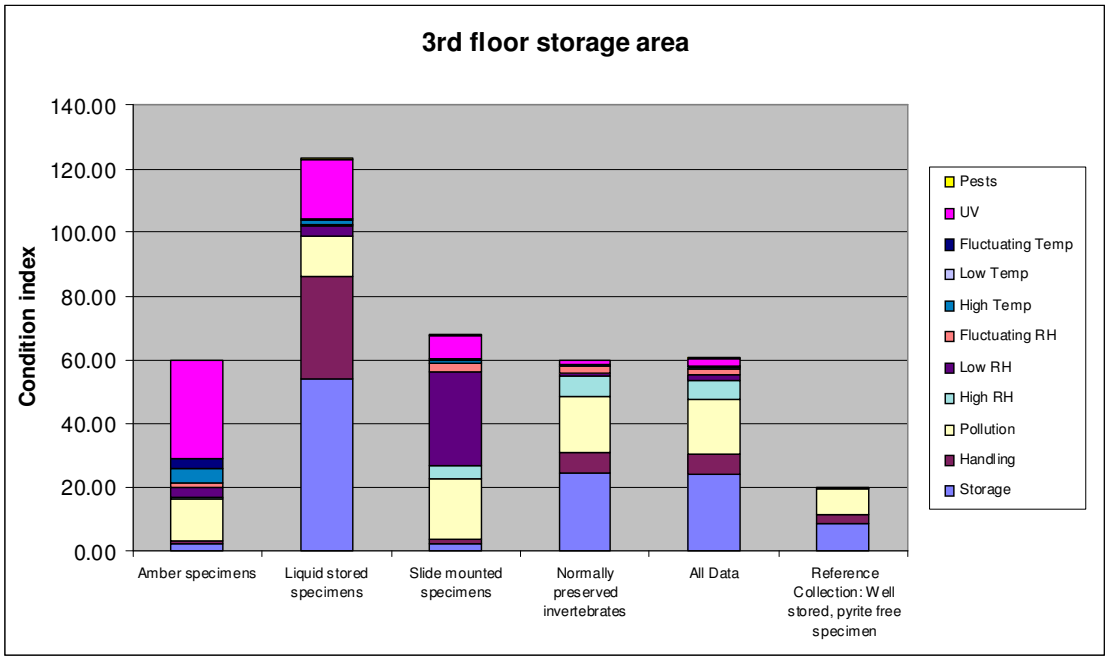


Figure 1: One storage area, four collections
The results above show the overall condition indices for four different collections, all held in the same storage area. Liquid stored specimens are the priority conservation issue due to current poor storage, whereas the issue with amber collection is previous exposure to UV (now stored in darkness).
(Full colour graphs available; please contact V.Noble@nhm.ac.uk – Ed.)

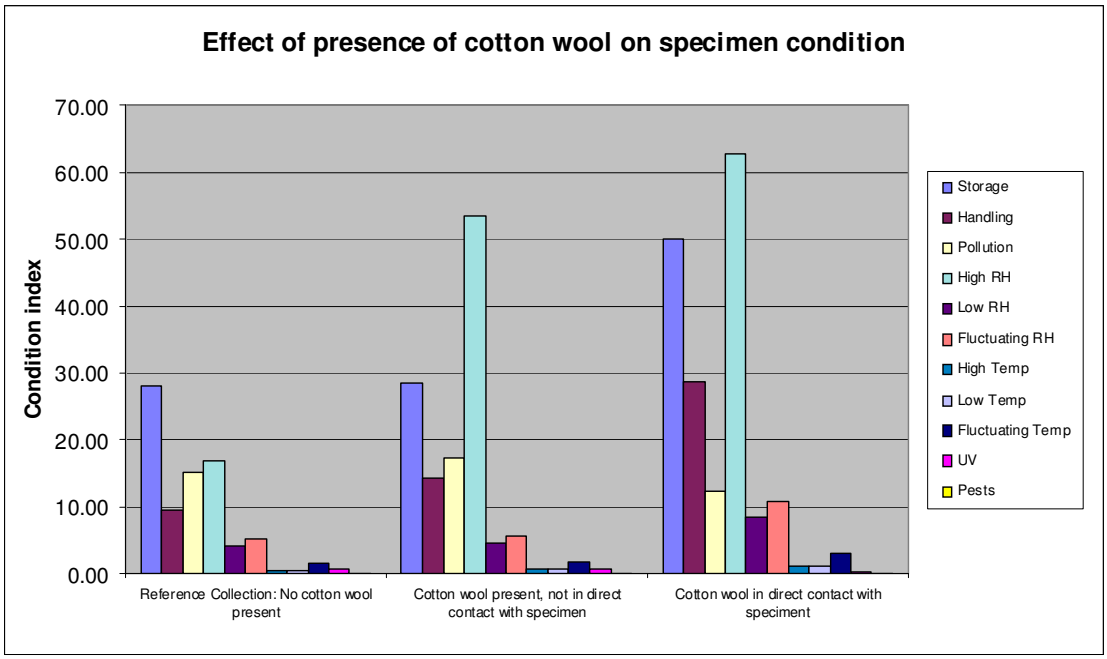


Figure 2: An early find – cotton wool…
The condition indices shown above are for specimens known to contain pyrite, and clearly show that cotton wool vastly increases the damage caused by high relative humidity (RH) by speeding the pyrite oxidation reaction.

(Full colour graphs available; please contact V.Noble@nhm.ac.uk – Ed.)

Going forward – what next for the survey?

The survey is a useful tool to directly compare collections containing different types of material. For example, for a smaller museum with mixed natural history collections it would be possible to survey a storage area containing spirit collections, dried skins, taxidermy and geological specimens and combine the results to report on e.g. the effects of humidity and style of storage that used in that location. There is already interest from other Museum departments who would like to use the survey on their collections and we also plan to pilot it in the gallery areas.
However this does not mean that the design of the survey is complete - it is observational and thus it is subjective. We have removed one level of interpretation from the user - surveyors state what they see and do not draw conclusions at the surveying stage. We also use tight guidelines to cut down on differences in opinion over condition and plan to introduce a reference collection for training surveyors. Further work is also required to ensure the probabilities and severities used are as accurate as possible.

References

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Waller, R R 1995 Risk management applied to preventive conservation *in Storage of Natural History Collections: A Preventive Conservation Approach (Edited by Rose, C L, Hawks, C A & Genoways, H H), Society for the Preservation of Natural History Collections pp21-27*