



**Canal &
River Trust**

Making life better by water




How resilient are canal fisheries to invasive species: a consideration of the ecological, legal, financial and practical aspects with special reference to the Zander, an introduced piscivorous fish

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- The Canal & River Trust
- The 'function' of canal fisheries (to balance ecological, sporting, wellbeing, statutory duty to provide fishing on cruising waterways)
- Invasive species and threats to canal fisheries and Sites of Special Scientific Interest
- Case Study: Zander



Fishing on canals is important to anglers because it's easily accessible, there's plenty of fish to be caught and it doesn't cost too much!



Canal & River Trust

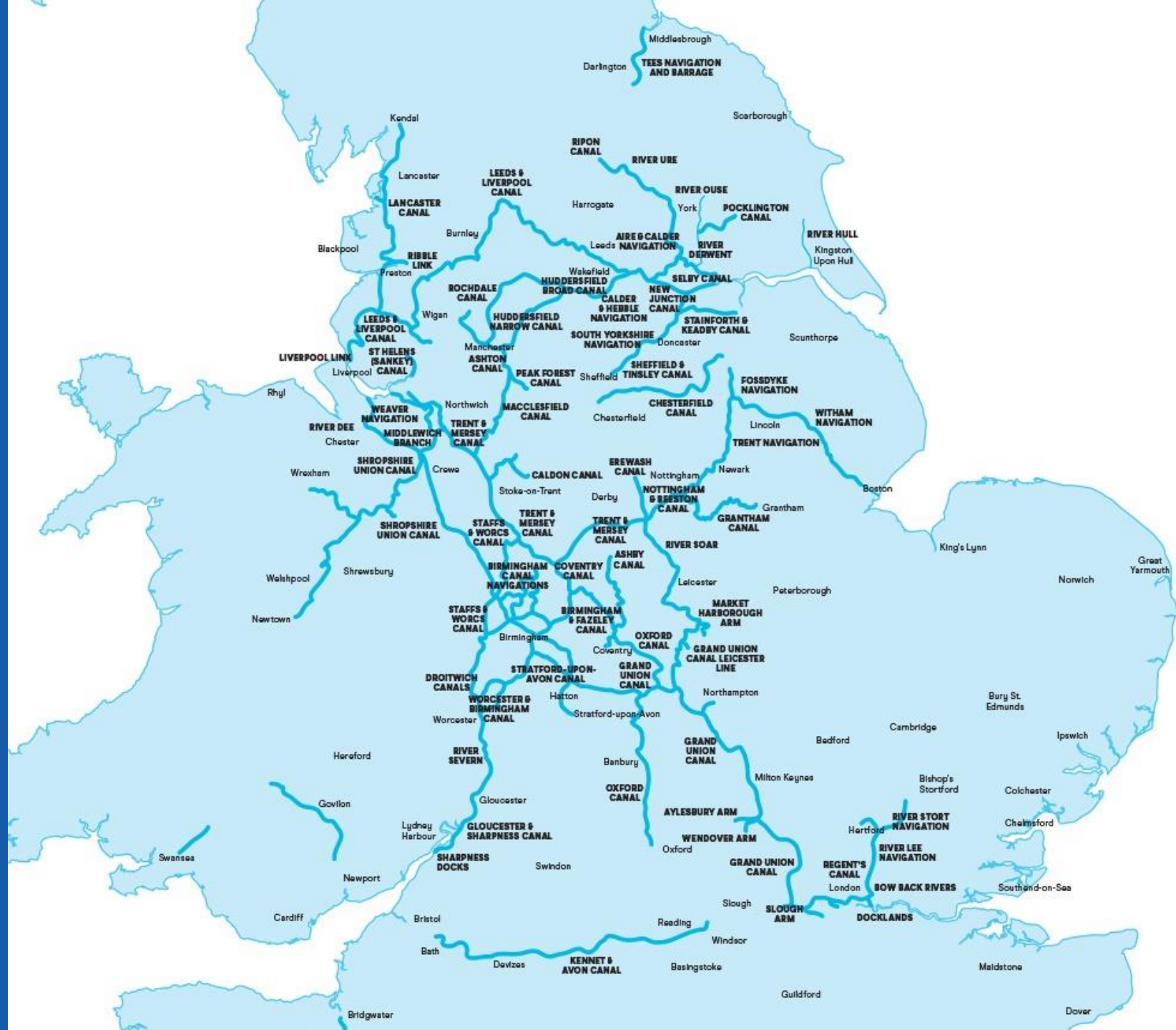
Making life better by water

The Canal & River Trust (the Trust) manage most of the canal system in the UK. It brings to life 2,000 miles of canals and rivers across England and Wales.

Map Key

— Canal & River Trust waterways

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- We are a waterways and wellbeing charity
- Bringing to life 2,000 miles of canals and rivers across England and Wales
- Waterways have the power to make a positive difference to our lives
- By bringing communities together to value and help us care for their local waterway

The 'function' of canal fisheries

- A dedicated team manage the fisheries within our canals
- 'To balance ecological, sporting, wellbeing, statutory duty to provide fishing on cruising waterways'
- Fisheries contribute to the overall aim of making "*life better for millions of people across England and Wales*" and to support health and wellbeing
- 8 million people live within 1km of a canal so important as often nearest place to fish for new anglers, particularly children

Types of threat...

- The enjoyment of fishing
- Commercial income from fishing rights
- Retaining angling club customers
- Ecological impacts on native species and fish predators such as kingfishers etc
- An ecological impact on wildlife at statutory protected sites including Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SACs)
- The recruitment of the next generation of anglers

Impact of 'invasives' on canal fisheries

Species	Enjoyment of Fishing	Ecological threat	Commercial threat	Distribution	Overall impact
Bitterling	negligible	low	low	limited	low
Catfish (Wels)	positive?	low	medium?	limited	low
Goldfish	negligible	low	low	limited	low
Grass carp	positive	positive?	low	limited	low
Koi carp	negligible	low	low	limited	low
Sterlet	negligible	low	low	limited	low
Sunbleak	mixed	low	low	limited	low
Topmouth gudgeon	negative	low	low	limited	low
Zander	mixed*	high**	high	expanding	high

* Some anglers would like to catch Zander from canals but overall negative

** Strong evidence that Zander affect the fish community of heavily trafficked narrow canals

- Do nothing and accept the impact
- Containment and isolation of population
- Limit the expansion of the population and make best use of any opportunities that arise
- Eradicate the invasive species (or reduce abundance to a level where impact is accepted)

Management options for invasives

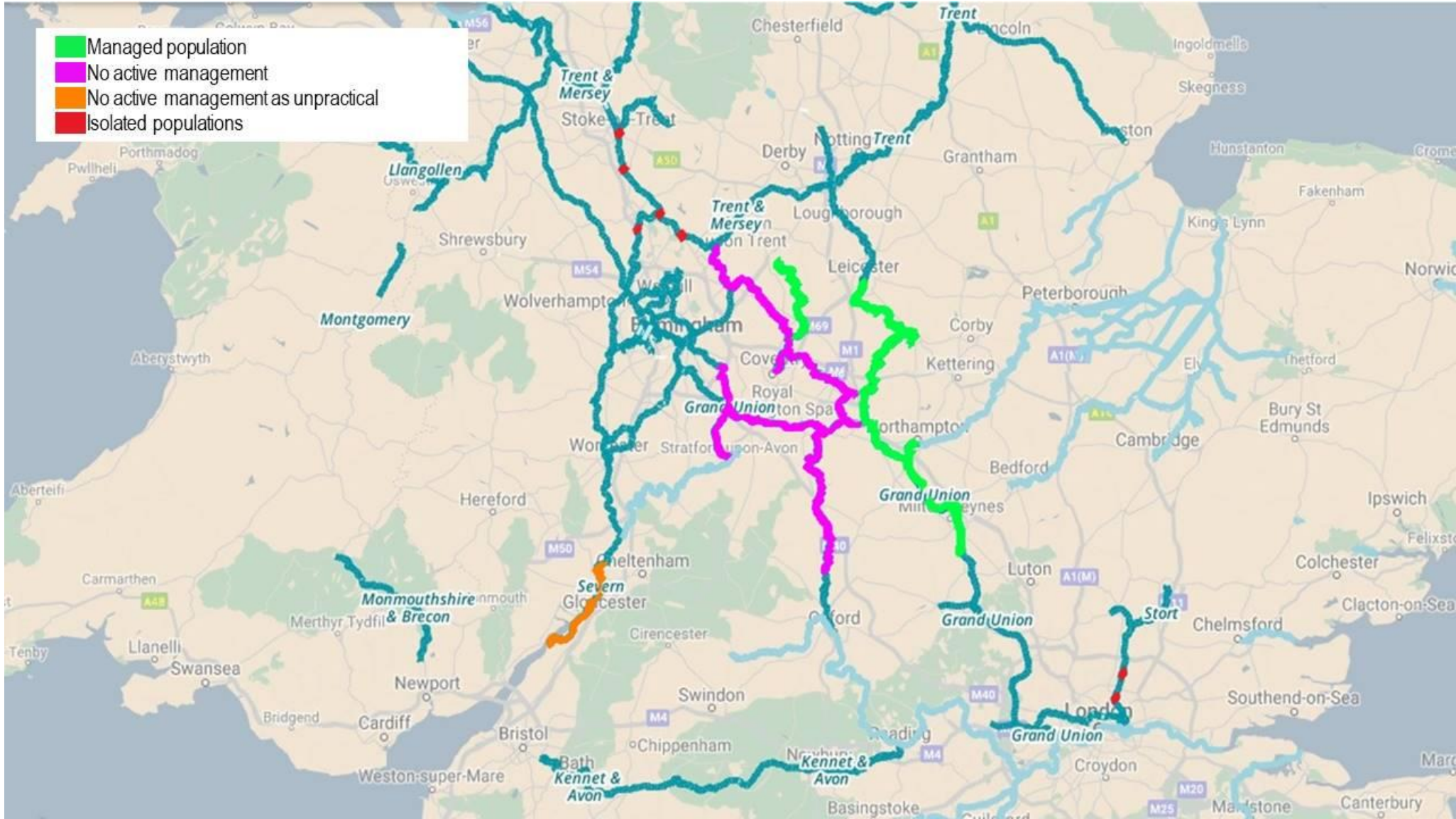


Zander was introduced into UK waters in 1878 but did not establish self-sustaining populations in un-enclosed waters until 1963.

- Mainly from a three year PhD study by Smith⁵ and a number of published papers ^{1-4,6,7}
- These represent the most intensive study of canal fisheries and the effect of Zander conducted so far and builds on earlier work by and Kell⁸ and Fickling⁹

- Three year study in mid 1990s
- Compare Zander-colonised and adjacent sections
- Netting of 58 sites: 58,585 fish, 19 species
- Zander assessed via electrofishing surveys – the distribution, growth and feeding based on the stomach contents of 2,733 zander
- 657 zander were tagged and movement monitored.
- Experimental population dynamics – 3 sections of canal (24.3km) on 5 occasions over a 24-month period

Distribution of Zander in the canals

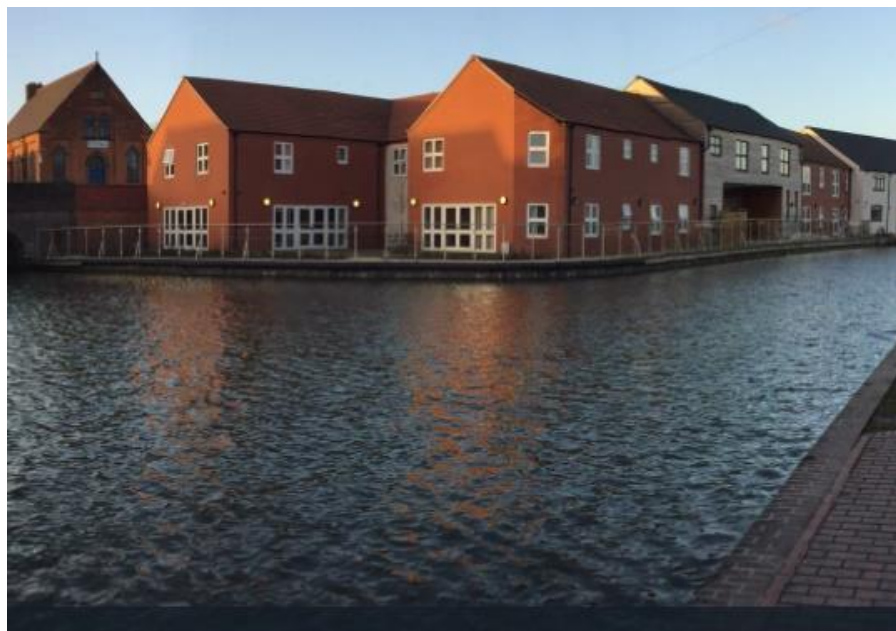


Main factor to determine fish populations in narrow canals

Low
boat traffic



High
boat traffic



Main factor to determine fish populations in narrow canals

	Low boat traffic	High boat traffic
Water	Clear	Turbid
Vegetation	Plenty	Little
Typical fish community	roach, perch, bream, tench, pike and carp	mainly roach and gudgeon with few perch and bream

Main factor to determine fish populations in narrow canals

Low
boat traffic

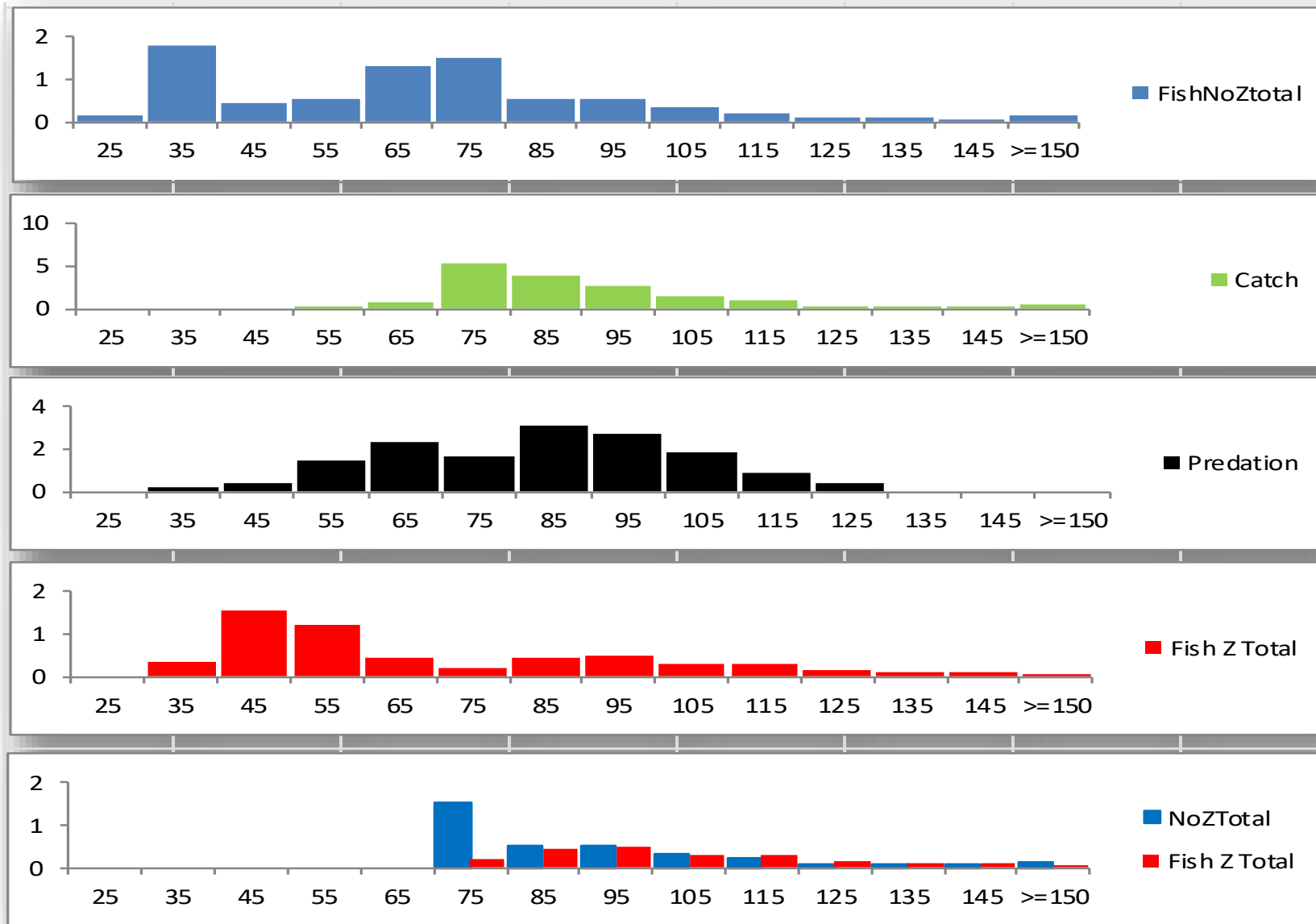


High
boat traffic

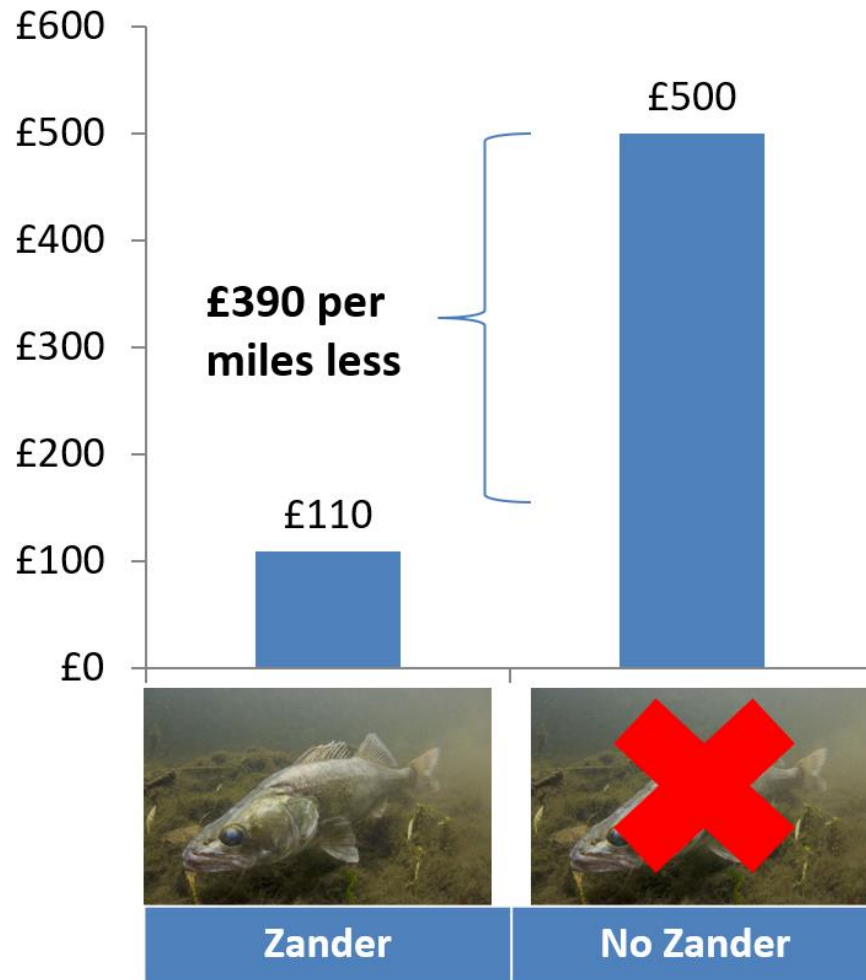


	Low Boat Traffic	High Boat Traffic
Zander biomass	Low	High
Impact on other fish	Little	Reduce abundance of fish < 100mm
Impact on fishery	➤ No direct impact	75% catch <100mm ➤ Causes a decline
Zander angling	➤ Positive	➤ Positive

Suggested impact on fish and catch



Eg. Grand Union Canal 2018



Caveats

- Decline in angling?
- 2017/8 15% decline in rod licence sales 2017/8
- Lets Fish events on zander established venues are difficult to hold successfully as it's impossible to catch sufficient numbers of small fish throughout the day

Lure Anglers Canal Club



An economic perspective of why £97k pa

Canal	Established population	Type of Impact	Estimated loss of fishery income
Grand Union, Three Locks to Braunston tunnel	36 miles	Fishery	£14,040
Grand Union, Norton Junction to Kilby Bridge	31 miles	Fishery	£12,090
Grand Union, Braunston to Knowle	50 miles	Fishery	£19,500
Coventry Canal plus adjacent areas	42 miles	Fishery	£16,380
North Oxford Canal	27 miles	Fishery	£10,530
Ashby Canal	22 miles	Ecological	(minor fishery loss)
South Oxford Canal Napton to Kidlington	38 miles	Fishery	£14,820
South Stratford Canal	24 miles	Fishery	£9,360
Gloucester & Sharpness Canal	17 miles	Minor	-
	287 miles		£96,720

Options for the removal of zander



Options for the removal of zander were subject to a very detailed assessment^{4,5}.

- Three year study of Zander population dynamics
- To significantly reduce the abundance of zander using electrofishing then 80% of the breeding adults would have to be removed every year for three-five years, then repeated
- This is because electrofishing has a low efficiency for capturing small (< 20cm) zander
- With recent advances in the effectiveness of electrofishing equipment, Boom boats with booms covering the width of the width of the canal plus use of a back boat twice per year could be sufficient now

Could we eradicate Zander?

- We can't realistically eradicate large, well-established zander populations without draining sections of the system entirely but we could/can reduce abundance
- We can prevent the establishment of new, small isolated populations using repeat electro-fishing
- To significantly reduce the abundance of zander using electrofishing then 80% of the breeding adults would have to be removed every year for three-five years. Based on the equipment available in the mid 1990s this meant that culling would need to be repeated at least three times a year
- With recent advances in the effectiveness of electrofishing equipment, twice per year could be sufficient now

- **Not financially viable to eradicate**
- The rate of natural colonisation of the canal system by zander **could be significantly slowed down or stopped by electrofishing those sections that contain Zander focussing at the edge of their range**
- Both the Canal & River Trust, EA, other conservation bodies and the clubs that rent fishing rights on the middle Grand Union are anxious to avoid further southerly spread
- Where we have had recent illegal introductions on the Trent & Mersey and Staffordshire & Worcester clubs are anxious to avoid establishment of new populations

Clarification of the legal situation

- Increase in numbers of anglers wanting catch and release
- DEFRA classification as a non-native invasive species
- As the law stands any Zander or other non-native fish caught, whether in fish rescues or by anglers **must not be returned** to the canal network as set out in (Sec 14 Sched 9 Wildlife & Countryside Act, and Regulation 6 & Regulation 8 of ([KIFR](#)))
- The W&CA makes it an offence not to carry out work to improve/maintain the condition of a SSSI e.g. Ashby Canal
- The W&CA is enforced by the police and EA/NRW enforce KIFR
- In 2015, the Trust applied to develop a Midland canal Zander zone where Zander could be returned but unfortunately this was not granted

- 1) **Active management by removal of Zander**
 - a) **To limit further expansion** eg. Grand Union Canal mainline from the Long Buckby flight southwards to the known southern limit of Zander and to support recovery of roach stocks
 - b) **In response to periodic reports of isolated illegal introductions** eg. Trent & Mersey Canal and Staffordshire & Worcester Canal
 - c) **Removal of Zander from canals where SSSI status could be threatened** eg. Ashby Canal and Leicester line summit which is adjacent to the Kilby-Foxton SSSI
- 2) **No active management of Zander populations** where removal is not practical or there is little, or no, effect on the fishery and the SSSI status of the canal is unlikely to be affected by Zander eg. Gloucester and Sharpness Canal
- 3) **Seek to enable a legal basis for the catch and return of Zander** from certain Midlands canals where populations are established and SSSI status is not likely to be affected

- Canal & River Trust
- Invasive species and types of threat
- Case study on Zander



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