

Hydro acoustic fish population survey

The Ely Ouse

May 2021

This report provides a summary of results from our recent hydro acoustic fish population survey conducted on the Ely Ouse between Popes Corner and Denver. The survey was carried out to assess the health of the river and enable management of our principal fisheries.

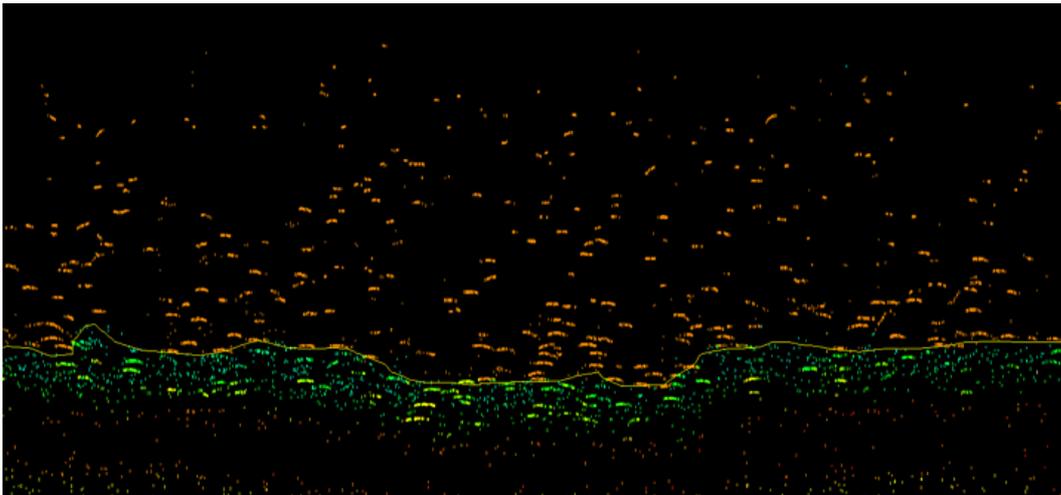


Image 1: Fish echoes observed on the Ely Ouse near Ten Mile Bank.

Summary

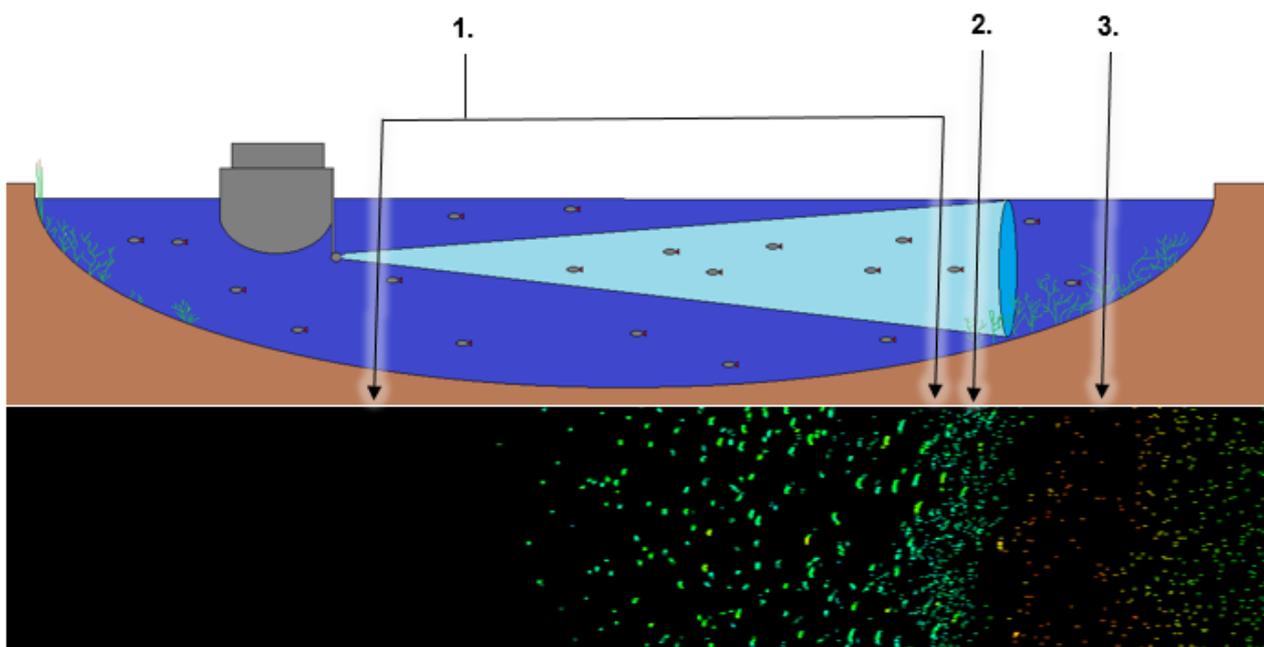
- The Ely Ouse was surveyed over three nights between the 11th and 13th of May 2021.
- A total of 60km of channel was sampled with the river broken up into three reaches.
 1. Popes Corner to Branch Bridge
 2. Branch Bridge to Southery Fen
 3. Southery Fen to Denver
- Each reach was sampled in an upstream and downstream direction, sampling the right hand bank and left hand bank respectively. Both transects of each reach would be completed on the same night to minimise the influence of stock movement on the results.
- The average fish density derived from the upstream and downstream runs equate to 36 fish per 1000m³ and 40 Ind./1000m³ respectively, giving an overall population estimate of 38 Ind./1000m³.
- The 2021 result sits a little above the long term average from this river (35 Ind./ 1000m³).

Survey technique

- The hydro-acoustic survey technique utilises sound waves (pings) which are fired across the river channel and are reflected back to the transducer from objects within the 4m x 10m elliptical beam. Depending on the strength of the returning echo the nature of the reflective object can be determined, solid items such as the far bank, bridge supports and river bed give extremely strong returns; echoes from fish, or more accurately from fish swim bladders, give a moderate return while surface scatter gives a much weaker echo (See **Image 2**). Reflected echoes are recorded and analysed by an on-board laptop computer.
- The pulses of sound are transmitted across the river width at 10 pings per second, from a boat-mounted transducer unit situated well forward on the craft to prevent any background 'noise' from interfering with the acoustic signal. The craft is piloted at approximately 6 km/h, working just off the edge of the marginal shelf to avoid submerged macrophyte growth from wrapping around the sounder unit.
- The surveys are conducted at night since fish are distributed more evenly throughout the water column during the hours of darkness and this allows them to be easily distinguished from substrate, macrophyte growth and bank-side 'clutter'. It is also important to avoid periods of boat traffic as the residual propeller wash can greatly reduce the range of the survey apparatus by filling the water column with air bubbles that reflect echoes and obscure the sonar image. This issue was largely avoided in 2021 with one notable exception, at Branch Bridge, which is detailed later in this report.
- Our hydro acoustic surveys are scheduled by lunar cycle to coincide with a new moon and we aim to conduct the annual Ely Ouse survey under the new moon that falls closest to the start of the coarse angling season. This timing provides a minimum of moon illumination (which may perhaps influence fish distribution within the water column) whilst also providing sufficient time for the data to be analysed for the start of the coarse angling season when distribution data will likely be of interest to anglers.
- After the survey is completed the raw echograms (see image 2) are post-processed and interpreted with output provided as fish density (fish/1000m³) and also displayed as density groupings in map format.

Image 2: A simplified image of the hydro acoustic survey technique and raw echogram output (below).

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 river bank.



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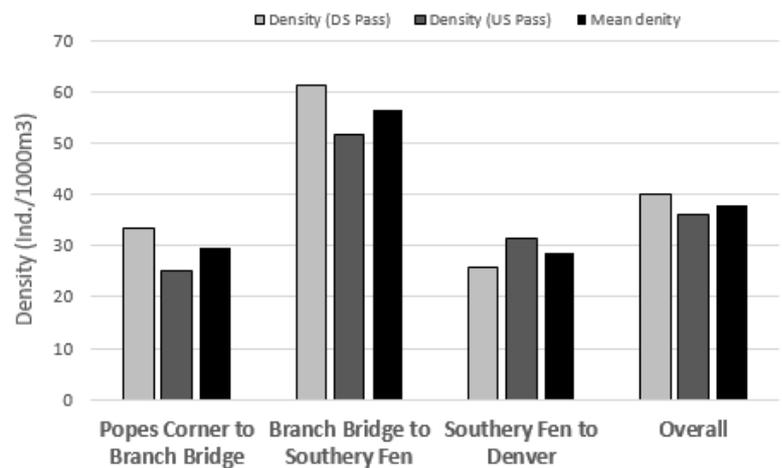
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Results:

Fish population density derived from each reach is exhibited as **Figure 1** and **Table 1** (below). There is close comparison between mean density estimates in reaches one and three however the middle section has considerably higher densities in both upstream and downstream transects. Examination of figures 2 and 2a and maps 1-4 show that the increased density in this middle reach is principally due to the large number of fish recorded around the A10 Road Bridge at Littleport. The highest fish density of 2021 was observed within Ely Town Centre, a known hot-spot, and notable aggregations of fish were also recorded around Coopers Field Ely, Roswell Pits, Ten Mile Bank and the Lark and Wissey Outfalls. On both runs population density was seen to decline downstream of Queen Adelaide Bridge before increasing once more around the Lark outfall at Branch Bridge.

Figure 1: Fish density by survey reach and transect direction 2021



It should be noted that on the downstream pass there was a GPS failure on reach 3 which led to about two kilometres of river being un-sampled whilst data from immediately below the rail bridge near the Wissey Outfall was very noisy and unusable. Thankfully the data from the upstream pass was acceptable for analysis.

Table 1: Fish density (Ind./1000m3) by survey reach and transect direction 2021

River reach	Density (DS Pass)	Density (US Pass)	Mean density
1. Popes Corner to Branch Bridge	33.6	25.3	29.5
2. Branch Bridge to Southery Fen	61.4	51.7	56.5
3. Southery Fen to Denver	25.8	31.5	28.6
Overall	40.2	36	38.1

Stock distribution is expressed overleaf as Figures 2 and 2a and displays density for each 100m length of channel between Popes Corner and Denver. While some outliers are expected (and inevitable) it is immediately apparent that there is close correlation in the distribution of stock observed on the upstream and downstream transects. This is not always the case and we have, on occasion, noted fish distribution that is strongly biased towards one bank, with no obvious reason why.

One notable area sampled during 2021 where results *are* quite different between the two survey transects is in the area immediately downstream of Branch Bridge where moderate fish densities are observed on the upstream run but considerably lower were recorded on the downstream pass. This discrepancy was not due to fish distribution but was instead due to a large boat which passed rather rapidly through the area just as the survey was about to begin. Our survey was delayed to allow some clearing of the water column to occur, however the data collected was sub-optimal as the transducer needed to be angled downwards to look under the residual disturbance and this came at the cost of reduced beam range. Unfortunately we could not afford a longer wait to allow the acoustic image to clear fully as further delay should mean the survey would continue into the early morning when increasing light levels would influence fish distribution and further skew the data collected.

As the technique logs the position of the survey vessel rather than the area of the channel where the 'pings' are being directed the data points on maps 1-4 have been manually offset (where possible) to better reflect stock distribution and avoid data from the left hand bank being plotted on the right hand side, and vice versa.

Figure 2: Upstream Pass: fish density estimates (Ind./1000m²) from the Ely Ouse 2021

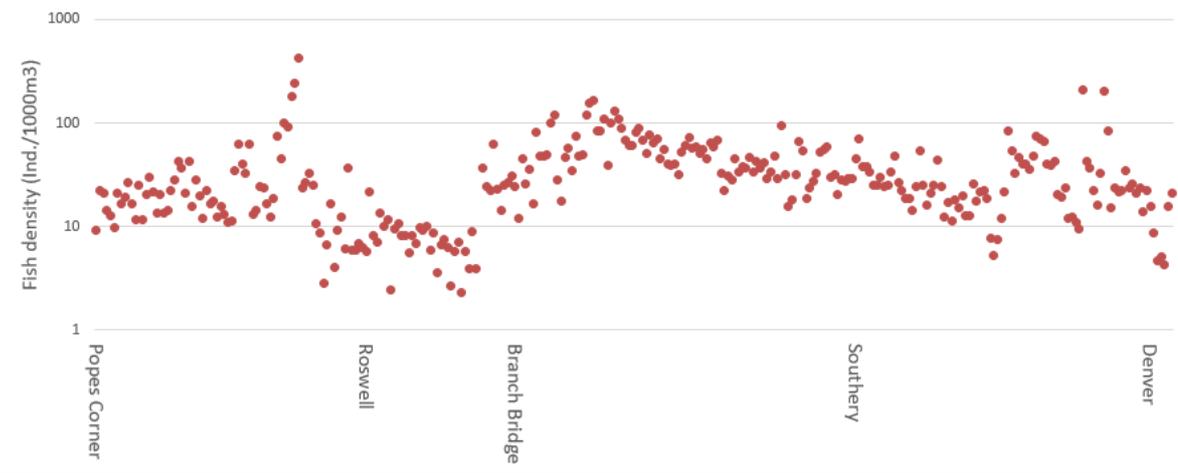
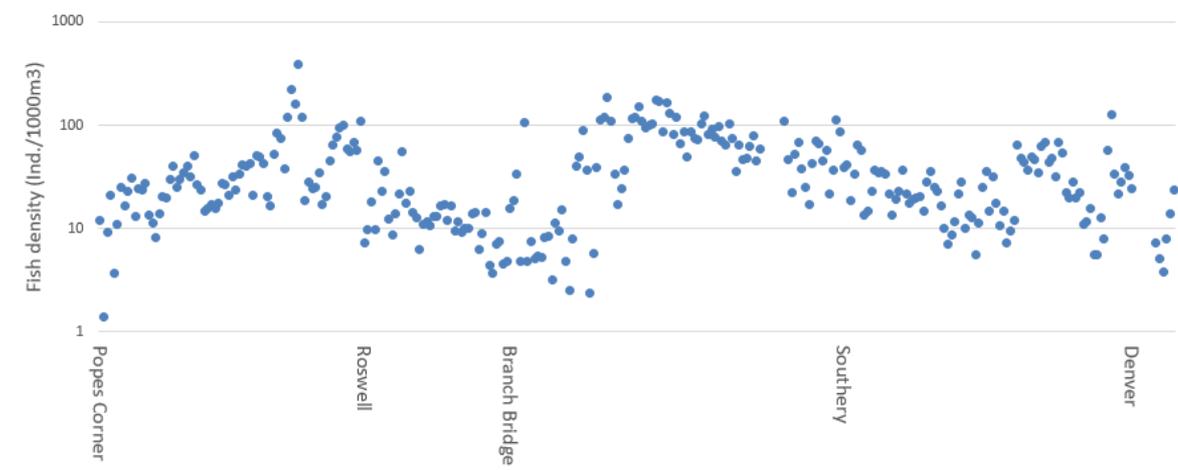


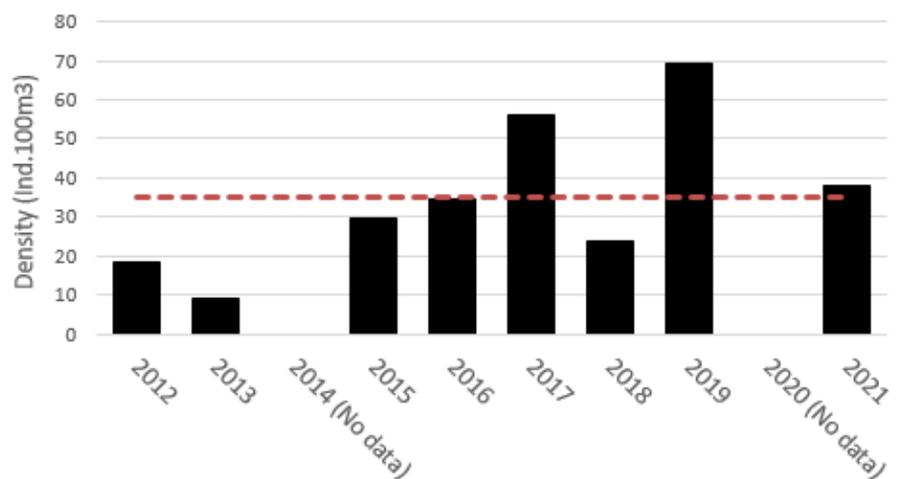
Figure 2a: Downstream Pass: fish density estimates (Ind./1000m²) from the Ely Ouse 2021



Long term density:

The overall density estimate derived from the 2021 survey is around 45% lower than determined in 2019. Unfortunately Covid restrictions meant that no survey occurred in 2020 and therefore we do not know whether the current population estimate is due to a gradual reduction in stock or a short term change such as seen in 2018. It is feasible that the unusually cold spring has influenced fish distribution within the Ely Ouse, its connected tributaries and off-river habitat.

Figure 3: Long term fish density derived from hydro-acoustic survey on the Ely Ouse 2007-2021



The recent population density estimate of 38 Ind./1000m³ remains above average when compared to the previous seven surveys and it is expected that the Ely Ouse should continue to offer good sport to the angling community.

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Environment Agency East Anglia (West)
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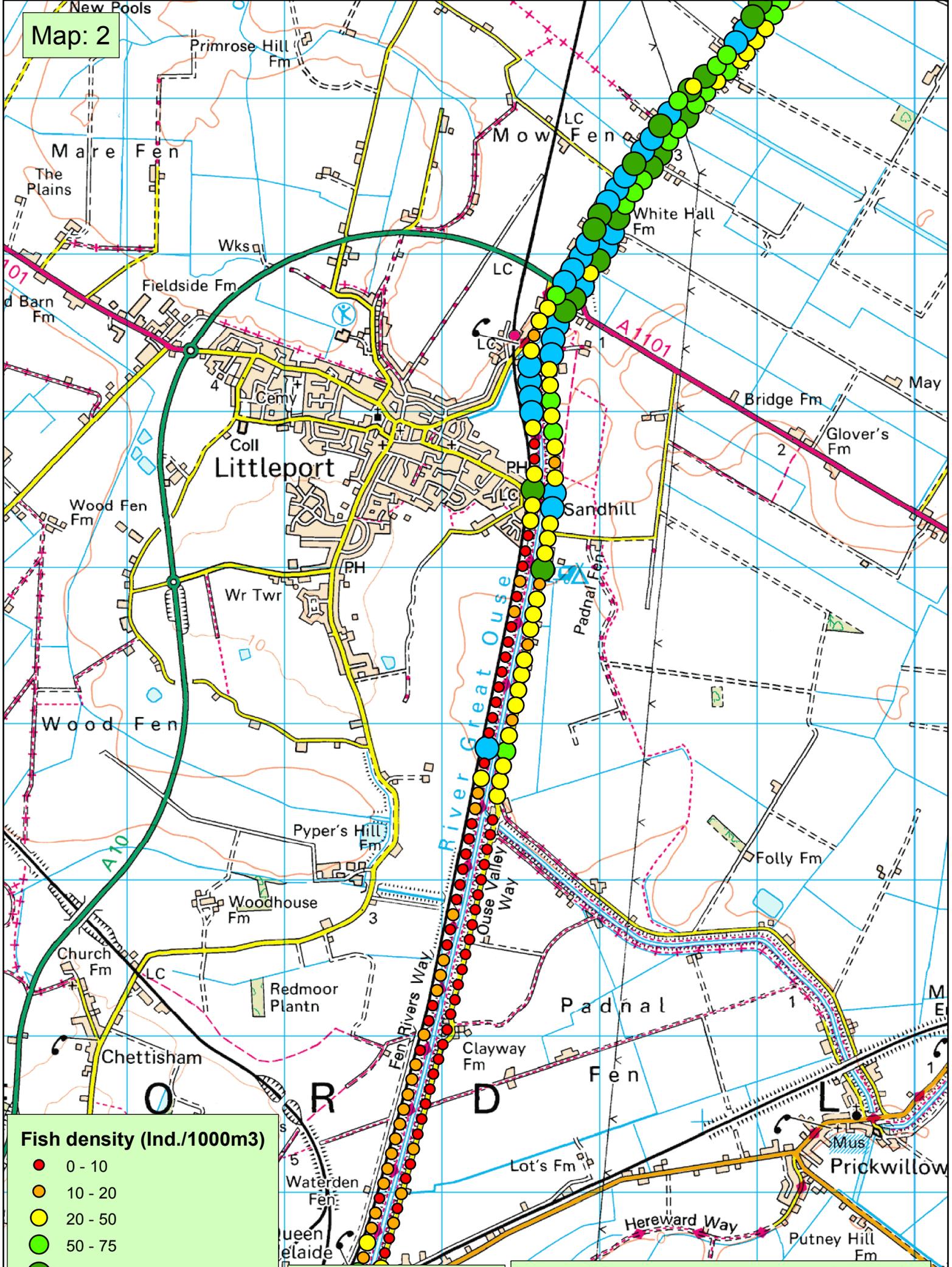
Fish density (Ind./1000m³)

- 0 - 10
- 10 - 20
- 20 - 50
- 50 - 75
- 75 - 100
- >100

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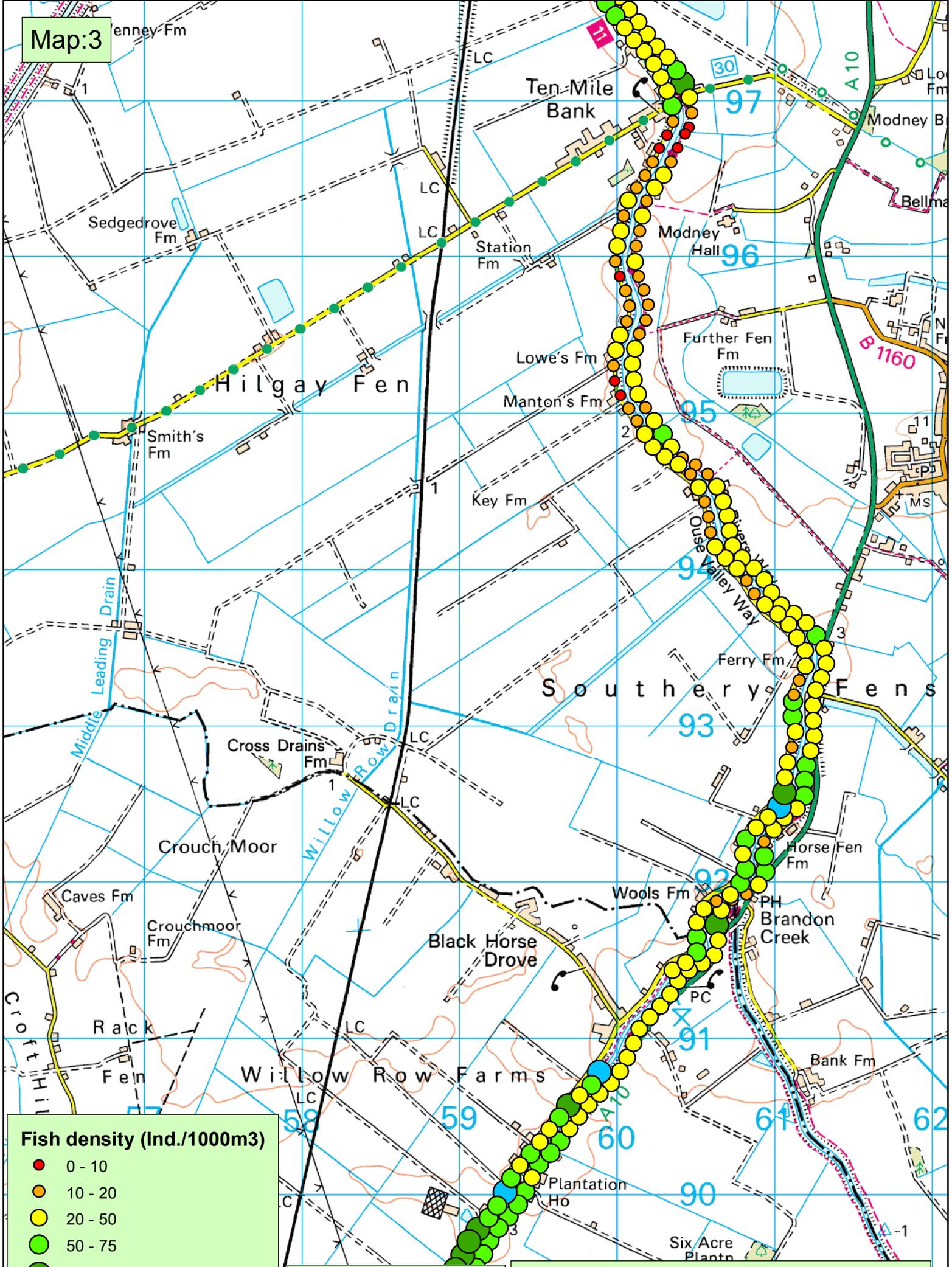
Fish density (Ind./1000m³)

- 0 - 10
- 10 - 20
- 20 - 50
- 50 - 75
- 75 - 100
- >100

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Map:3



Fish density (Ind./1000m3)

- 0 - 10
- 10 - 20
- 20 - 50
- 50 - 75
- 75 - 100
- >100

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0 0.5 1 2 Kilometers

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