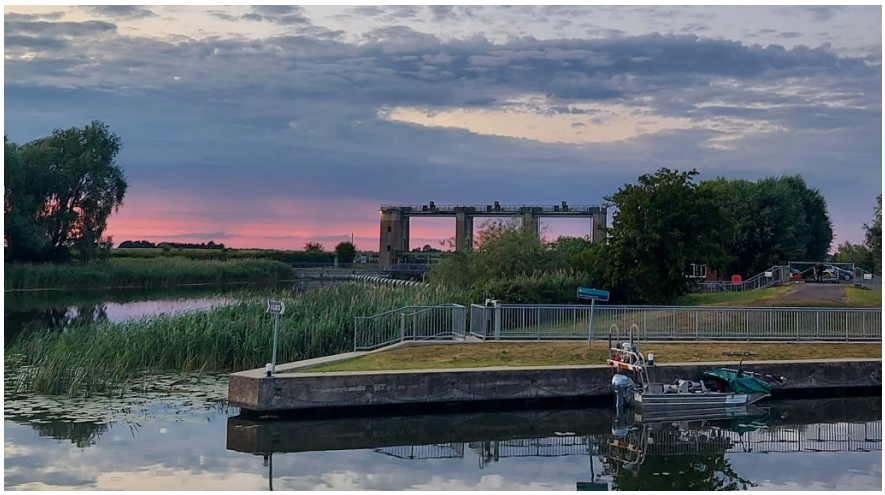
Hydroacoustic fish population survey

The Relief Channel: 25th - 27th June 2025

WARNING: Giant Hogweed *Heracleum mantegazzianum* has been observed on the banks of this fishery. Visiting anglers should make themselves aware of this plant and avoid it. The sap of Giant Hogweed can cause severe burns and photosensitive blistering with effects of exposure potentially lasting for several years. More information can be found on the GB Non native species secretariat website here.

This report provides a summary of results from our recent hydroacoustic fish population survey of the Relief Channel between Denver and Saddlebow. The survey was carried out to assess the health of the river and enable successful management of our principal fisheries.



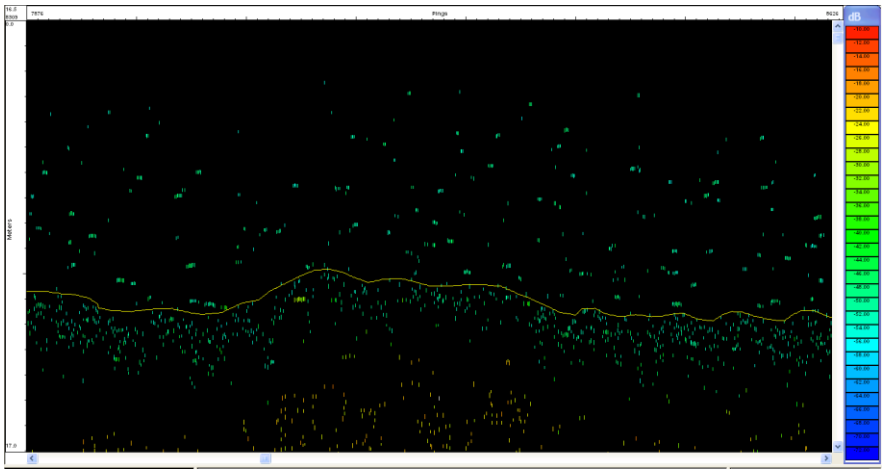


Image 1&2: The Reeve moored at Denver Lock & Fish echoes at Downham Market

The survey was undertaken using the small 'Reeve' acoustic boat, as our usual vessel was employed elsewhere for marine inspection work.

The survey was beset by equipment failure as the rotator unit that allows fine orientation of the acoustic beam in the water column, did not respond to input. This meant that the beam was essentially 'locked' in position and could not be adjusted to account for macrophyte growth or changes in weight distribution on the survey boat, for example when drivers swap roles.

The 'locked' rotator meant that sample range was generally around 12-15 meters; acceptable, but a significantly lower range than is usually attained on this channel, and as a result the total sample volume was less than half of that which was assessed during our most recent comparable survey (2023). Macrophyte growth proved to be a considerable issue in the upper watercourse between Denver Sluice and Downham Market and, although numerous fish were apparent within this area, the data collected had to be excluded from our results as both survey range and sample volumes were insufficient to allow confidence in any population estimate derived from within this area.

Summary

- The Relief Channel was surveyed on the 25th-27th June 2025 using hydroacoustic sampling methodology. Two passes were conducted along the channel. The upper channel between Denver and Downham Market was not sampled due to extensive macrophyte growth.
- The downstream pass recorded fish densities ranging between 1.1 and 112.5 Ind./1000m^3 with an average population estimate of 22.3 Ind./1000m^3. The upstream pass recorded a minimum of 1.2 and a maximum of 127.8 Ind./1000m^3 with an average density estimate of 16.1 Ind./1000m^3.
- The 2025 density estimate of 19.2 Ind./1000m^3 lies a little below the long-term density value of 24.8 Ind./1000m^3 (derived from surveys between 2010 and 2024), continuing declining trend observed following the last 'peak' identified in 2023. It should be noted that the upstream run did not effectively sample the high-density reach around Downham Market and is therefore likely an underrepresentation of overall stock present.

Survey technique

- Our hydroacoustic survey technique utilises sound waves (pings) that are fired across the river channel at a rate of 10 'pings' per second. These 'pings' are reflected to the transducer from objects within the 4m x 10m elliptical beam.
- When struck by the acoustic beam, solid items such as the far bank, bridge supports, and riverbed reflect extremely strong returns; echoes from fish give a moderate return and surface scatter reflect a much weaker echo (See **Image 3** below).
- The survey boat travels at 6 km/Hr along the edge of the marginal shelf. Positioning the boat in this way helps avoid submerged macrophyte growth which may otherwise become wrapped around the sounder unit obscuring the acoustic beam or, at the very least, reduce sample range.
- Hydroacoustic surveys are conducted at night since fish are distributed more evenly throughout the water column during darkness and this allows them to be easily distinguished from reflected 'noise' eg from the channel substrate.
- After the survey is complete the data is post-processed, and output is provided as a fish density estimate expressed as individuals per 1000m^3 (Ind./1000m^3) and can also be displayed as density groupings via map format and these are provided at the end of this report as **Maps 1, 2 & 3**.

Image 3: Simplified image of the hydro acoustic survey technique.

1. Open water and clearly visible fish echoes.
2. Limit of the 'usable' data surface scatter (light blue) and echoes from rooted plants (light green).
3. Heavy (red and brown) echoes from marginal slope and riverbank.

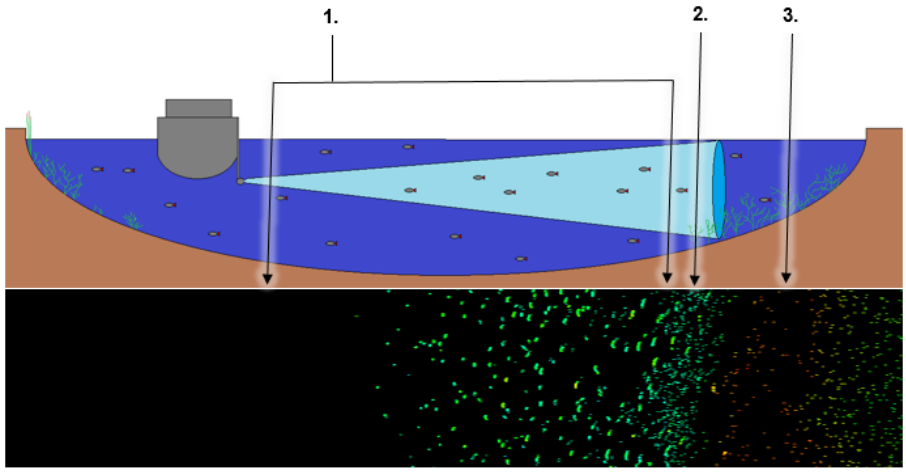


Image 4: The Reeve showing twin bow acoustic mounts

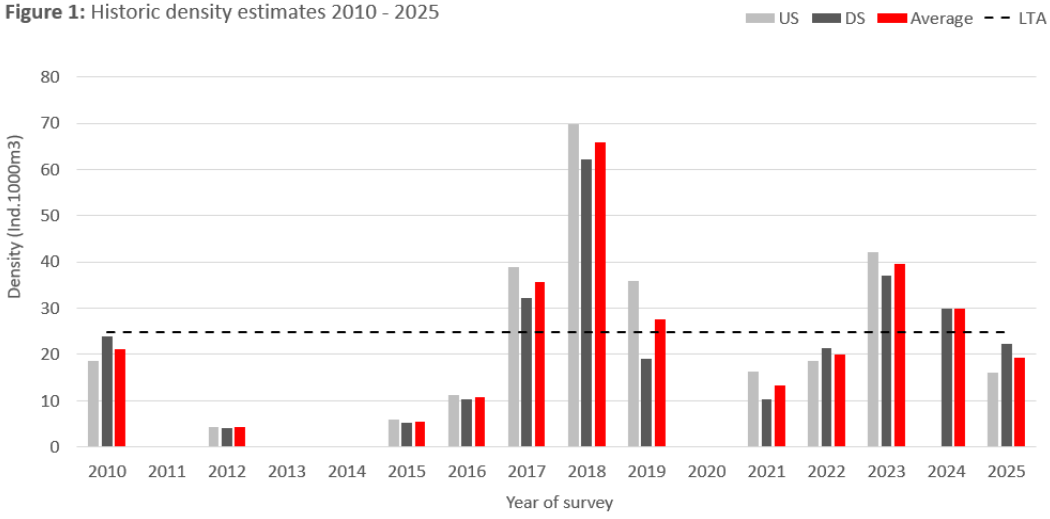
Results

The Relief Channel was surveyed on the 25-27th June 2025 using hydroacoustic sampling techniques. Two passes were conducted along the channel length, although dense weed growth between Denver and Downham Market meant that this area could not be sampled effectively.

Our downstream pass was conducted on the night of the 25th/26th. The calm, muggy conditions with little illumination from the new moon meant that conditions were close to perfect, although prolonged dry weather preceding the survey meant that there was little flow available to align the fish within the water column. This transect recorded fish densities that ranged between 1.1 and 112.5 Ind./1000m^3 with an average population estimate of 22.3 Ind./1000m^3. Our Humminbird side scan unit confirmed the presence of large numbers of fish between Denver and Downham Market (**Image 5**) and allowed identification of the 'noise' within this area, i.e. the macrophyte growth. A stiff breeze and rain made survey conditions on the upstream pass more challenging on the open boat, however; similar minimum and maximum returns were recorded with values of 1.2 and 127.8 Ind./1000m^3 respectively, although the average density estimate from this run (16.1 Ind./1000m^3) was around a quarter lower than the previous night's result.

The overall 2025 population estimate of 19.2 Ind./1000m^3 (an average derived from both runs output) lies a little below the long-term value of 24.8 Ind./1000m^3 (from surveys between 2010 and 2024) and this seems to continue the decline observed following the population 'peak' in 2023.

Figure 1: Historic density estimates 2010 - 2025



It should, however, be noted that the upstream survey was not able to effectively sample the high density reaches around Downham Market, and because of this, the mean population estimate from this transect was some 6 Ind. lower than indicated by the downstream sampling. If we only examine data from reaches sampled efficiently on each pass, then this produces density estimates of 16.8 and 15.1 for the downstream and upstream runs. Given the close affinity of these results it is

perhaps reasonable to suggest that, had all data from the upstream run been suitable for analysis and inclusion, then upstream sampling would have provided a similarly density to the downstream result and the overall population estimate would have been more closely comparable to the long-term average for this channel.

Stock Distribution

Figure 2: Fish density (Ind./1000m3) between key locations on the Relief Channel (Hashed column denotes partial data)

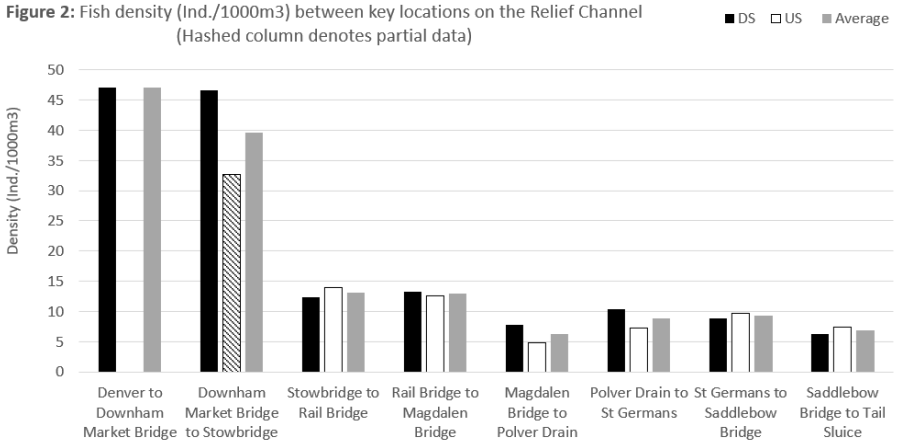
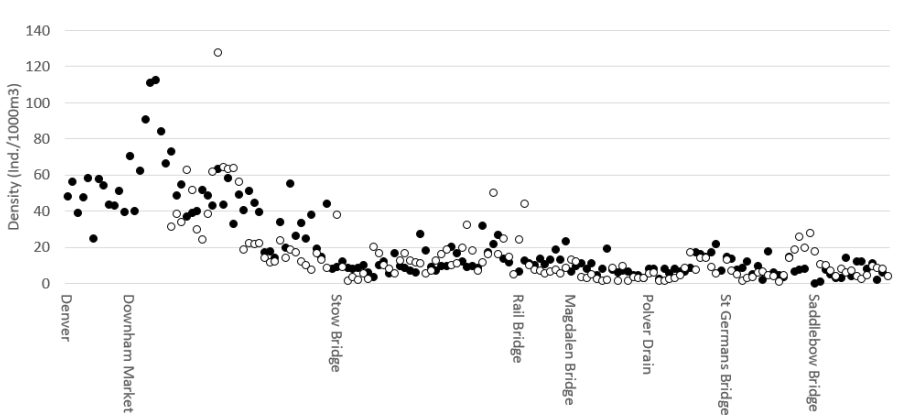


Figure 2 shows average population density within key reaches. These sections are not defined by comparable lengths, or volume of the area sampled, but are subdivided and using local features that are well-known to the local angling community who will hopefully find this information of some value. The density figures clearly show stock distribution skewed towards the upper channel and demonstrates that this area is likely to offer the best 'general' fishing opportunities (at the time of writing).

Figure 3 displays density estimates per 100 meters of channel-length sampled and plots data from both upstream and downstream passes to allow comparison of stock distribution between runs. As can be seen, both upstream and downstream passes showed a close correlation in the distribution of stock, the highest population densities consistently recorded between Denver Sluice and Downham Market and subsequently declining steadily (in both runs) between Downham Market and Stow.

Figure 3: Stock distribution recorded on upstream and downstream transects (Ind./1000m3)



It will perhaps be no surprise to anyone from the local angling community that elevated fish density was observed throughout the 'Golden Mile', a well-known hotspot near to the disused rail bridge at Wiggenhall St Mary Magdalen, and maximum density exceed 40 Ind./1000m^3. Other areas of note were situated immediately upstream of St Germans and Saddlebow Bridges, and in both instances maximum density was seen to exceed 20 Ind./1000m^3.

The distribution of stock observed during 2025 was quite dissimilar to that recorded in the preceding 2023 and 2024 sampling, when fish seemed to favour the lower and middle reaches of the watercourse respectively.

Conclusions

The 2025 survey suggests a reduction in population density, continuing the declining trend observed in 2024, however this should not be of particular concern as coarse fish populations often show a cyclic pattern of population growth and loss and it is tempting to suggest that this can be seen within the long-term hydro acoustic data-set, with two periods of steady population growth, and subsequent loss, apparent between 2015 and 2025 (See Figure 1).

It should also be remembered that the population estimate from the upstream run is likely a underestimation of stock present and, as such, the mean density estimate for 2025 is perhaps a little low. During the survey, fisheries staff were pleased to see large numbers of juvenile fish present, these were particularly notable around Denver Sluice and Downham Market bridge, the team also regularly observed mature Roach and Rudd within the marginal areas at multiple locations along the channel.

The Relief Channel will be capable of providing good sport to the visiting angler, although location will be key to enjoying the best that the channel can offer, particularly when targeting the large bream and predatory species present. Those visitors hoping for a good pleasure angling session could do a lot worse than trying some of the locations detailed in this brief report.

Justin Mould
Analysis and Reporting
15/08/2023

The Relief Channel will be sampled by hydro acoustic and seine netting techniques in 2026

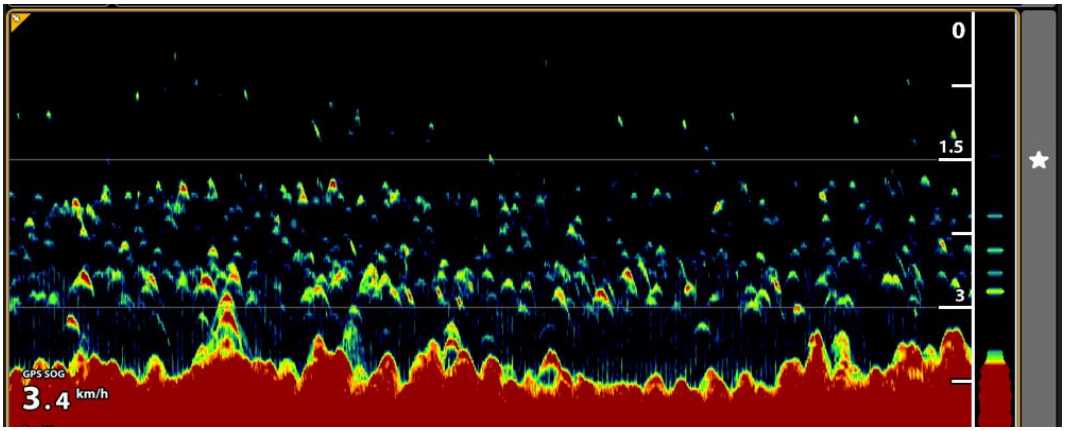


Image 5: Fish echoes observed using a commercial Humminbird acoustic unit.


Map 1: Relief Channel fish density plots (Ind./1000m3)
25th -27th June 2025
Legend
Density (Ind./1000m3)
0 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
>80
No Data
N
Willow Lodge
Crabb's Abbey Cottages
South Farm
Silver Fir Wood
Herons' Plantation
Wardens Lodge
Brick Kiln Plantations
Stow Bridge
Low Road
West Head Road
Stow Corner Farm
Willoween
Honeysuckle Cottage
Fern Cottage
Willow Farm
Stow
Slubberdike Wood
Dudley Farm
Hill Farm
Ward's Chase
Common Lode Farm
Round House
Cuckoo Road
West Way
Miller's Lane
Lynn Road
Wimbotsham
Thistlehill Barn
Bardolph Farm
Kingston's Plantation
Upper Farm
Dolvers Farm
Broomhill
Wimbotsham Road
Glebe Road
The Plains
Hillcrest
Redgate House
Downham Market
Bexwell Road
Tile Farm
Downham Market Farm
Rouse's Lane
Trafalgar Road
Downham Market Fen
Slate Farm
White Gate Farm
Kilometers
0
0.5
1
2
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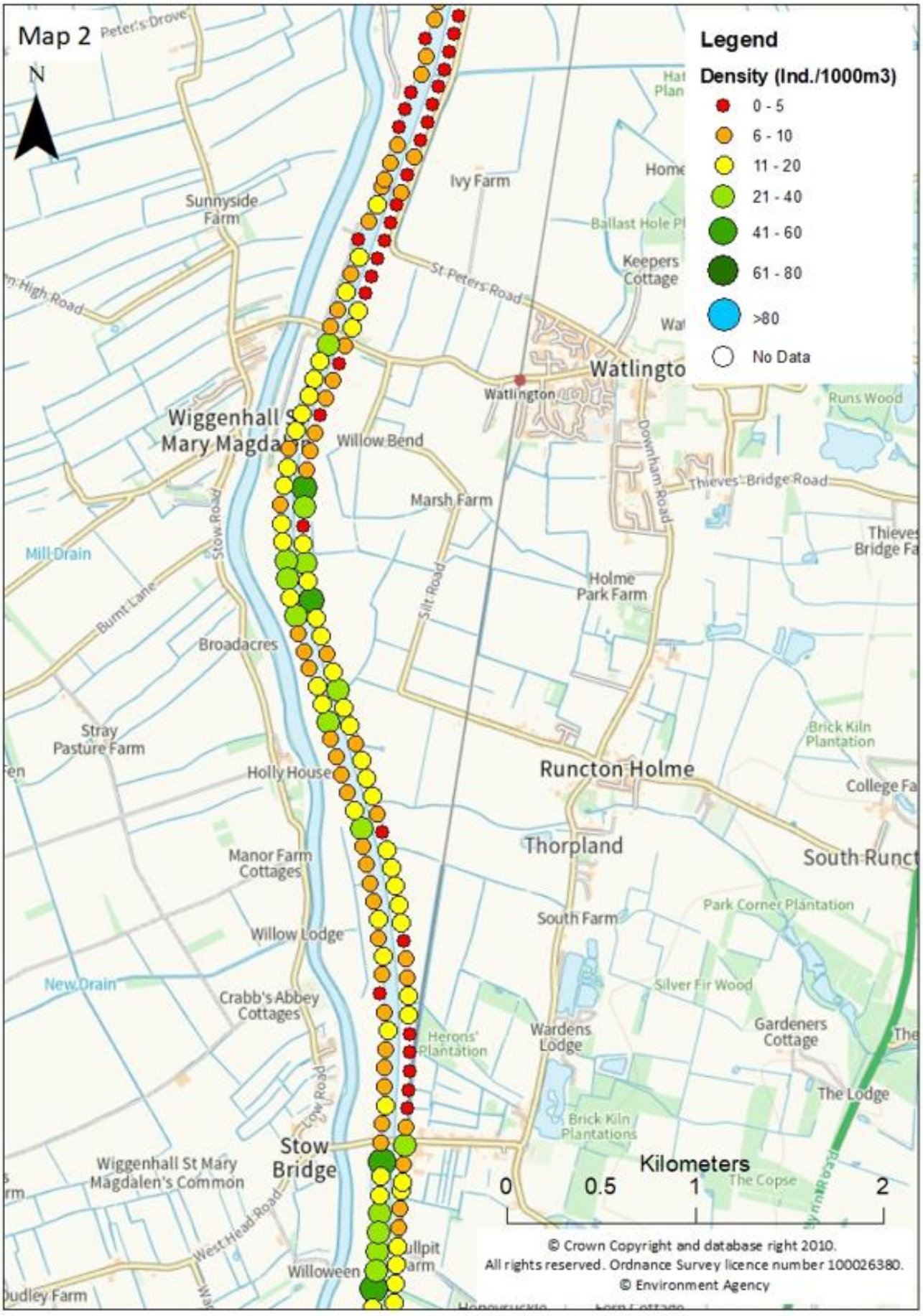
Map 2
N
Legend
Density (Ind./1000m3)
0 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
>80
No Data
Peter's Drove
Sunnyside Farm
Ivy Farm
Ballast Hole
Keepers Cottage
St Peters Road
High Road
Watlington
Runs Wood
Wiggenhall St Mary Magdalen
Willow Bend
Marsh Farm
Thieves Bridge Road
Downham Road
Mill Drain
Stow Road
Burnt Lane
Silt Road
Holme Park Farm
Broadacres
Stray Pasture Farm
Holly House
Brick Kiln Plantation
Runcton Holme
College Farm
Thorpland
South Runcton
Manor Farm Cottages
Park Corner Plantation
South Farm
Willow Lodge
New Drain
Silver Fir Wood
Crabb's Abbey Cottages
Herons' Plantation
Wardens Lodge
Gardeners Cottage
The Lodge
Low Road
Brick Kiln Plantations
Stow Bridge
Wiggenhall St Mary Magdalen's Common
The Copse
West Head Road
Willoween
Dudley Farm
Kilometers
0
0.5
1
2
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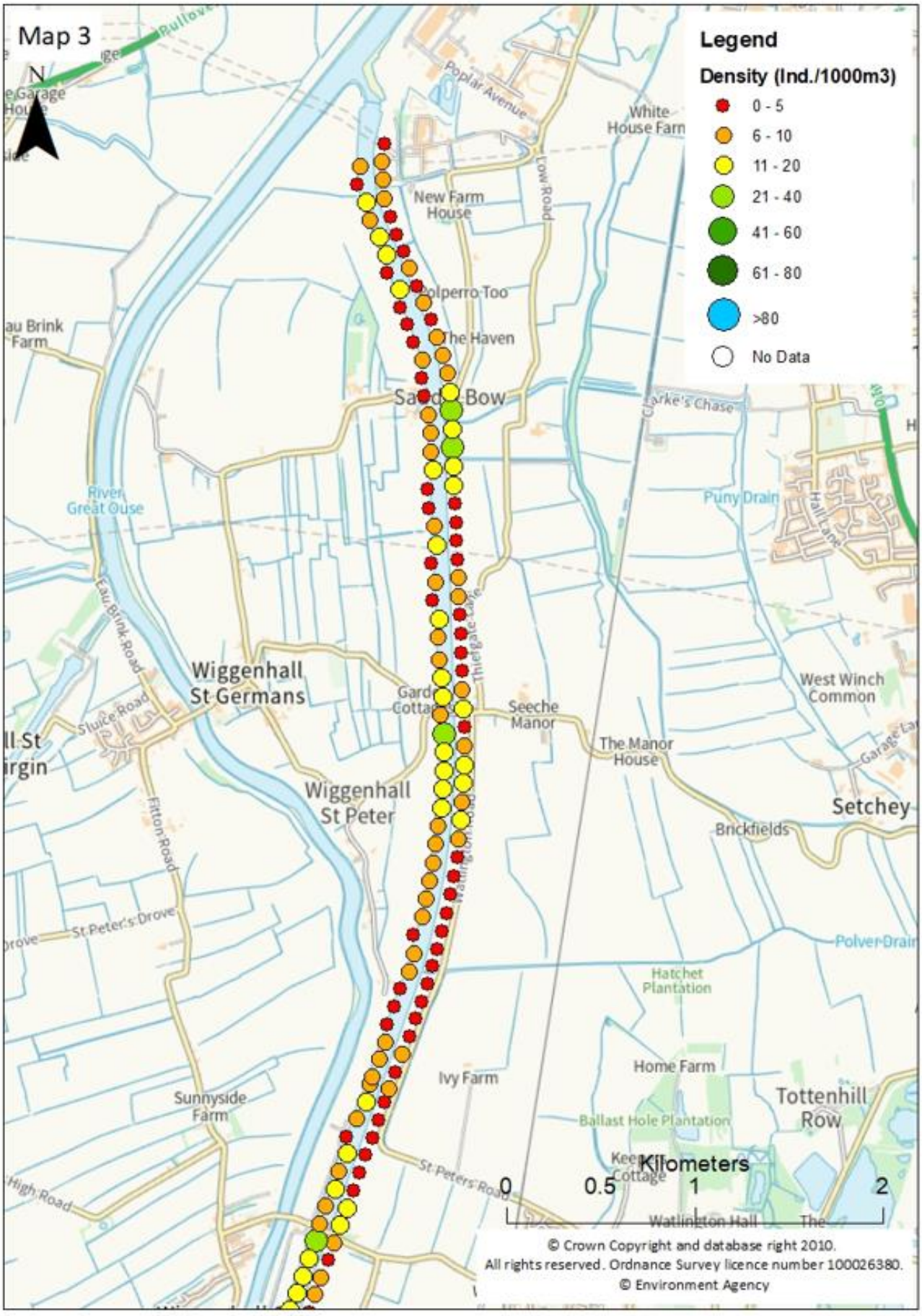
Map 3
N
Legend
Density (Ind./1000m3)
0 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
>80
No Data
Poplar Avenue
White House Farm
New Farm House
Low Road
Colperro Too
The Haven
Clarke's Chase
River Great Ouse
Puny Drain
Hall Lane
Eau Brink Road
Wiggenhall St Germans
Sluice Road
Thieftaker Lane
West Winch Common
Seeche Manor
The Manor House
Wiggenhall St Peter
Setchey
Brickfields
Fitton Road
St Peter's Drove
Polver Drain
Hatchet Plantation
Home Farm
Ivy Farm
Sunnyside Farm
Tottenhill Row
Ballast Hole Plantation
St Peters Road
High Road
Watlington Hall
Kilometers
0
0.5
1
2
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