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Secrets of Designation unlocked: the Tullie House natural science collection and a window into Cumbrian biodiversity

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Abstract

In 2018, Tullie House Museum and Art Gallery was awarded Arts Council England's Designated status for its natural science collection, recognising the outstanding quality of the collection to support research and understanding into Cumbrian biodiversity and geodiversity. Arts Council England's Designation Scheme identifies the pre-eminent collections of national and international importance held in England's non-national museums, libraries and archives, based on their quality and significance. This mark of distinction is a key to unlock the research "secrets" and potential of collections, through raising their status and through access to Arts Council funding programmes to develop them and to make them more accessible to researchers and the public. Understanding the content of our collections and their significance is also vital to public engagement. In this paper, the author explores the successful aspects of the Tullie House application, focusing on the collection and how it met the specific Designation criteria. The application focused on voucher specimens, centring on those which are most historically and scientifically important, and which provide key insights into Cumbrian biodiversity and wider UK ecology.

Keywords: Designation, Cumbria, Tullie House, biodiversity, geodiversity, collection.

Introduction

Designated status from the Arts Council England (ACE) was awarded to Tullie House Museum and Art Gallery (TH) for its natural science collection in 2018, and the integral role of the Cumbria Biodiversity Data Centre (CBDC), with its archival data, hosted at the Museum, was acknowledged. It has taken a number of years to achieve this award, and consequently a lot has been learnt about what works and what does not work when applying for Designation. Here, some of the aspects of the successful application are shared, from the position of having written and coordinated the bid, as the previous Curator specialising in the natural science collections.

The paper will include what Designation is, and why it is significant, how Designation works, the collections and context of the application, before laying out how TH addressed the key criteria. The purpose of this paper is not to provide general guidance about the process: for which people should refer to the ACE guidelines (Arts Council England, 2015) or staff at ACE, but instead to elucidate TH's successful approach. Each Designation candidate will have a unique collection and will need to tailor their bid to its strengths, but the author hopes that this article will contain some useful advice for Designation applicants.

What is Designation and why is it important?

The Designation Scheme was born out of a commitment in the government review of museum policy, *Treasures in Trust* (Department of National Heritage, 1996), that a system should be created to recognise collections of outstanding quality and importance: this became the Designation Scheme (Mendoza, 2017). Its founding principles were to raise the profile of collections and to encourage their safeguarding (Arts Council England, 2014). It was firstly administered by the Museums, Libraries and Archives Council until 2011, after which the ACE took over and revamped the application process.

The definition of Designation is that the scheme "… exists to identify and celebrate collections of outstanding resonance that deepen our understanding of the world and what it means to be human" (Arts Council England, 2015). Furthermore, a Designated collection is defined as "a nationally significant, coherent assemblage of items; held in trust in the long-term for public benefit… [and]… is an essential research resource for its subject" (Arts Council England, 2015). The scheme is established for non-national, accredited, English museums.

Designation is a mark of distinction, helping to raise the profile of collections nationally and internationally, to researchers, funders and stakeholders: it is something in which donors, affiliated societies and organisations should take great pride. With this accolade, the TH natural science collection is now formally recognised as one of England's most important collections.

In a climate where austerity continues in the museum sector, with a reduction in public funding and shrinkage of museum specialisms (Museums Association, 2019), the continuation of funding for core curatorial work becomes ever more vital. In the 17 year period of the scheme between 1997-2014, financial awards were made to 140 distinct Designated collections with around £32 million invested towards ACE objectives including collections development work, to facilitate the ongoing care and understanding of these collections, whilst ensuring that they are as accessible as possible (Arts Council England, 2014), helping to "unlock" their full potential. More specifically, Designated institutions are able to apply for the Designation Development Fund with grants of £20,000-£90,000 for 2 years (Arts Council England 2019a). Furthermore, Designation, as a mark of prestige, also helps to demonstrate the Excellence strand of the ACE National Portfolio Organisation (NPO) funding (where applicable such as TH), and will help Designated institutions secure further grants.

How does Designation work?

The Designation application is a two-stage process, formally assessed by the ACE Designation Panel, which meet twice a year to review applications. These are accepted for a single collection (e.g. natural sciences), although historically organisations could apply for all of their collections to be Designated in a single application. The purpose of Stage 1 is to demonstrate that the organisation has the potential to meet the definition of a Designated collection (Arts Council England, 2015). After the Panel have formally reviewed and evaluated the application they will then provide feedback to the applicant on if they have been successful. If so, then they will be eligible to apply for Stage 2. The receipt of Designated status is awarded following a successful Stage 2 result (see Arts Council England, 2015 for further details).

Who has Designation?

Of 149 museums, libraries and archives that have received this award (Arts Council England, 2019b), 77 (52 %) are accredited museums. There are at least 2,600 museums in England (Mendoza, 2017) which means at the most, 3% of English museums are Designated. 15 of these have natural sciences as a component of their collections.

The only other museum in the North West region to have been awarded Designated status for their natural science collections is the Manchester Museum, University of Manchester. This is significant because in the application TH needed to make extensive comparisons to their nearest Designated natural science collection, both in terms of discussing comparable content, but also how the two organisations work together. The only other Designated collection in Cumbria is Wordsworth House which is associated with William Wordsworth. Therefore, Tullie House is the only Designated natural science collection in the county.

Tullie House Museum and the context of the application

Tullie House Museum and Art Gallery is a regional museum in Carlisle, to the north of the county of Cumbria. The Museum has mixed collections of natural sciences, archaeology, social history, costume and art. Archaeology and social history document the lives and activities of the people who have settled in Northern Cumbria and include prehistoric, Roman, Viking, medieval and contemporary objects. The fine art collection includes 4,800 objects, mainly British paintings, including works from local artists.

The natural science collection has the greatest breadth and depth, with approximately 320,000 specimens, consisting of a rich variety of material from different disciplines including in order of size; entomology, botany, geology, bird eggs, and vertebrate taxidermy and skins, although the collection also includes a smaller collection of osteology, molluscs, microscope slides and spirit specimens. The greatest strength is its focus on Cumbria (described below), as well as containing material from elsewhere in the UK and overseas. The biological specimens date back to the 18th century, and the significant history of collecting is intertwined with the activities of prominent naturalists across the county and the development of the local Carlisle Natural History Society.

The collection plays a vital part in supporting exhibitions, the public engagement programme and also biological recording. Specimens are used regularly by researchers and artists and they support higher education teaching. With the community at the heart of engagement, the collection has great social impact, improving the lives of local people (e.g. "tactile" sessions for people with visual impairments).

TH had strong resources at hand to tackle the bid. The Museum had specialisms in natural sciences through in-house curatorial positions (the very first application was led by the, then, Curator of Natural Sciences, Stephen Hewitt), and the applications were supported at senior levels, including most notably the Directors (see Acknowledgements). TH is also very fortunate to host the CBDC, which currently houses 2.3 million biological records, and is supported by staff expertise in analysing data, biological recording and ecology: the CBDC was recognised by the Designation Panel as being integral to the work of TH. Through its relationship with the CBDC, but also through its historical relationship with its local natural history Society (the Carlisle Natural History Society), the Museum has always had a strong affiliation with local naturalists and recorders. The research activities and academic impacts of the Museum have always had an excellent track record of internal research and collaboration. These relationships meant that TH had a bounty of expertise on which it could draw upon in developing the Designation bid. TH also a strong public engagement programme, as explained above, which was an invaluable component of the bid.

The first and most important step taken in the Designation process, was to evaluate why the collection was nationally or internationally significant.

Cumbrian biodiversity and natural science

In order to demonstrate that a collection is nationally, or even internationally significant, one clear advantage is if the material is from across the world. In the case of natural science, specimens have links to other landscapes, environments and their biodiversity. In the case of human history, objects have links to other societies and cultures. The Manchester Museum, University of Manchester, for instance, has a collection of international scope, both in terms of natural science and human history.

The TH approach, however, was significantly different. Tullie House contains some material from overseas and from across Britain; for instance, the entomology collection contains some 10,000 British species. However, the greatest focus of the collection is undoubtedly on Cumbria and the TH application focused on why Cumbria itself is nationally and internationally significant for understanding natural science.

Cumbria is the most biodiverse county in England, with more priority habitats (24) than any other English county, according to Natural England data (Figure 1) (Eweda and Frost 2014). For instance, Cumbria contains 84% of English willow heath and montane environments; important for the dotterel (*Charadrius morinellus* Linnaeus 1758) and golden eagle (*Aquila chrysaetos* Linnaeus 1758) (JNCC, 2019). The county has more biological Sites of Special Scientific Interest (SSSI) than any other county in England. The outstanding bio and geodiversity is also an integral part of the Lake District, which is now a UNESCO World Heritage Site. Many of the UK endangered and Biodiversity Action Plan species have taken refuge in this region taking advantage of the abundance of natural habitats. Cumbria provides an excellent area for understanding human impacts on wildlife, including environmental pollution, habitat degradation and climate change.

The Museum has also had a long-term association with prominent Cumbrian naturalists. This includes the founder of Cumbrian natural science study, Reverend Hugh Alexander Macpherson who campaigned to have natural science collections at Tullie. His meticulous level of biological recording set the first comprehensive baseline for how species were changing in response to land-use change in the county, culminating in his comprehensive opus *A Vertebrate Fauna of Lakeland* (Macpherson, 1892). When he died, this left a huge gap in biological recording and the world's first natural science records bureau (as far as TH knows) was set up in 1902; today this has evolved to become the CBDC,

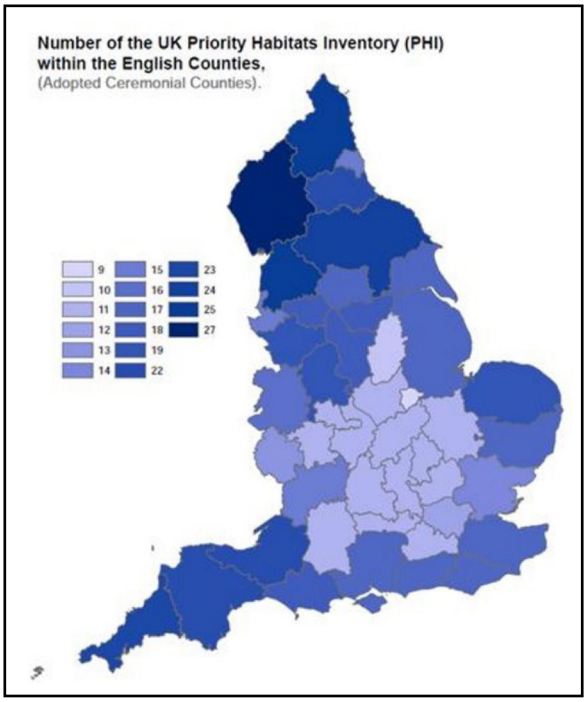

Figure 1. Map of the number of priority habitats by county. Cumbria has the greatest number of priority habitats (24) in England. © Cumbria Biodiversity Data Centre.

hosted at the Museum. The Museum has also had a 125 year association with its Carlisle Natural History Society and their collecting efforts have underpinned the development of the collection.

Number of type specimens: not a barrier

Voucher specimens are among the most important specimens in a museum, and can be defined in different ways, but with common elements. One of the most comprehensive definitions by Kageyama (2003) starts: "A voucher is a specimen, a sample thereof, or an artefact, and its associated data, that documents the existence of that organism or object at a given place and time in an archival manner, to ensure the repeatability of the study which otherwise could not be adequately reviewed or reassessed." A type specimen is a particular voucher specimen which serves as a vital basis (or taxonomic unit or reference) for describing new species.

Many Designated collections have numerous type specimens, and detailing them can certainly help to demonstrate national and international significance in a Designation bid; indeed, one of the prompts in the Designation guidelines (Arts Council England, 2015) indicates applicants may wish to detail their type specimens to support their application. With a relatively small number of type specimens, TH focused on documenting their impact on the literature. TH also made it clear that the strength of the collection was also the inclusion of other voucher specimens from Cumbrian localities and historical and scientific studies. Examples of these were discussed throughout the application.

Meeting the criteria

There are 3 main criteria (national significance, outstanding quality, and research value) to meet in the Designation application (Arts Council England, 2015). The purpose of this paper is to illustrate how TH met the criteria with the strength of its Cumbrian collections, focusing on the Stage 2 bid, where the criteria were addressed most explicitly.

Criteria 1: national significance

TH kept the national significance section entirely focused on the subject of Cumbrian biodiversity and geodiversity, by discussing why Cumbria's biodiversity is so special (e.g. number of priority habitats, biological sites as discussed above). More importantly, TH briefly cited a number of examples of how particularly important Cumbrian species (e.g. those that have had strongholds in the county) have been studied upon the basis of the collection, and the impacts the research has made on natural science studies. Some of these examples were discussed in more detail in later sections of the bid.

For example, peregrine falcons (*Falco peregrinus* Tunstall 1771) have historically had one of the world's most important nesting sites, in terms of population density, in the Lake District. In the mid-20th century, across the country, the species was declining dramatically with the eggshells breaking. Famous ecologist and conservationist, Derek Ratcliffe undertook work on TH collections and others including museums and private collections, studying how eggshells were changing in thickness over a period of a hundred years and found a link between the introduction of the pesticide DDT and the thinning of eggshells (Figure 2) (Ratcliffe, 1970). This demonstrated a clear link between environmental pollution and the decline of the species. His meticulous studies eventually paved the way for a ban on these pesticides so that these birds of prey could recover. This example clearly demonstrates the impact of a collection on the conservation of the species and our understanding of our affects on the environment.

The national significance criterion was explicitly addressed in the first section of the Stage 2 bid, but TH also made sure that the theme underlined

*Figure 2. Bird eggs of the peregrine falcon (*Falco peregrinus *Tunstall 1771) from the Ernest Blezard collection which were studied in Derek Ratcliffe's ground-breaking research. © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

the rest of the application, frequently referring back to the significance of Cumbrian biodiversity and making sure that all examples were relevant to the subject.

Criteria 2: outstanding quality

This section looked at the size, scope and coverage of the TH natural science collection, demonstrating that it is a coherent assemblage; part of the definition of a Designated collection (Arts Council England, 2015). This was one of the relatively easiest parts of the TH bid, as it focused on one county. For instance, more than half the specimens are from SSSIs, and of the 288 SSSIs known in Cumbria, 275 are represented by specimens (Cumbria Biodiversity Data Centre, 2017 *pers comm.*). The collection includes almost 200,000 Cumbrian specimens; almost two thirds of the entire natural science collection are from this county.

The collection is also associated with 2.3 million biological records held at the Cumbria Biodiversity Data Centre. These records present some 20,000 species in archival data which includes rare or protected species such as the natterjack toad, *Epidalea calamital* Laurenti, 1768. Both the collection and biological records comprise the pre-eminent resource for understanding the changing Cumbrian biodiversity.

The remaining part of this section was broken down into different discipline areas, in order to provide specific examples from the collection showing how it is comprehensive, and how it is an essential resource for researchers. A few examples from the bid are included below. In each section TH also made frequent comparisons to Cumbrian holdings in other Designated museums, particularly the Manchester Museum which is their closest comparator in the North West.

The entomology collection

Entomology is by far the largest part of the collection with around 200,000 specimens, of which 122,000 specimens (c. 6,500 Cumbrian species) represent voucher records for sites in the county. The specimens extend back more than 125 years thanks to the history of past collecting associated with the Carlisle Natural History Society, extending back to George Routledge (collecting period 1890-1930) and Frank Henry Day (1890-1950 collecting period), right up to the present day with the collecting activities of the Cumbria Biodiversity Data Centre, the society and other naturalists.

The key example cited in detail in this section, was that of the marsh fritillary (*Euphydryas aurinia* Rottemburg, 1775) (Figure 3). This species has had an historical stronghold in Cumbria, with the abundant wet grasslands and its larval host food plant, the Devil's Bit Scabious (*Succisa pratensis* Moench). Famous geneticist of Oxford University, Edmund Brisco Ford studied specimens, now in the Tullie House collection, from a population near Carlisle (Orton) between the late 19th and early 20th century with his father HD Ford to investigate the relationship between population size and variation and the affects of bottlenecks on the populations (Ford and Ford 1930). This work significantly contributed to understanding the role of natural selection in ecology and the understanding of natural fluctuations helped to inform the conservation and successful reintroduction of the species to the county in 2007 (Porter, 2007) following its local extinction. This example demonstrates the links not only to a Cumbrian species, and the understanding of evolutionary theory, but also the legacy in terms of impacting conservation science today.

Vertebrate zoology: the taxidermy and skins collection

This collection consists of around 4,500 mounts and study skins. Many of these specimens were cited in Macpherson's *A vertebrate fauna of Lakeland* (Macpherson, 1892), which provides a unique window into the fauna of the late 19th century. Many of these were then subsequently incorporated into

*Figure 3. Specimens of the marsh fritillary (*Euphydryas aurinia*) in the George Routledge Collection which were studied by EB Ford (CALMG:1935.28). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

Figure 4. Taxidermy mounts of the Atlantic puffin, Fratercula arctica *Linnaeus, 1758, in their habitat case based on their historical nesting site on new red sandstone at St Bee's Head. Sadly only one pair are left there and the species has considerably declined. (CALMG:2001.784.222, CALMG:2001.784.223, CALMG:2002.1525.391, CALMG:2002.1525.372, CALMG:2002.1525.373). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

the 300 mostly Cumbrian habitat cases, modelled on field observations, from Cumbrian sites. These set piece dioramas include sites which are now SSSIs (e.g. St Bee's Head) and nesting localities which can still be observed today (Figure 4).

Of greatest research value, TH cited the red squirrel (*Sciurus vulgaris* Linnaeus 1758) skins (Figure 5). Red squirrels are habitat specialists and excellent markers sensitive to changes in woodland. By studying genetic changes and also changes to skull shape, Dr Peter Lurz and his team were able to identify distinct populations within the species and how they were changing over time in response to our changing land use (Hale *et al.*, 2001, Hale and Lurz 2003). This research also showed that before 1980 there was a distinct West Cumbrian race and a distinct continental one to the north-east. After the Kielder Forest was built this effectively acted as a land bridge joining up previously fragmented populations and allowing these populations to come together to mix. The upside is there is now greater genetic diversity within this region, making the species more immune to local extinction (Lurz, 2018 *pers comm.*), but the West Cumbrian race is now harder to identify. These studies demonstrate the specific changes to populations that occurred due to human impacts. Again this is an example which links to Cumbrian biodiversity, as red squirrels have one of their last English strongholds in the county and the collection will have a considerable and vital part to play in the ongoing conservation of this species.

*Figure 5. Study skins of red squirrel (*Sciurus vulgaris *Linnaeus 1758) are an important source of genetic material for studying populations of the species. CALMG: 1949.122, CALMG: 1937.10, CALMG: 1963.4). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

The herbarium

The nationally significant herbarium is a unique research resource for present and future work on the county's flora and underpins nationwide publications. It consists of c. 60,000 specimens, some dating back to the 18th century, from Cumbria, but also from the UK and beyond. The application emphasised the importance of a recent significant acquisition, from the University of Lancaster in 2015 (Figure 6) consisting of c approximately 35,000 sheets, containing invaluable voucher specimens from the most comprehensive floral surveys to date of the county, and their floral compendium, *A Flora of Cumbria* (Halliday, 1997). This indispensable voucher collection, with the survey data held in the CBDC, provides the baseline for understanding the exceptional Cumbrian flora.

Figure 6. Herbaria sheets such as this specimen of lesser water parsnip Berula erecta *(Hudson) Coville, in the ex-University of Lancaster herbarium are invaluable voucher specimens for Cumbrian biological records including county surveys. (CALMG:2015.14). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

The geology collection

This consists of c.10,000 specimens showing how Cumbria's environments have changed over a period of 300 million years (Lower Ordovician-Lower Jurassic). After Cornwall and Devon, Cumbria is the next most mineral rich area in the UK (Rumsey, 2016) and the outstanding geodiversity across the county underpins the rich variety of habitats. The TH geological collection has had a strong track record of research.

The main example TH cited was the fossil collection of Professor Robert Harkness, which is the largest geological collection at TH. Harkness had a significant impact on the 19th century palaeontological literature and was able to show that the oldest rocks in the Lake District, the Skiddaw Slates were far richer in fossils than previously thought, using his observations and the TH collection itself (Harkness, 1863, Salter, 1863). His collection includes type specimens including *Ormathops nicholsoni* Salter, 1866, the earliest record of trilobites from the Skiddaw Slates (Whiteside, west of

Figure 7. Fossil specimen of Ormathops nicholsoni *Salter, 1866 in the Professor Harkness Collection, the earliest trilobite record from the Skiddaw Slates (CALMG:1978.126.99). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

Braithwaite and Keswick) (Figure 7). The Harkness collection also includes Permian Hilton Plant Bed specimens of the Eden Valley, one of the few localities in the British Isles to have Permian plant fossils (Worley, 2016 *pers comm.*). It was important to emphasise the rarity of assemblages to help demonstrate their significance.

Criteria 3: research value

Research

This section was framed around the type of people TH works with and focused on how research is facilitated. Throughout this section, TH referenced their Research Framework. The application addressed how research has been undertaken historically in-house at the Museum including former Curator, Ernest Blezard's 1943 *Birds of Lakeland*. TH also focused on collaborative work, including the example of the red squirrel research (Hale *et al.*, 2001), noting that it was published in the peer-reviewed, high-impact journal, *Science*.

It was important to highlight TH's current collaboration in a NERC-funded Imperial College London and Natural History Museum led project; investigating how bumblebees are changing in response to land-use change. Using the Museum's 18 bumblebee species from Cumbria, TH is able to contribute unique data to the project for the far North West (Cumbrian) area of England (Figure 8). This project combines the latest genetic sampling

technology and imaging to build the most comprehensive picture to date of how these vital pollinator species are changing, and will enable the team to investigate why some species are declining (e.g. moss carder bee: *Bombus muscorum* Linnaeus, 1758) whilst others are not (e.g. common carder bee: *Bombus pascuorum* Scopoli, 1763) and will hopefully provide useful insights into the future conservation of the species.

TH also discussed the central role of the Cumbria Biodiversity Data Centre has in working with taxonomic specialists and biological recorders across the county to promote and support research into Cumbrian species and habitats. For instance, working with the Cumbria Wildlife Trust, the CBDC has made data from the Uplands for Juniper survey freely accessible to all providing a comprehensive assessment for a species under pressure from disease and climate change.

Contribution to public understanding

TH framed this section based on the audiences with which they worked. This included the exhibitions programme, for instance, Eden Rivers Wonder World was a 2018 exhibition developed in partnership with the Eden Rivers Trust exploring the exceptional biodiversity of the River Eden and its catchment area.

The application addressed TH's work using the collection in both in-house and outreach workshops for primary schools and how they collaborate with external partners including Natural England. TH also detailed how they use the collection to develop their input into the University of Cumbria zoology course, in particular focusing on the taxidermy and osteology to investigate anatomy and evolution. A key strength of this section was the work of the CBDC and its relationship with recorders. The CBDC provides opportunities for specialists and amateurs to enhance their knowledge of the county and its species and to facilitate surveying special, under-recorded sites. For instance, in 2018 the Bowkerstead Bioblitz was organised in partnership with the Rusland Horizons HLF project. 100 individuals in family groups attended, collecting 609 records representing 443 species including 99 that are rare or protected. Prior to this event the number of recorded species held at the centre for the area was only 22 (Muscat, 2019 *pers comm.*).

*Figure 8. Specimen of red-tailed bumblebee (*Bombus lapidarius *Linnaeus, 1758) used in the NERC- funded project investigating how bumblebees are changing in response to land-use change. (CALMG:1935.28). © Tullie House Museum and Art Gallery (photograph by Guy Broome).*

TH also emphasised their work with their closest comparator collection, Manchester Museum, delivering a joint workshop in geological collections care, as part of the Museum Development North-West initiative providing training for smaller museums in the region.

Conclusions

This paper charts the key elements of TH's successful application which will hopefully provide some insights into the process of Designation and how TH developed a strong bid. Designation is a highly prestigious award, and achieving it has been a challenging process. The successful bid entailed a large amount of resources, in terms of expertise and time, which is something a potential applicant should consider when embarking on their journey towards Designation. TH was fortunate in its expertise at hand, in terms of existing and also previous curatorial staff. The expertise from the in-house CBDC, but also affiliated societies and naturalists and researchers was also invaluable; this meant therefore that there was a community to support the application. Furthermore, the process was also supported at senior levels of the organisation.

The most significant step in developing the application for TH was to determine the subject of national significance. This was Cumbrian biodiversity and geodiversity, a subject which underpinned the application, and allowed the collection to be considered a coherent assemblage. However, as most of the material is from this one region, it was crucial to the bid to determine why this area was of national or international significance. As well as explicitly addressing this in the 'national significance' section, examples were used throughout the bid which linked back to the subject. The author subsequently selected and researched a number of suitable research examples, which had considerable impact, and linked to contemporary issues including

climate change, environmental pollution and conservation efforts. This included going back to the researchers, including face-to-face meetings, to obtain more detail on the impacts of their work and why the TH collection was vital. In some cases, this also culminated in letters of support.

Of course, each applicant will have different subjects of national significance, and will need to tailor their application to their collection and work of their organisation. The ACE guidelines and staff provide a crucial reference for the development of the application.

Designation has been a long process for TH, but the successful achievement of Designated status, has now opened up the Designation Development Fund income stream, as well as supporting future funding applications. However, the application has "evolved" over the 3 versions, incorporating new research and knowledge about the collections, a broader understanding of how they fit in with the wider picture of other museums across the country, and deeper relationships with users of the collections. Therefore, Designation is just as much a 'journey' as well as a 'destination' (modified from a quote often attributed to Ralph Waldo Emerson).

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