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## Historical maps in *ScotlandsPlaces*: new collaborative geographic retrieval and presentation options for the National Library of Scotland's maps

*Keywords:* Historical maps, geographic searching, series maps, web-portals, web-services

### *Summary*

*ScotlandsPlaces* ([www.scotlandsplaces.gov.uk](http://www.scotlandsplaces.gov.uk)) is a collaborative web portal allowing access to geographic records and images held by three institutions: the Royal Commission on the Ancient and Historical Monuments for Scotland (RCAHMS); the National Archives of Scotland (NAS); and the National Library of Scotland (NLS). *ScotlandsPlaces* was first launched in October 2009 with records from RCAHMS and NAS, but in December 2010, 18,000 map records and images from NLS were incorporated.

This paper describes the main work involved in incorporating NLS historical maps into *ScotlandsPlaces*, and the benefits of doing so, including the practical advantages for the user in terms of access and presentation, the advantages for NLS in improving georeferencing of maps, and the economic advantages of sharing institutional resources in this collaborative application. It also reviews the improvements to geographic access to historical maps through map, gazetteer, and county / parish based search methods in *ScotlandsPlaces*, and describes the various open standards and services employed, including Web Map Services, Zoomify and Openlayers software, and KML search results. The planned enhancements to *ScotlandsPlaces*, including an e-commerce facility and a mobile application, are also discussed.

### Introduction

*ScotlandsPlaces* ([www.scotlandsplaces.gov.uk](http://www.scotlandsplaces.gov.uk)) is a collaborative web portal, initially launched in October 2009, allowing the public to search data seamlessly from two of Scotland's foremost national institutions: the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) and the National Archives of Scotland (NAS). One of the key advantages of the new *ScotlandsPlaces* portal was its ability to offer multiple user-friendly, methods of geographic searching for records. A second, important advantage was its ability to bring together disparate collections and record types into one searchable dataset, thereby uniting collections held in physically separate institutions and made available digitally on separate websites. From a user perspective, therefore, *ScotlandsPlaces* offers a single portal offering easy geographic searching for material, including historic maps, held by separate institutions. A third major advantage was the ability to share infrastructure, website development and services across institutions, to pool resources and collaborate – a useful end in itself, but also a policy that public sector institutions in Scotland are specifically encouraged to follow. Fourthly, *ScotlandsPlaces* contributes towards the *One Scotland, One Geography* Geographic Information Strategy for Scotland, as well as the EU INSPIRE programme, through the way in which government information with a geographic component is being made available.

During 2010, the National Library of Scotland joined *ScotlandsPlaces* as a project partner, incorporating 18,000 map records which were formally added to the *ScotlandsPlaces* website in De-

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ember 2010. This project to incorporate them, described below, essentially involved revising NLS metadata (geo-referencing record content with coordinates and place-names), and setting up web services (receiving search calls and responding using *ScotlandsPlaces* XML). Related work also included revising Openlayers to deliver zoomable images directly into *ScotlandsPlaces*, setting up map boundary boxes as Web Map Services, and providing customised links at item and group levels between the *ScotlandsPlaces* website and NLS maps website.

The core functionality of *ScotlandsPlaces*, its development, enhancements, and content have been well described in papers by Beamer (2010a and 2010b) and Beamer & Gillick (2010). The purpose of this paper is to focus on the project to join NLS maps into the *ScotlandsPlaces*, and the key advantages of doing so from the perspective of the library and the user community. The main technical background to *ScotlandsPlaces* is briefly reviewed from this perspective, before looking at the incorporation of NLS map records and images, and revising metadata. The search methods are then illustrated, together with the database queries and web-services that support these. The future plans for the site are briefly mentioned, before summarising the main advantages of *ScotlandsPlaces* from the perspective of making maps available online.

### Technical background

Some of the key functionalities of *ScotlandsPlaces* that made it attractive as a project to join were its hospitality to different record types, its comprehensive in-house gazetteer allowing linkages between multiple geographies, and its intuitive front-end website for geographic searching.

#### *Metadata*

One of the key aims of *ScotlandsPlaces* was to allow institutions with quite different record types to be brought together. The NAS typically use archival standards, such as the International Standard for Archival Description (ISAD), the International Standard of Archival Authority Records (ISAAR), and the Encoded Archival Description (EAD). The RCAHMS data follows MIDAS Heritage, the UK technical data standard for information about the historic environment, created by the Forum on Information Standards in Heritage (FISH) Interoperability Toolkit (FISH, 2008). The NLS records essentially follow library standards, including the International Standard Bibliographic Description (ISBD), Anglo-American Cataloguing Rules (AACR), MARC and the Resource Description Framework (RDF). The *ScotlandsPlaces* project has also been keen to allow the possibility of new members joining (for example, the museum community, using the SPECTRUM standard), and so be hospitable to the use of other standards in the future (Beamer & Gillick, 2010).

Rather than attempt to map between these multiple formats for this data, *ScotlandsPlaces* developed its own bespoke XML format. Joining institutions can therefore supply quite different metadata content, provided they supply it in a consistent generic *ScotlandsPlaces* XML format. This can be best illustrated by the following examples from the RCAHMS and the NLS. Whilst the first call to each database results in a relatively brief record, with greater similarity, the second call to display the full record for each resource shows quite different information.

1<sup>st</sup> Call XML Example record returned from RCAHMS

```

<?xml version="1.0" encoding="UTF-8"?>
<Document>
<Folder id="RCAHMS" styleUrl="RCAHMSSStyle" other informational attributes >
  <Placemark>
    <id>243969</id>
    <name><[Aberdeen, 13-17 Nicholas Street]></name>
    <description><[Shop]></description>
    <thumbnail>SC39402</thumbnail>
    <other1> Aberdeen </other1>
    <other2> Aberdeenshire </other2>
    <other3> 1</other3>
    <relevance> 16</relevance>
    <coordinates> NJ 94153 06267 </coordinates>
  </Placemark>
</Folder>
</Document>

```

1<sup>st</sup> Call XML Example record returned from NLS

```

<?xml version="1.0" encoding="UTF-8"?>
<Document>
<Folder id="NLS" type="Bathymetric" RecordTotal="2" RecordStart="1" RecordEnd="2">
  <Placemark>
    <id>263</id>
    <referenceid>74422131</referenceid>
    <name>
      <![CDATA[ Bathymetrical Survey chart of White Loch ]]>
    </name>
    <lochname>White Loch</lochname>
    <description>
      <![CDATA[ See: <a href="http://maps.nls.uk/bathymetric/index.html">Bathymetrical Survey of the Fresh-Water
Lochs of Scotland, 1897-1909</a> ]]>
    </description>
    <other1>1903</other1>
    <relevance>20</relevance>
    <thumbnail>http://www.nls.uk/4/74422131.jpg</thumbnail>
    <imagecount>1</imagecount>
    <coordinateCentroidsEN>316982,742962</coordinateCentroidsEN>
  </Placemark>
</Folder>
</Document>

```

## 2nd Call XML Example record returned from RCAHMS

```

<?xml version="1.0" encoding="UTF-8"?>
<Document>
<Folder id="RCAHMS" styleUrl="RCAHMSSStyle" collink_url="http://canmore.rcahms.gov.uk/en/details/"
thumbnail_url="http://canmore.rcahms.gov.uk/images/s/">
  <Placemark>
    <name><[Aberdeen, 13-17 Nicholas Street]></name>
    <altname></altname>
    <type>Shop</type>
    <canmoreid>SC39402</canmoreid>
    <mapno></mapno>
    <siteno>SC39402</siteno>
    <parish>Aberdeen</ parish >
    <county>Aberdeenshire</county>
    <council>City of Aberdeen</ council >
    <ngr>NJ 94153 06267 </ ngr >
    <coordinates>57.147248N, 2.098265W</coordinates>
    <imagecount> 1 </imagecount>
  </Placemark>
</Folder>
</Document>

```

```

<thumbnail>
  <arcnumlink>arcnumlink</arcnumlink>
  <item>SC358738</item>
  <description><[Aberdeen, 1-21 St. Nicholas Street. General view of corner of Union Street and Nicholas
Street from East]></description>
  <collection><[General Collection]></collection>
  <date>1953</date>
  <copyright>RCAHMS</copyright>
</thumbnail>

<summaryNotes><summaryNotes >
<archaeolNotes></archaeolNotes >
<architechotes></architechotes >

</Placemark>
</Folder>
</Document>

```

## 2nd Call XML Example record returned from NLS

```

<?xml version="1.0" encoding="UTF-8" ?>
<Document>
  <Folder id="NLS" styleUrl="NLSStyle" type="Bathymetric" re-
cord_url="http://maps.nls.uk/bathymetric/spview/?sid=74422131" thumb-
nail_url="http://www.nls.uk/4/74422131.jpg">
    <Placemark>
      <id>263</id>
      <referenceid>74422131</referenceid>
      <cartographernames>
        <![CDATA[
Murray, Sir John (1841-1914)<br />Pullar, Laurence
]]>
      </cartographernames>
      <name>
        <![CDATA[
Bathymetrical Survey chart of White Loch
]]>
      </name>
      <original_url>http://maps.nls.uk/bathymetric/chart.cfm?id=2089</original_url>
      <description>
        <![CDATA[
See: <a href="http://maps.nls.uk/bathymetric/index.html">Bathymetrical Survey of the Fresh-Water Lochs of Scot-
land, 1897-1909</a>
]]>
      </description>
      <imprint>[London] : Royal Geographical Society, surveyed 1903, published [1908].</imprint>
      <lochname>White Loch</lochname>
      <riverbasin>Ryan basin</riverbasin>
      <publicationdate>1903</publicationdate>
      <pagination>6 maps on 1 sheet : col. ; 23.3 x 41 cm.</pagination>
      <shelfmark>Map.B.1.c</shelfmark>
      <parish1>BLAIRGOWRIE</parish1>
      <county1>PERTSHIRE</county1>
      <coordinateCentroidsEN>316982,742962</coordinateCentroidsEN>
      <imagecount>1</imagecount>
      <image>
        <imageURL>http://www.nls.uk/3/74422131.jpg</imageURL>
        <thumbnailURL>http://www.nls.uk/4/74422131.jpg</thumbnailURL>
      </image>
    </Placemark>
  </Folder>
</Document>

```

### *Geographic indexing*

Institutions often have multiple and inconsistent ways of indexing geography or place-related content, especially when going back in time with different jurisdictions and gazetteers. *ScotlandsPlaces* addresses this problem very effectively through utilising its own gazetteer and controlled vocabularies for place, searching using names and coordinates, whilst also able to translate queries between different geographies and names based on their spatial position. The *ScotlandsPlaces* gazetteer combines administrative area records including historic counties and parishes from SCAN (the Scottish Archive Network), with records for all populated place names from the General Register Office for Scotland's 1982 listing (General Register Office for Scotland 1990). The gazetteer holds place names, descriptions, centroids for places, and polygons for larger administrative areas using the Alexandria Digital Library standard.<sup>1</sup> The gazetteer is used to clarify and refine user searches and it does this by providing the user with a disambiguation list of matches from the gazetteer for any word entered into the search box (Beamer, 2010a). Joining institutions, such as NLS, made the choice to index their material textually using the standard *ScotlandsPlaces* controlled vocabulary gazetteer terms, although variant names are also possible, which can be retrieved through more elaborate search parameters on both standard and variant names. Where accurate coordinates exist for records, either as boundary coordinates, or centroids, these form a key part of the geographic retrieval process, as illustrated below.

### *Search middleware*

*ScotlandsPlaces* uses open source geographic middleware, developed from an Edinburgh University MSc Geographic Information System project called CYGnus, to search across separately hosted databases (Carter & Gittings 2009). CYGnus uses place-names and geographic coordinates and returns the results in Keyhole Markup Language (KML), which can then be displayed to the user in an application such as Google Earth or ArcGIS. As developed in *ScotlandsPlaces*, CYGnus allows searches are carried out by simple URL parameter pair calls, and the results are amalgamated and presented in the *ScotlandsPlaces* web site. The place-name gazetteer described above, also guides the user through place-name and boundary changes in Scotland throughout the past several hundred years. The CYGnus and gazetteer middleware allow spatial queries to be refined to an exact locality, which is then used to conduct the query, as well as mix and integrate the results into a tabular format. This is illustrated and described further below. The response times for queries usually take less than a few seconds, helped through auto-caching of results pages, dynamically updated every Sunday morning.

## **Incorporating NLS map records**

### *Categories of maps added*

As the existing content of *ScotlandsPlaces* is particularly good for detailed, larger scale information, the following main categories of NLS maps were felt to be most relevant to incorporate:

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<sup>1</sup> Further information on the *ScotlandsPlaces* gazetteer and jurisdictions is at: <http://www.scotlandsplaces.gov.uk/content/index.php?action=view&id=3>

1. Ordnance Survey six-inch to the mile, Scotland, 1843-1882 (2,123 sheets). These maps form the earliest comprehensive topographic mapping of Scotland by Ordnance Survey. The six-inch to the mile scale is the most detailed that covered the whole of Scotland, and record practically all man-made and natural features in the landscape. Every road, railway, field, fence, wall, stream and building is shown, even including smaller features such as letter boxes, bollards on quaysides, mile posts, and flag-staffs. Uncultivated land is distinguished by over 10 different symbols for types of woodland (e.g., birch, fir, mixed, furze, osier, brushwood), as well as marsh, bog, and rough grassland. (<http://maps.nls.uk/os/6inch/index.html>)
2. Ordnance Survey 25 inch to the mile, Scotland, 1855-1882 (13,045 sheets). These maps are the earliest, most detailed mapping of all the inhabited regions of Scotland, covering over a third of the total land area of Scotland. The maps are immensely valuable for local history, providing good detail of all buildings, streets, railways, industrial premises, parkland, farms, woodland, and rivers. All towns, villages and cultivated rural areas were mapped, and the scale allows practically every feature in the landscape to be shown. (<http://maps.nls.uk/os/25inch/index.html>)
3. Historical County Maps, 1580-1928 (382 sheets). These maps are the most useful maps for discovering all rural parts of Scotland from the 1580s to the 1830s – before Ordnance Survey maps. They include the work of the most famous Scottish cartographers: Timothy Pont, Robert Gordon, and John Adair. They also include the county maps from the major Scottish Atlases by Joan Blaeu (17654), Hermann Moll (1745), and John Thomson (1832). They locate the earliest farms, hamlets and castles, routeways and roads, canals, woodland, and parish boundaries. (<http://maps.nls.uk/counties/index.html>)
4. Historical town plans of Scotland, 1580-1919 (192 sheets). These are uniquely valuable for understanding Scotland's towns. For the larger towns (Aberdeen, Dundee, Edinburgh, and Glasgow) beautiful and accurate maps or bird's eye views exist from the 17th century. Over time, the maps become more detailed, and widespread for other towns. By far the most significant surveyor of Scottish towns was John Wood, who published over 50 plans of Scottish towns between 1818 and 1826. A few of these plans (such as those for Edinburgh, Leith, Glasgow, and Dundee) were based on recent town plans by other surveyors, but many were based on original surveys by Wood himself. There are 75 town plans included in *ScotlandsPlaces* relating to the Great Reform Act (1832). (<http://maps.nls.uk/towns/index.html>)
5. The Bathymetrical Surveys of the Fresh-Water Lochs of Scotland, 1898-1909 (571 sheets), provide a comprehensive understanding of the depths and nature of some 562 inland Scottish lochs. This 10 year project was conceived and organised by oceanographer, Sir John Murray, and includes 60,000 soundings, the results of which provide the first detailed charts of the loch depths. (<http://maps.nls.uk/bathymetric/index.html>). The texts of the volumes, which had already been scanned, were made available on the *ScotlandsPlaces* website using Zoomfy, and by creating an XML file of the contents as a Digital Volume. ([http://www.scotlandsplaces.gov.uk/digital\\_volumes/dv.php?dv\\_id=69](http://www.scotlandsplaces.gov.uk/digital_volumes/dv.php?dv_id=69))

### *Enhancing metadata for these map records*

These maps were already scanned and available on the NLS website (maps.nls.uk), but work was required to revise the existing metadata NLS held for them. From 2004, NLS has been actively trying to develop georeferenced access to its online map collections (Fleet, 2006), and by 2010, some 5,000 of its 20,000 online maps have been georeferenced, with bounding boxes for a further 13,000 items. We were able to capitalise on this for *ScotlandsPlaces*, by focusing on these collections we had georeferenced bounding boxes as shapefiles for, such as the Ordnance Survey series maps (categories 1 and 2 above). However, other categories of maps we wanted to add had no coordinate georeferencing and involved more work:

Categories 1 and 2. Coordinate extents were supplied for all the Ordnance Survey six-inch and 25 inch maps, derived from pre-existing shapefiles of boundaries. By running a spatial query on these shapefiles against shapefiles of counties and parishes held by RCAHMS, textual index entries for parish and county names were also added to these Ordnance Survey map records.

Categories 3 and 4. As NLS held no specific coordinate extents for historic county maps or town plans, these were indexed by county and parish/burgh name from the *ScotlandsPlaces* gazetteer, and centroids were assigned based on these counties from RCAHMS shapefiles for these counties / burghs. This is therefore only an approximate spatial reference, and it could be that through work in progress with Klokan Technologies' Georeferencer tool (<http://geo.nls.uk/maps/georeferencer/>), as well as ongoing geo-referencing through projects such as Visualising Urban Geographies ([geo.nls.uk/urbhist](http://geo.nls.uk/urbhist)) more accurate coordinate referencing will be possible in future.

Category 5. A lochs boundary shapefile, courtesy of the Scottish Environment Protection Agency, was used to generate coordinate extents and parish names for the Bathymetrical Survey maps.

This improved geographic indexing of these records will also have a long-term value beyond *ScotlandsPlaces*. It also demonstrates how with improved georeferencing of metadata, and by using pre-existing georeferenced boundaries in a new application such as *ScotlandsPlaces*, map sheet metadata can be repurposed to improved, and ever-evolving web-presentations of this same content (Fleet, 2008).

### **Search methods for users**

The main *ScotlandsPlaces* search methods are illustrated by Figures 1-8 below. A major benefit of *ScotlandsPlaces*' presentation over their availability in NLS, is the ability to search all these map categories geographically at once – on the NLS website, the different categories are currently made available through separate applications. In addition, as *ScotlandsPlaces* URLs and results pages are spidered by search engines, a growing number of geographic searches by place in search engines return results directly within *ScotlandsPlaces*, a particularly important benefit of the website.





Figure 3: The County/Parish search method allows searching by the pre-1975 counties and parishes of Scotland. County searches often retrieve thousands of records, and the parish option (not illustrated above) is a second stage allowing more specific geographic searching.



Figure 4: This detailed gazetteer of administrative units and populated places, also allows good disambiguation between homonyms (eg. Oakbank).

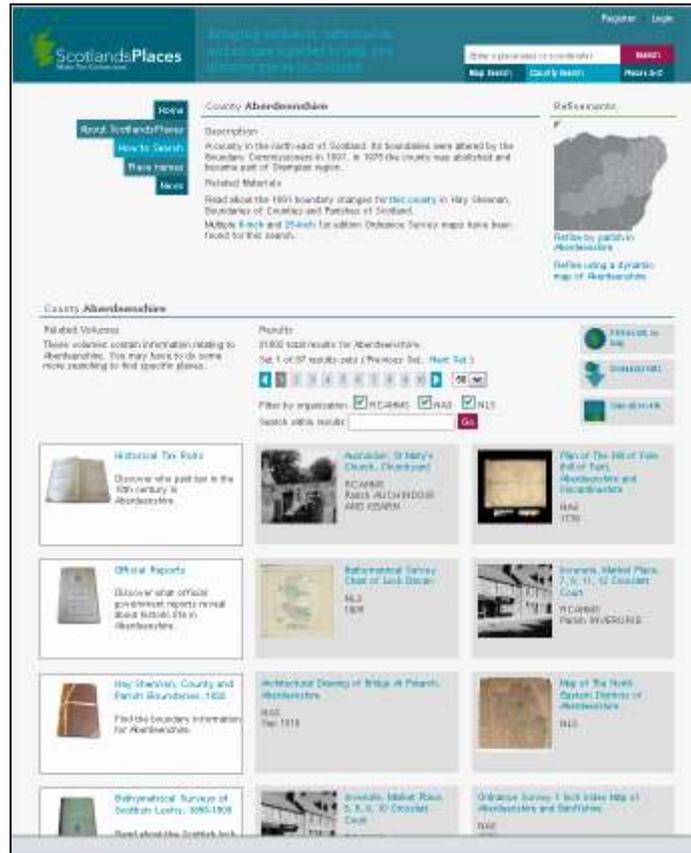


Figure 5: The first call of results for Aberdeenshire. The main results are ordered sequentially by the three organisations, and can be filtered to any particular organization. In the left column are the historical volumes relating to this area. Note the ability to plot the results geographically as a KML file (shown in Figure 8)

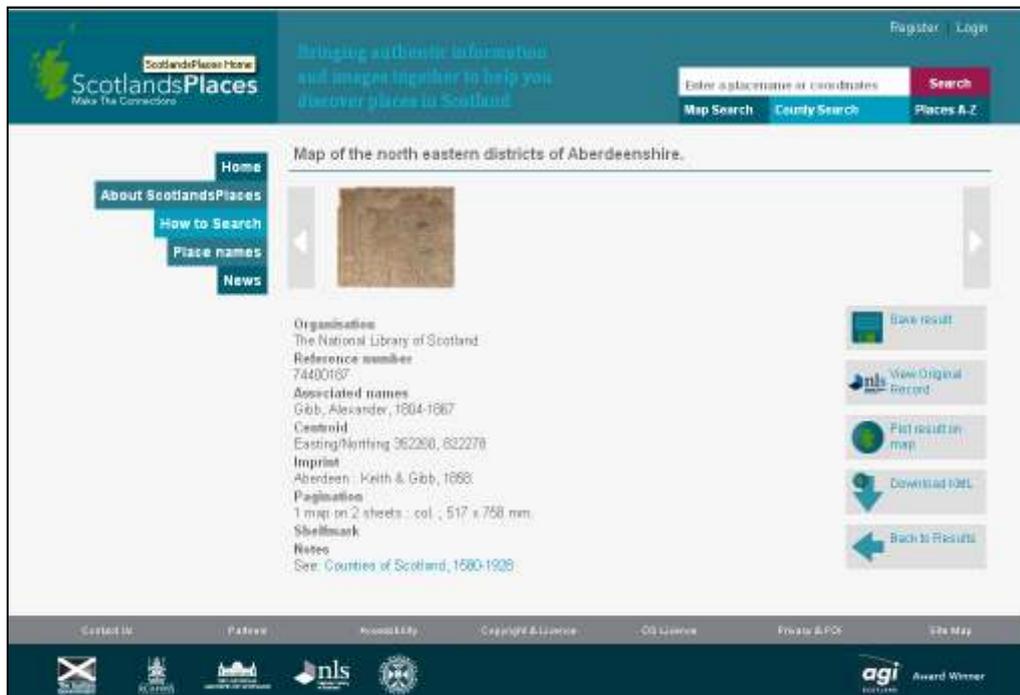


Figure 6: The second call selecting data for a particular map record.

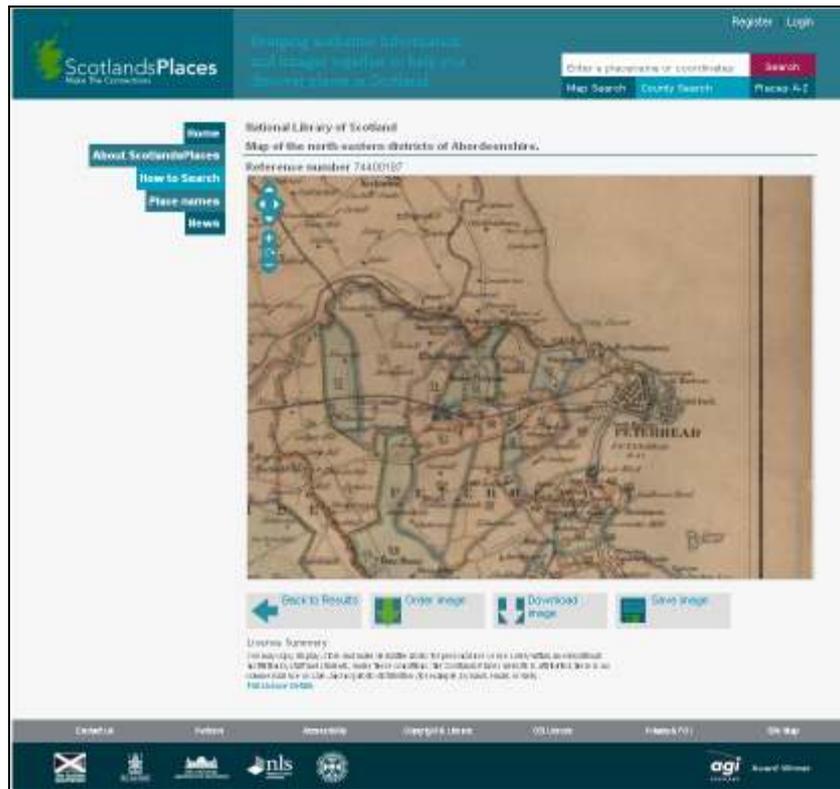


Figure 7: Zoomable version of the image within Openlayers, with the MrSID image pulled from the NLS server.

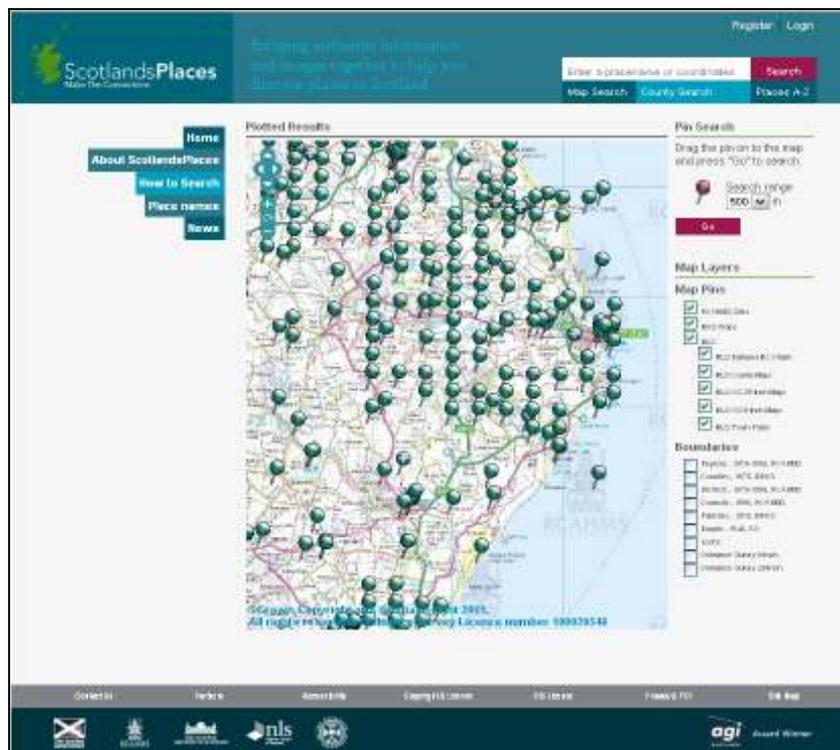


Figure 8: Plotting the results of searches as a KML file. Due to speed limitations in Internet Explorer, the website recommends the use of Firefox for this.

Usage of the *ScotlandsPlaces* website has continued to grow as its content has expanded, and the site has become better known. In the six-months from 1 June to 1 December 2010, the site recorded 409,348 visits, with 1,360,475 page views. 88% of traffic came from search engines.

### *ScotlandsPlaces back end search and retrieval processes*

*ScotlandsPlaces* uses database queries via web services to select all of the data relating to specific records, thereby simplifying the search process for the user. The various map, county and place name queries are translated into a standardised URL syntax, as illustrated below:

1. Typical county search for the county of Aberdeenshire:

[http://www.scotlandsplaces.gov.uk/search/index.php?action=do\\_search&p\\_type=COUNTY&p\\_name=Aberdeenshire&id=1](http://www.scotlandsplaces.gov.uk/search/index.php?action=do_search&p_type=COUNTY&p_name=Aberdeenshire&id=1)

2. Typical parish search for the parish of Alford:

[http://www.scotlandsplaces.gov.uk/search/?p\\_type=PARISH&action=do\\_search&p\\_name=alford&p\\_county=Aberdeenshire&id=517](http://www.scotlandsplaces.gov.uk/search/?p_type=PARISH&action=do_search&p_name=alford&p_county=Aberdeenshire&id=517)

3. Typical place name search for Aberargie (noting that as Aberargie is in Abernethy parish, the *ScotlandsPlaces* gazetteer also searches on parish of Abernethy to retrieve records indexed under Abernethy but not Aberargie):

[http://www.scotlandsplaces.gov.uk/search/index.php?action=do\\_search&id=1485&p\\_name=ABERARGIE&p\\_type=POPULATED\\_PLACE&p\\_parish1=Abernethy](http://www.scotlandsplaces.gov.uk/search/index.php?action=do_search&id=1485&p_name=ABERARGIE&p_type=POPULATED_PLACE&p_parish1=Abernethy)

4. Typical coordinate search based on British National Grid Eastings, Northings, and an extent of 500 metres:

[http://www.scotlandsplaces.gov.uk/search/index.php?action=do\\_search&p\\_type=coordinates&p\\_name=294216\\_757850&p\\_ngr\\_x=294216&p\\_ngr\\_y=757850&p\\_extentvalue=500&id\[\]=1125](http://www.scotlandsplaces.gov.uk/search/index.php?action=do_search&p_type=coordinates&p_name=294216_757850&p_ngr_x=294216&p_ngr_y=757850&p_extentvalue=500&id[]=1125)

Whilst these searches above relate to the main parish, county, and spatial coordinate fields, it is also possible to search on several other controlled vocabularies (eg. burghs, islands, cities, lochs, etc.) and free-text searches are also possible on title and name fields. URL queries from the *ScotlandsPlaces* server are handled by Adobe Coldfusion scripts on the NLS web server, querying an Access database, to return the resulting records in the required *ScotlandsPlaces* XML format. Records are also ranked, depending upon their match with the various search parameters, and whether they include an image or not: this ranking is then used for ordering their presentation in the *ScotlandsPlaces* website.

All NLS digital image metadata is organised around a standard unique, 8-digit ID for images, and these IDs are also used for MrSID zoomable images in Openlayers, the URLs to these, and for JPEG derivatives. This metadata therefore easily allows various sizes of JPEG thumbnail to be displayed in *ScotlandsPlaces*, and a 'View Original Record' link to the same item record on the NLS website. By simple categorisation of records, a Notes field also displays a link to the main NLS category of maps the item falls within (ie. *Notes, See: Ordnance Survey Maps 25 inch 1st edition, Scotland, 1855-1882*). Some relatively minor changes to Openlayers on *ScotlandsPlaces* were required for it to display the same zoomable image from NLS web server on the *ScotlandsPlaces* website.

### **Future developments**

A number of improvements and enhancements to the site are being actively developed for deployment during 2011. E-commerce functionality and a subscription service will be released, al-

lowing the partners to develop an income stream from the website. Whilst free searching and viewing of zoomable images will still be possible, the e-commerce package will allow online purchase of high-resolution images through WorldPay, whilst the subscription service will allow different levels of registered users to gain additional access to particular resources. The mobile application will not only allow access to the website from mobile phones, but also use GPS within phones to allow users to view ScotlandsPlaces KML plotted result locations within a certain range of their current location.

There is also ongoing work to improve on the internal gazetteer, by improving links to the *Gaelic Place-Names Society / Ainmean-Àite na h-Alba Place Name Database*

(<http://www.gaelicplacenames.org/Database.asp>) and the *Gazetteer for Scotland*

(<http://www.scottish-places.info/>).

Ongoing work of transcribing the Ordnance Survey Name Books (recording variant names of all named features in the 1840s-1880s topographic survey of Scotland) will also allow new names to be incorporated into the *ScotlandsPlaces* gazetteer. Institutional partners will also add more content to the site through ongoing digitisation programmes. The NAS is adding 100 new map images and records every month, and NLS is planning to add 7,000 Ordnance Survey six-inch to the mile map images from the 1890s to the 1940s during 2011.

### Conclusion

For NLS, *ScotlandsPlaces* allows ongoing improvements to the way in which sets of maps, and particularly series maps, can be made available to users. Through joining the project, NLS has taken advantage of better geographic search functionality, gazetteers, and presentation infrastructure offered by *ScotlandsPlaces* than on the NLS website. Although no new maps have been made available, the incorporation of these maps into *ScotlandsPlaces* has allowed significant improvements in access to them.

For institutions with map collections, *ScotlandsPlaces* allows further evolution and enhancements to the way in which series maps can be made available online. In the last decade, NLS has tried a range of methods for presenting series maps on the web, using textual lists, static clickable maps, dynamic zoomable maps, and various geo-referenced indexes (Fleet, 2006). One of the conclusions which still holds true, is that web-users are often best served by multiple access methods, and that all of these methods have some advantages over each other. Another conclusion is that dynamic, zoomable georeferenced indexes have a great potential, and are enjoyed by users, but these are often the most time-consuming and technically difficult of all the options. In the last five years, it is pleasing to record that this is far less the case: indexes as shapefiles have become more available, along with the technology to create and use them. *ScotlandsPlaces* takes advantage of this, and illustrates enhanced ways of delivering historical series maps, through a successful and ongoing collaborative project.

In summary, the main advantages of joining NLS maps into *ScotlandsPlaces* have been:

- Better range of search options for users – by map, county, place-name and keyword
- Improved search engine access to material by excellent spidering of search results pages
- Better search display methods for map records, especially series maps, which can also be dynamically displayed for subsets of records
- As a portal site, all historic maps owned by separate institutions can be searched for collectively in a one-stage process
- Distributed servers across institutions spread load and increasing resilience of the application

- Partners own and take responsibility for their own data and records, allowing for easy updating or correction of data

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