‘1830 England and Wales Navigable Waterways GIS shapefile documentation’
by Max Satchell

1830EngWalesNavWaterways.shp

ArcGIS shapefile of the navigable waterways of England and Wales in 1830. This shapefile derives from a time dynamic GIS and database of navigable waterways of England and Wales 1600-1948 which is so structured that it can generate a GIS of navigable waterways for any given year between these dates.[1]

A number of organisations and individuals contributed funding, time and expertise to make possible the time dynamic waterways GIS, and by implication this 1830 GIS snapshot, which derives from it. It is important to document their various contributions. The time dynamic GIS was built-up incrementally thanks to generous funding in the form of three grants awarded between 2008 and 2014. The first grant, which was awarded in 2008 by the ESRC to Leigh Shaw-Taylor and Tony Wrigley, included the production of four GIS snapshots of the extent of the navigable waterways of England and Wales c. 1820, 1851, 1861 and 1881.[2] In 2010 the second grant, which was awarded to Leigh Shaw-Taylor and Tony Wrigley by the Leverhulme Trust, included the linkage and upgrading of the four GIS snapshots GIS produced under the previous grant into a fully time-dynamic waterways GIS for the period 1600-1948.[3] In 2014 a third grant was awarded to Leigh Shaw-Taylor, Tony Wrigley and Dan Bogart from the Leverhulme Trust. This enabled the time dynamic GIS to be upgraded to make it suitable for the rigorous demands of network analysis, and in so doing some digitization and attribute inconsistencies in the previous version of the waterways GIS were identified and fixed.[4]

The individuals who did the work were as follows. First Owen Tucker, formerly of the Cartography Unit of the Department of Geography, under the direction of Max Satchell digitised the major navigable rivers from geo-rectified scans of the Ordnance Survey 1:10560 first edition (surveyed 1840-1890) supplied by Edina.[5] Next Zoe Crisp under the direction of Satchell produced a scratch digitisation of all the waterways shown on Richard Dean's *Inland Navigation. A Historical Waterways Map of England and Wales*.[6] The *c*.1:536,448 scale of Dean's map meant that in itself, it was not sufficiently detailed to produce a high standard GIS. It also had a substantial number of waterways with little or no information about them and a greater number that did not have

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[1] Satchell, M., Newton, G, and Shaw-Taylor, L., 'Navigable waterways of England and Wales Time Dynamic GIS 1600-1948' (2017). A description of the dataset can be found in Satchell M., ‘Navigable Waterways of England and Wales 1600-1948 time dynamic GIS shapefile documentation’ available at http://www.campop.geog.cam.ac.uk/research/projects/occupations/datasets/documentation/navigablewaterwaysofenglandandwales1600to1948dynamicgisdraftdatasetdocumentation.pdf

[2] ESRC, ‘The Occupational Structure of 19th Century Britain’: LCAG/080 RG43990

[3] Leverhulme Trust, ‘The Occupational Structure of England and Wales 1379-c.1729’: JJAG/078 RG51665

[4] Leverhulme Trust, ‘Transport, urbanisation and economic development in England c.1670-1911’: RPG-2013-093

[5] Edina is a centre for digital expertise and online service delivery based at the University of Edinburgh.

[6] R. Dean, *Inland Navigation. A Historical Waterways Map of England and Wales* (M. &M. Baldwin, Cleobury Mortimer, 1993).

sufficient date information needed to create the ESRC output. As a consequence, Satchell used the Dean digitisation only as a guide to locate candidate waterways for the snapshots on the Ordnance Survey first edition 1:10560 map series scans, and if other sources indicated the waterways in question were navigable any time between c.1820 and 1881, they were digitised directly from this map series in most instances. For the small number of waterways which had disappeared before their locality had been surveyed by the Ordnance Survey 1:10560 series, Satchell used earlier mapping, of which sheets 1-90 of the Ordnance Survey 1: 63,360 Old Series (surveyed 1789-c.1840) were the most important.

In terms of attribute data, emphasis was primarily on establishing as far as possible when each section of the waterway opened and when they either closed or ceased to be in commercial use. For the snapshots, the source for this exercise was the regional volumes by Charles Hadfield and his collaborators.[7] All the digitisation and attribute data for the snapshots were created by Satchell with the exception of the regional volume for the South-West and part of that for the South and South-east. These were done by Ellen Potter with supervision, checking and further editing by Satchell.

Under the second grant, the range of source material was substantively increased. In addition to Hadfield, extensive use was now made of other important works including T.S. Willan, *River Navigation in England 1600-1750* (1936), the *Royal Commission on Canals and Waterways*, BPP, 11 vols, (1906-1911) and H. de Salis, *Bradshaw's Canals and Navigable Rivers of England and Wales* (1904). Secondary studies of particular regions and individual waterways were also consulted where these were available. On the second grant in addition to date data, information was systematically collected on the type of waterway, and the types of vessel, which used it and whether this changed over time.

In line with producing a time dynamic waterways GIS, the treatment of dates for each section of waterways had to be consistent. In some instances, the opening, closing or commercial disuse date of a particular section of waterway could not be assigned to a single year but could only be represented by a range of years between two dates. For example, a canal that went out of commercial use sometime from 1906 to 1909 is represented by the range 1906, 1907, 1908, and 1909. These dating distinctions were also entered in the database with opening, closing and commercial disuse dates or date ranges for each section of waterway linked to the GIS polyline were entered in an excel table. In instances where a waterways was closed or went out of commercial use for at least a year and then reopened this was also recorded.

Gill Newton used this raw date data to create an Access database, which enabled the network of navigable waterways for any given year from 1600 to 1948 to be generated automatically and to be internally consistent i.e. the database output also flagged up pre-existing dating errors or anomalies in the raw data. These errors were then corrected by Satchell and the database was rerun with the corrected input. The date range problem was dealt with by the database having the capacity to generate two versions of the waterways GIS for any given year: optimistic and pessimistic.[8] The optimistic version interprets waterway sections, which have dating elements represented by a range of

[7] The *Canals of the British Isles* series by Charles Hadfield et al,, 11 volumes (1967-1985)

[8] Cambridge Group for the History of Population and Social Structure, Waterways1.mdb. The database has 14 diagnostic queries and 68 processing queries.

years with the most positive view of what that, range might mean. For example, a waterway is regarded as open from its earliest year in the date range and closed or commercially disused at the latest year in the date range. The pessimistic version interprets waterway elements, which have dating elements represented by a range of years with the most negative view of what each range, might mean. For example, the waterway is regarded as open from its latest year in the date range and closed or commercially disused at the earliest year in that date range. Finally, under the third grant Satchell and Edvard Alvarez made the GIS suitable for network analysis. The act of running extensive multimodal network queries between all cities and most towns in England and Wales also led to a number of hidden errors in digitisation and/ or the dating attributes of the dynamic waterways GIS to be identified and corrected.

The 1830 waterways GIS was generated from this the latest version of the GIS and database. As such, its dating structure derives from the optimistic version created by the database. Our thanks go out to the ESRC and the Leverhulme Trust for their generous funding and to the Landmark Group and Edina for supplying the geo-referenced scans of historic Ordnance Survey first edition 1;10560 mapping. The shapefile comprises the standard ArcGIS .shx, .shp, .sbx, .sbn, .prj and .dbf files. The dbf file is described below.

Attribute data

1830EngWalesNavWaterways.dbf

The dbf table contains the following fields.

Field	*Data type*	*Description*
FID	Object ID	Unique ID for each row in the table
Shape	Polyline	Polyline/s for each navigable waterway
ID	Long	Fixed unique identifier
Length	Double	Length of waterways polyline in miles
Name	Text	Name of waterway
Status	Text	River or canal

Co-ordinate system

British_National_Grid
Projection: Transverse_Mercator
False_Easting: 400000.000000
False_Northing: -100000.000000
Central_Meridian: -2.000000
Scale_Factor: 0.999601
Latitude_Of_Origin: 49.000000
Linear Unit: Meter

GCS_OSGB_1936
Datum: D_OSGB_1936

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should cite the data even if it does not appear as an image or map in your work if it has been used to generate findings or a new dataset that is used.

Citation

Satchell, M., Shaw-Taylor, L., Wrigley E.A., '1830 England and Wales navigable waterways shapefile' (2017). This dataset was created with generous funding from the ESRC (LCAG/080 RG43990) and the Leverhulme Trust (JJAG/078 RG51665; RPG-2013-093). A description of the dataset can be found in Satchell, M., '1830 England and Wales Waterways GIS shapefile documentation' (2017, 2010) available at: http://www.geog.cam.ac.uk/research/projects/occupations/datasets/documentation.html

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