Environment Agency

using science to create a better place

Economic evaluation of inland fisheries

Managers report from science project SC050026/SR2

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It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

This report is the result of research commissioned and funded by the Environment Agency's Science Programme.

Published by:
Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, BS32 4UD
Tel: 01454 624400 Fax: 01454 624409
www.environment-agency.gov.uk

ISBN: 978-1-84432-975-5

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or by telephoning 08708 506506.

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Dissemination Status:
Publicly available / released to all regions

Keywords:
economic, evaluation, inland, fisheries, England, Wales, regional, welfare, expenditure

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Science Project Number:
SC050026/SR2

Product Code:
SCHO0109BPGI-E-P

Science at the Environment Agency

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- **Setting the agenda**, by identifying where strategic science can inform our evidence-based policies, advisory and regulatory roles;
- **Funding science**, by supporting programmes, projects and people in response to long-term strategic needs, medium-term policy priorities and shorter-term operational requirements;
- **Managing science**, by ensuring that our programmes and projects are fit for purpose and executed according to international scientific standards;
- **Carrying out science**, by undertaking research – either by contracting it out to research organisations and consultancies or by doing it ourselves;
- **Delivering information, advice, tools and techniques**, by making appropriate products available to our policy and operations staff.

Steve Killeen

Head of Science

Foreword

This project has significantly increased our understanding of the value of inland fisheries to society.

The project was initiated and managed for the Environment Agency by Guy Mawle.

Lead Research Contractor: Jacobs UK Ltd., 27 Abercromby Place, Edinburgh EH3 6QE. Keith Lawrence and James Spurgeon were authors of Module A in collaboration with Professor Ken Willis of the University of Newcastle; and Rainbow Research.

Module B Research Contractor: Alan Radford, and Geoff Riddington, both of Glasgow Caledonian University, and Hervey Gibson of CogentSI Ltd.

The main project reports were published on the Environment Agency website in December 2007 and are listed with hyperlinks in the references (Lawrence and Spurgeon 2007; Radford *et al.* 2007). They are suitable for economists and those who wish to explore the methods used in the evaluation. This report summarises the results for the benefit of others, especially those responsible for fisheries and angling policy.

Disclaimers

Results have been rounded up, so the whole may on occasion differ slightly from the sum of its parts due to rounding error.

The views expressed in this summary and the interpretation placed upon the results are those of the authors and not necessarily those of the contractors who conducted the original studies and who wrote the main reports.

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Executive summary

This report summarises and interprets key results from the Economic Evaluation of Inland Fisheries project commissioned by the Environment Agency and the Department for Environment, Food and Rural Affairs (Defra). Separate analyses are also presented for Wales and for individual government office regions in England.

Around one million anglers were licensed to fish in England and Wales in 2005. They fished for 30 million days on inland fisheries, mostly coarse fishing and substantially more than in 2000.

Expenditure on freshwater angling in England and Wales supports £1 billion of household income, equating to 37,000 full-time jobs in these countries. If salmon and sea trout fishing were to cease, for example via the introduction of the parasite *Gyrodactylus salaris,* about £10 million in household income (400 full-time job equivalents) would be lost across England and Wales. The overall economic loss to society from a severe decline in salmon stocks would be much greater than indicated by this impact on the economy from the cessation of salmon fishing. Annually, the loss in welfare would be £350 million. If capitalised over 25 years, this equates to a present value of £6 billion.

Most salmon rivers in England and Wales were perceived by the public to be of only ‘moderate’ environmental quality. While the public valued even ‘poor’ stocks of salmon, they placed little or no value on having ‘poor’ river quality or ‘poor’ stocks of other fish. For these, only stocks in ‘moderate’ or ‘good’ condition were valued. Stocks in ‘good’ condition would be valued about twice as much as those in a ‘moderate’ state. These results suggest that achieving ‘good ecological status’ under the Water Framework Directive would deliver significant benefits. The public were willing to pay two to three times more to prevent a deterioration in river quality than to improve it.

Most anglers consider fishing inland waters to be light physical activity or ‘moderate’ exercise. There is no general picture of increased physical exercise from angling compared to alternative activities. Psychological benefits are likely to be more important.

Introduction

Historically, economic values of fish have been viewed solely in the context of commercial harvest. However in recent years, others aspects of value are being recognised both in the UK and abroad. Recreational fisheries, principally angling, can have significant economic importance and social benefits while fish can be valued for their own existence as part of the native fauna, regardless of their exploitation.

The Environment Agency has recently published a second major study on the socio-economic benefits of inland fisheries in England and Wales (Lawrence and Spurgeon 2007; Radford *et al.* 2007) This work, partly funded by the Department for Environment, Food and Rural Affairs (Defra), follows on from the Environment Agency's earlier investigations of the economic values associated with fishing rights, angling activity and fish populations reported in Spurgeon *et al.* (2001) and Radford *et al.* (2001); eel fisheries (Knights 2001); and the heritage value of traditional salmon fisheries (Simpson and Willis, 2003).

This report summarises key results from the latest studies for the benefit of fisheries managers. For detailed information, especially to understand the methods used and potential sources of bias, the reader is referred to the main contractors' reports.

Why is economic information on fisheries needed?

Understanding the contribution made by inland fisheries is vital for making effective decisions about managing and investing in fisheries.

As well as the conservation of fish stocks, the Environment Agency's remit includes enhancing the contribution that fisheries make to the economy and the social value of angling as a widely available and healthy form of recreation.

Angling is available to people of all abilities and ages

The Environment Agency needs to be able to evaluate the costs and benefits of changes in environmental quality and fish stocks, and to prioritise its work, such as for the Water Framework Directive. The economic values of fisheries also set the context for dealing with potential outbreaks of destructive fish diseases, and for securing national, regional and local funding for schemes to improve fisheries.

Others bodies, notably regional and national government, may find it helpful to have a better understanding of the economic activity supported by angling and the extent to which the public value fish and fisheries.

Aims of this study

Economic activity, either regional or national**,** focuses on the jobs and household income supported by expenditure associated with angling. Whilst readily understood and a helpful measure, economic activity only presents a limited perspective of economic value of fisheries.

It would therefore be unwise to focus on economic activity alone in decision making. For example, the repair of broken windows generates economic activity but is that a recommendation for vandalism? Decision makers should also consider the value people place on fish, including fishing for them.

Economic welfare looks at the monetary value of the overall benefits derived from fish and fishing (including to fishery owners, anglers, and the general public) over and above what they cost. This is usually done by assessing what extra people are willing to pay either to prevent the loss of a resource or to improve it.

These two approaches, economic activity and welfare, yield figures which should not be added, but viewed as different aspects of the value of fish and fisheries.

This study explores these alternative approaches, with the following objectives:

i) Provide estimates of annual expenditure on different types of freshwater angling in Wales and each government office region of England.
ii) Provide estimates of the impact on regional economies of potential increases and decreases in different types of angling activity, especially that generated by tourism.
iii) Provide national estimates of value that the general public have for the existence of salmon stocks and other selected species in a selection of rivers, and for changes in the abundance of these fish stocks.
iv) Evaluate the benefits of angling derived from improved mental and physical health and social welfare.

How the values were estimated

These different aspects of economic value required a variety of approaches in order to estimate them.

Expenditure on angling and impacts on regional economies

Licensed anglers were surveyed by telephone or internet. Activity (days fished) and expenditure on angling were estimated for different species and on different water types regionally and nationally. Three thousand anglers were contacted by telephone and 4000 responded to the internet survey. A specialised modern economic modelling tool (DREAM®) was used to convert the raw expenditure data to economic impacts.

The total economic value of salmon and other fish

A sample of 911 members of the general public from 23 different locations across England and Wales were interviewed face-to-face using a carefully designed and tested questionnaire. People were asked firstly about their general attitudes and perceptions of rivers and fisheries. Later in the interview they were asked more detailed questions about their willingness to pay to protect salmon rivers from serious decline and how much they would be prepared to pay for different types and scale of improvements in the quality of named rivers. Questions were included to check understanding of the survey and validity of the answers. The average willingness to pay per household was taken as representative of households in England and Wales.

Health and social benefits of angling

Due to limited funds, only preliminary aspects could be included in this study. Anglers participating in the telephone and internet surveys of fishing activity and expenditure were asked how they benefited physically and psychologically from going fishing.

Main findings

The contribution of angling expenditure to national and regional economies

Where do anglers live?

Figure 1 shows Wales, the government office regions in England, and the number of resident licence holders in each. The total number of licensed anglers was just under a million. This contrasts with the estimate of 2.6 million people in England and Wales, based on people who said they had been freshwater fishing in the previous year and so, in theory, should have had a licence (Simpson and Mawle 2005).

Estimates in this report relate only to licensed angling. Although there may be a large number of unlicensed anglers, checks on the bank indicate that they fish infrequently. Thus, the amount of unlicensed days fishing is relatively small, probably in the order of five per cent of the days fished by licensed anglers. Given that unlicensed anglers fish infrequently, their average expenditure on a day's fishing is expected to be less than that of licensed anglers. Total expenditure on unlicensed fishing is thus likely to be a small proportion of that by licensed anglers, probably only a couple of percent.

The geographical distribution of anglers reflects the overall population and local angling opportunities amongst other factors.

Almost all licences are purchased by the resident population. About four thousand come from other parts of the United Kingdom. An insignificant number are recorded from other parts of the world.

Figure 1. The distribution of rod licence holders across Government Office Regions in England and Wales, in 2005

Angling activity – where, how often and what for?

Licensed anglers fished a total of 30 million days during 2005. Figure 2 shows where they fished. Angling effort was greatest in the East Midlands where anglers fished almost five million days in 2005.

The balance between coarse, trout and migratory salmonids (salmon and sea trout) reflects not only the popularity of different branches of the sport but also the opportunities available.

The number of days fished was 26 per cent greater than the 24 million days in 2000 estimated by an earlier survey of rod licence holders (Simpson and Mawle 2001).

The increase was due to a rise in licensed coarse fishing activity from 20 million to 26 million days. The number of days game fishing, that is for trout or salmon, remained unchanged at four million. Even in areas traditionally associated with salmonid fisheries such as the South West and Wales, coarse fishing accounted for most activity.

Angling for salmon and sea trout was very much a minority activity, practised mostly in Wales, North West, North East and South West England.

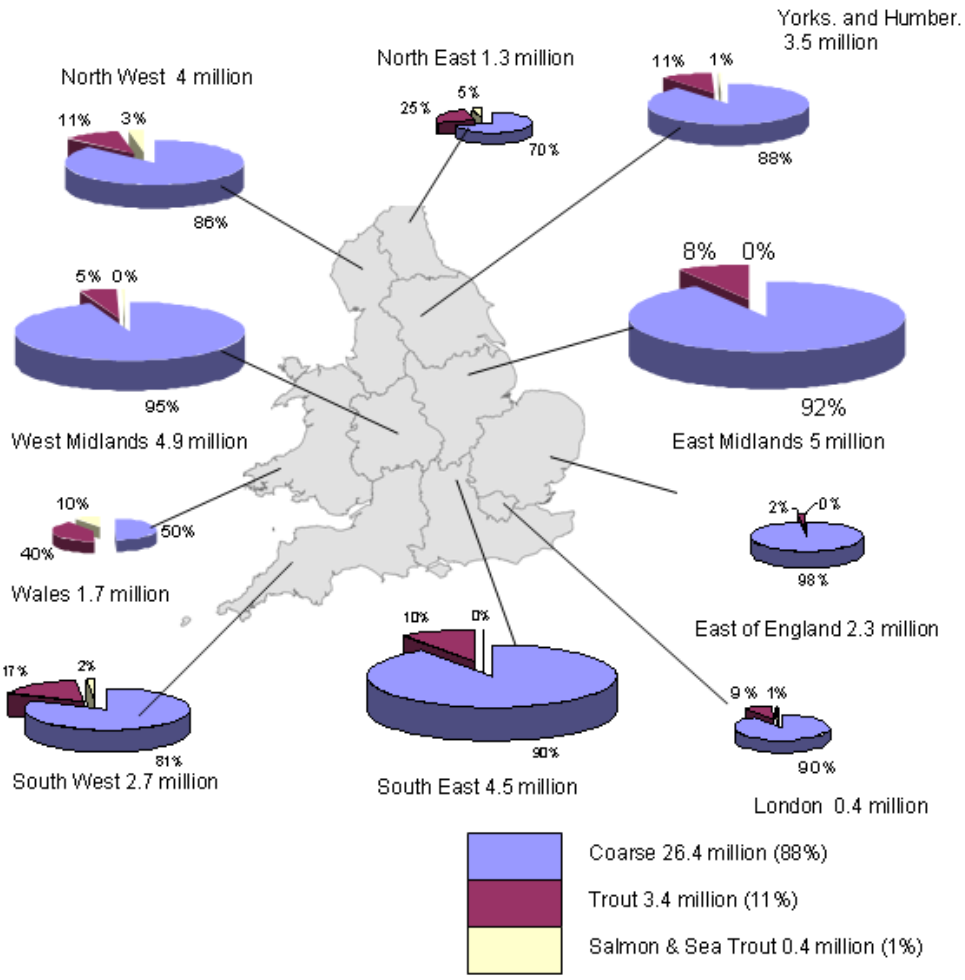


Figure 2. The number of days fished in each region in 2005 showing the proportion for each species.

Figure 3 shows the angling effort on different water types. Still waters (lakes, ponds, reservoirs) attracted the most visits, with 18 million days during 2005. This pattern was most marked amongst trout anglers – 70 per cent of their fishing took place on still waters.

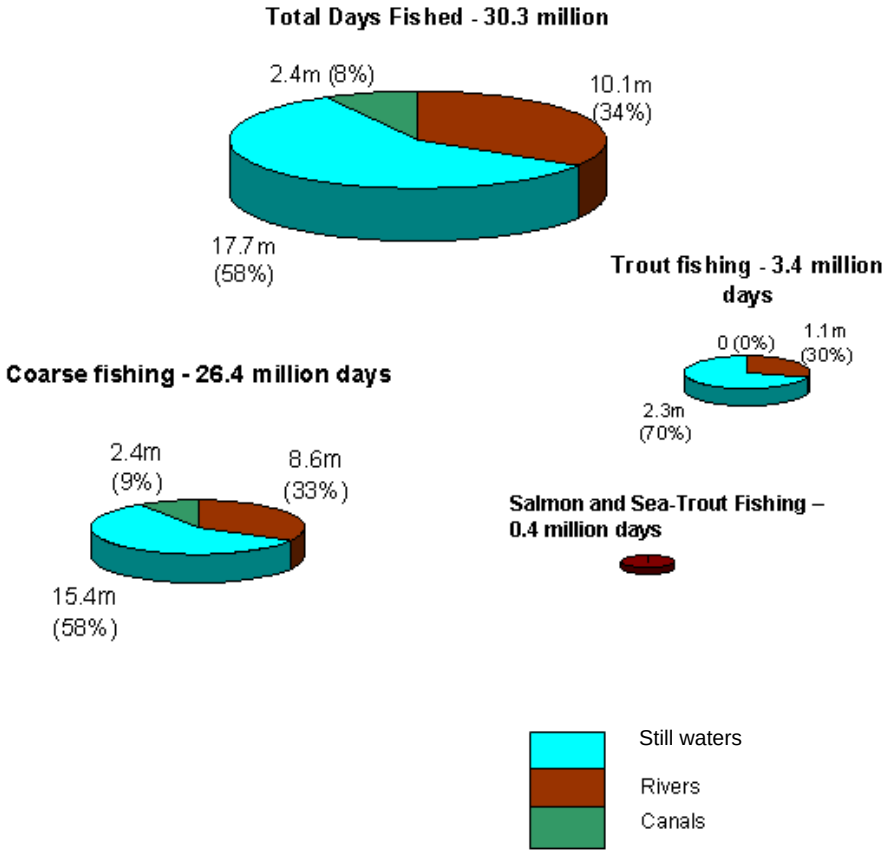


Figure 3. Number of days fished by species and water type in 2005

A couple of good roach from the Wye

A spring salmon in the net

A specimen brown trout

How much do anglers spend on their sport?

Licensed anglers in England and Wales spent a total of £1.16 billion on their fishing during 2005. This expenditure can be divided into trip-specific items such as bait, permits, accommodation and fuel, and non-specific expenditure on items that can be used repeatedly throughout the year including larger tackle items (such as rods and reels), clothing, books and magazines.

The modern angler has a huge range of equipment to chose from

The breakdown between the different species is shown in Figure 4. Although individual anglers fishing for salmonids spend rather more on their sport than do coarse anglers, the latter account for by far the greatest proportion of both types of expenditure.

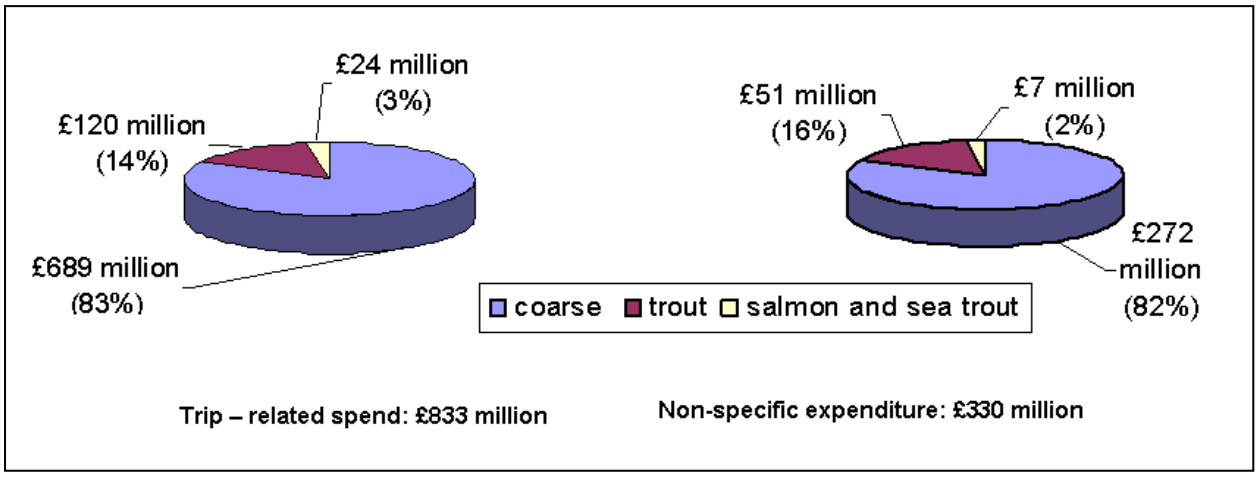


Figure 4. Gross expenditure on angling (£ 's), 2005: trip-related and non-specific.

In addition to expenditure by anglers, the Environment Agency spent approximately £20 million on angling-related fisheries work.

What does this mean for the national economy?

Economic activity generated by angling in England and Wales is estimated to support about a billion pounds in household incomes (gross value added or GVA) derived from the equivalent of **37,000 full-time jobs** of which over 20,000 are directly dependent on angling. Subsequent references to jobs in this report mean full-time job equivalents (FTEs).

A fishing tackle-dealer at work

Every pound spent on angling contributes around 85 pence to household incomes. Every £32,000 spent on angling supports one full-time job. Figure 5 shows the relative contributions made by the different types of angling.

Coarse angling contributes by far the biggest proportion of these benefits at the national scale with over 31,000 full-time jobs and a GVA of £800 million. Most of this is generated by angling activity undertaken in the licence-holder's home region.

Trout angling supports a smaller benefit with about 6,000 jobs generating £150 million in household incomes; as with coarse angling, most of this is generated by local activity.

Salmon and sea trout angling contributes the smallest proportion of economic benefit, but much of this is generated by angling tourism (fishing outside the licence-holder's home region) and by Environment Agency activity.

By comparison, a study by Drew Associates (2004), estimated that 1.1 million households in England and Wales contained at least one sea angler, totalling about 1.5 million people. Their annual expenditure of £538 million on fishing trips in England and

Wales supported just under 19,000 jobs and £71 million in suppliers' income. However, the study did not take into account multiplier effects, so these totals will underestimate the total impact of sea angling on the economy in England and Wales.

Interpretation: The above figures are estimates of the amount of national economic activity currently supported by expenditure on angling. The estimates are not necessarily indicators of what would be lost or gained were angling activity to either increase or decrease. The impact of such changes would depend on how expenditure would change on all goods and services within England and Wales.

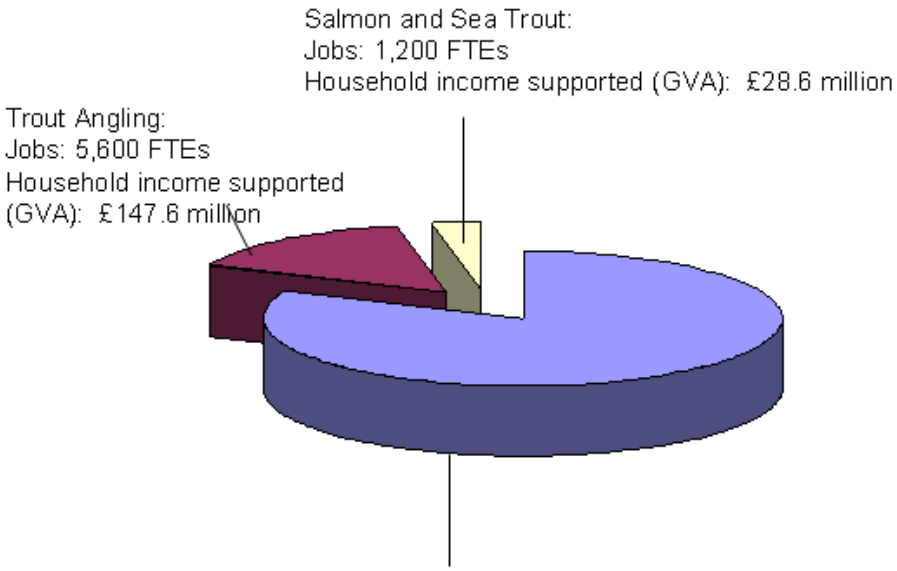


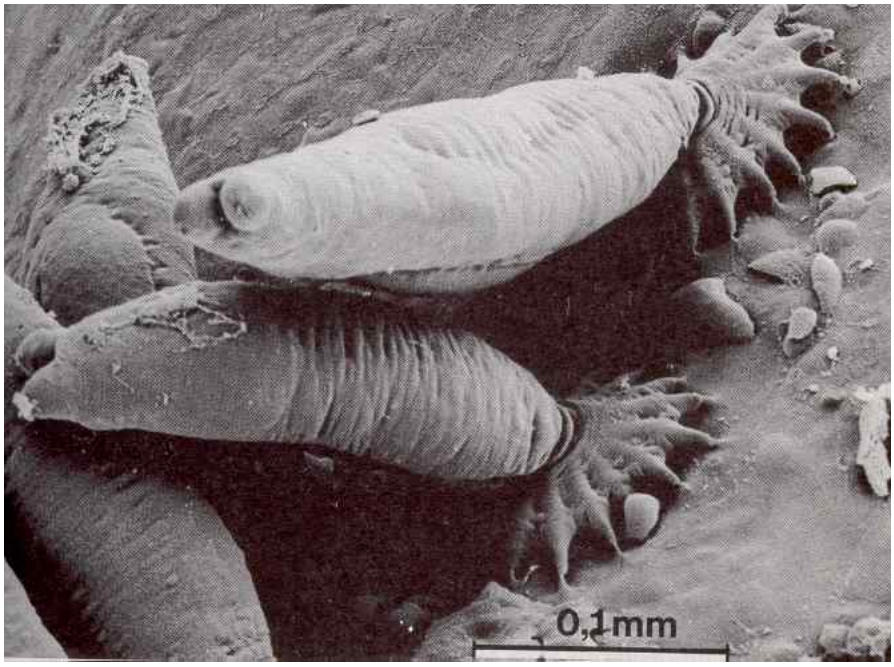
Figure 5. Economic activity in England and Wales supported by different types of angling on inland fisheries.

What would happen if some species became unavailable?

Information from the angler-survey was also used to estimate the economic impact on England and Wales, as a whole, of the total loss of each type of fishing – such as might happen if a disease were to wipe out stocks in the two countries.

- **Total loss of coarse fishing** in England and Wales would result in a loss in household income (GVA) of **£130 million** per year and around **5,000 jobs**.
- If **trout fishing** were to cease there could be losses of **£40 million** and **1,600 jobs**.
- For **salmon and sea trout fishing** this could amount to **£10** million and **400 jobs**.

For salmon fishing, such a loss could be a realistic prospect if the parasite *Gyrodactylus salaris* were to spread to this country.



Electron micrograph of Gyrodactylus salaris on the gill filament of a salmon .
copyright: courtesy of Tor Atle-Mo, Norwegian National Veterinary Institute

These figures are lower than the estimates of activity supported by each type of angling because if fishing for one species became unavailable, there would be a switch to other species and possibly fishing for the original species outside England and Wales which would still entail some expenditure and support for the economy here.

Because of the ability to switch fishing activity, these potential losses cannot be summed across species. If all types of fishing ceased, the overall loss would be greater than the sum of the losses indicated for each type of fishing.

What does this mean for regional economies?

A summary of key statistics for all regions is given in Appendix A.

North West

- Of four million days fished on inland waters in the North West in 2005, over three-quarters were spent coarse fishing.
- The North West was the leading English region for game fishing, particularly for salmon and sea trout.
- There were 116,826 licence holders resident in the North West in 2005 who generated 3.6 million days (91 per cent of the angling activity in the region), fishing mainly for coarse fish.
- In contrast, around a quarter of all effort for salmon and sea trout was by visiting anglers, mostly from Yorkshire and Humberside. Nonetheless, coarse fishing in the North West, especially on still waters, attracted the most visits (over 300,000 days) from other parts of England and Wales.
- Anglers' annual expenditure on fishing inland waters in the North West totalled about £140 million, supporting approximately 3,200 jobs and almost £80 million of household income.
- Visiting anglers came to the North West from most other parts of England and Wales, especially the adjacent regions. Their activities accounted for about 11 per cent of anglers' expenditure in the region.
- Anglers who lived in the North West mostly fished in the region; only 13 percent of their days fished were in other regions. But the latter still amounted to 560,000 days fished, mainly on river and still water coarse fisheries.

Q: What if there were 1,000 more days fishing by visitors to the North West? What impact would this extra trip expenditure have on the regional economy and how would this vary between coarse, trout and salmon and sea trout fishing?

A: Provided that it was all new expenditure to the region, this would generate:

	Coarse fishing	Trout fishing	Salmon and sea trout fishing
Household income (GVA) (£)/1,000 days	15,000	25,000	43,000
Jobs (FTEs)/1,000 days	0.6	1.0	1.9

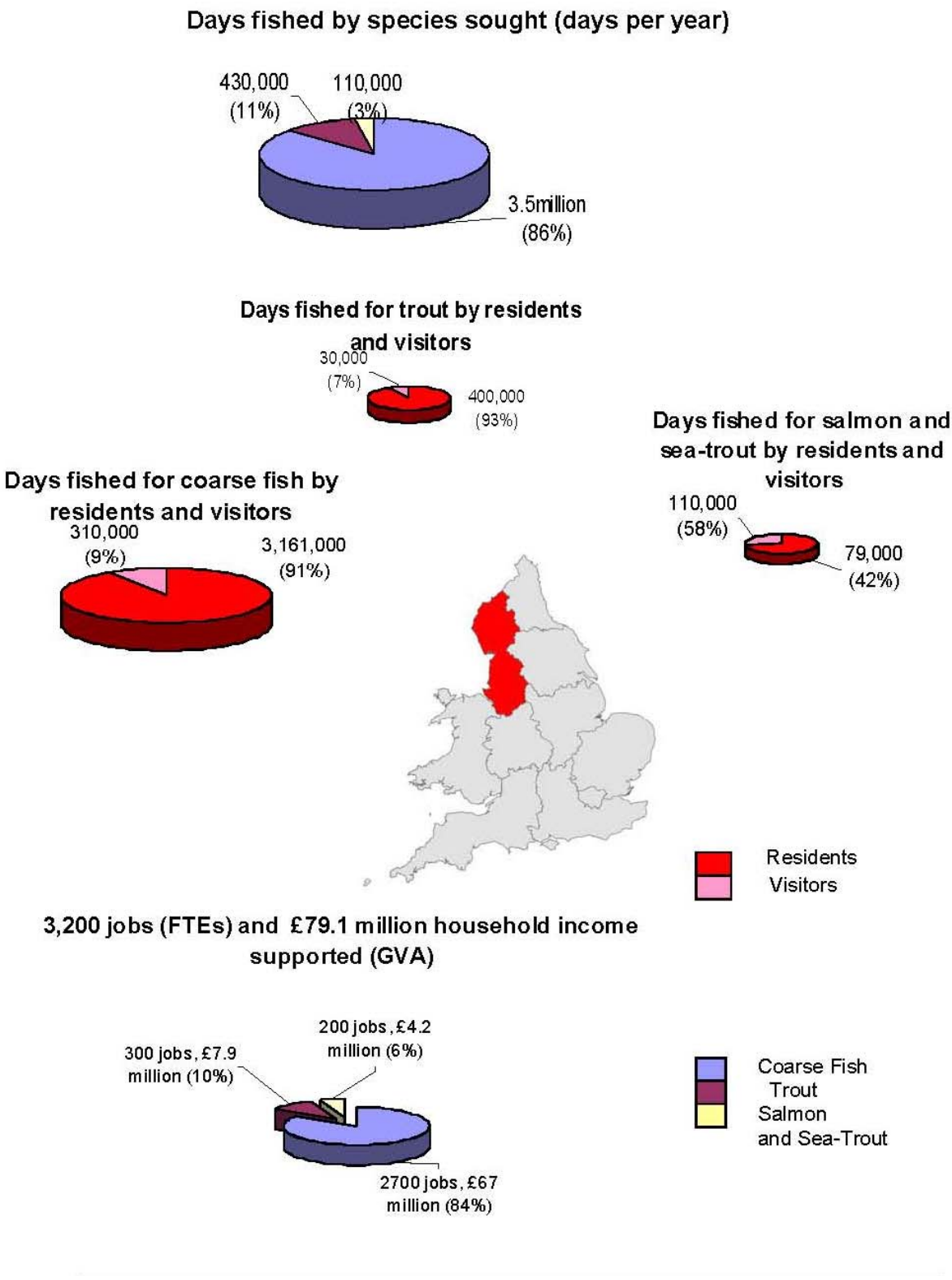


Figure 6. Days fished for different species in the North West by residents and visitors, showing their economic impact in the region.

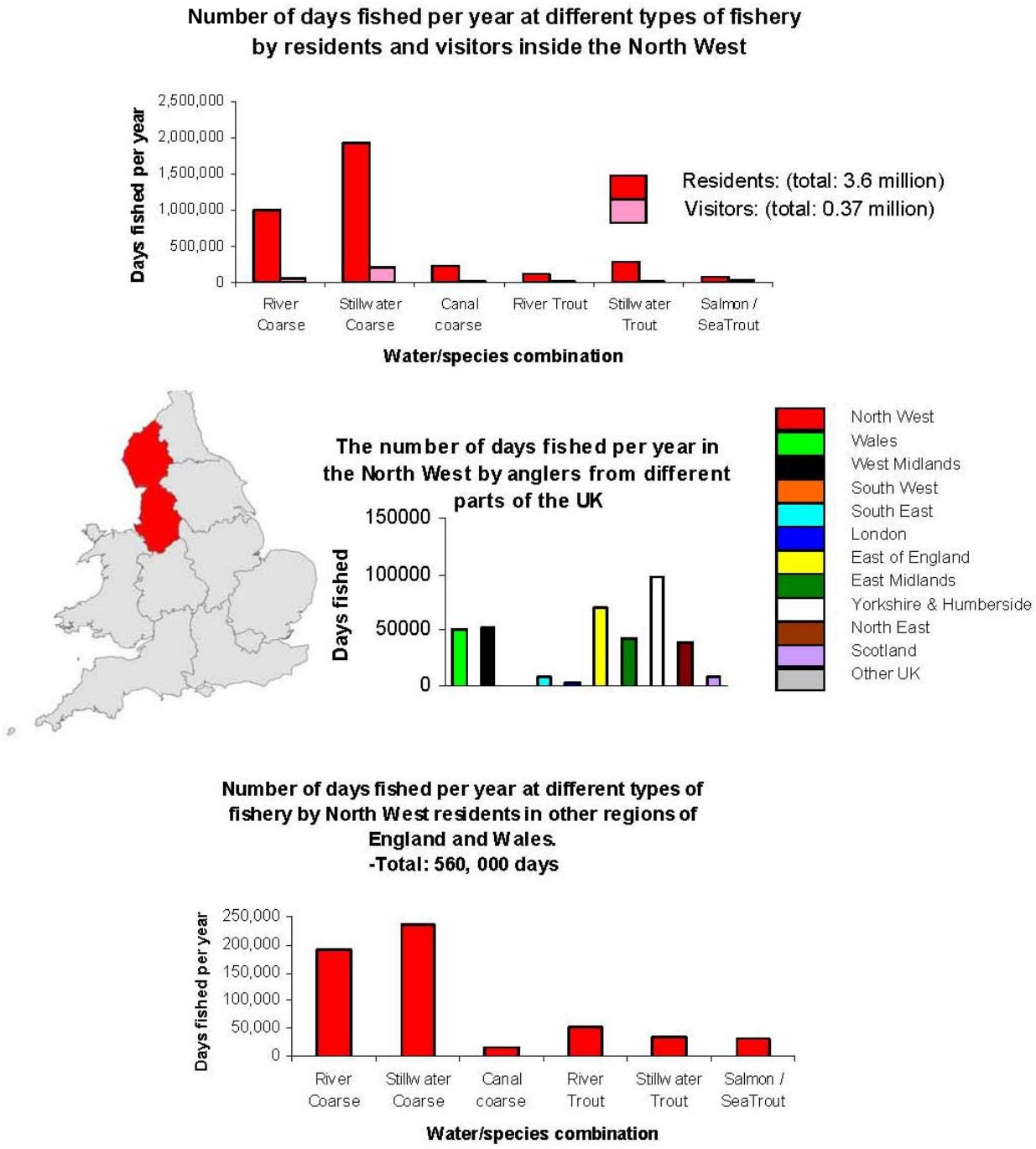


Figure 7. The types of fishery visited in the North West by resident and visiting anglers; origins of anglers visiting the North West from other parts of the UK; and the types of fishery visited in other regions of England and Wales by North West residents

Wales

- There were 1.7 million days fished on inland fisheries in Wales by licence holders, generating £74 million of expenditure in the principality by anglers.
- Although game fishing (salmon or trout) is far more important in Wales than in any English region, half of the days fished were for coarse fish.
- Around 1,500 Welsh jobs and £32 million in household income is supported by angling on inland fisheries in Wales. About 40 percent of this derives from expenditure by visitors.
- Expenditure per day on game fishing is greater, on average, than on coarse fishing, so two-thirds of this economic activity is derived from game fishing (salmon or trout).
- There were 47,186 licence holders resident in Wales in 2005 who generated 1.3 million days, most of the angling activity. Nonetheless, half a million days were fished by visitors to the area.
- Residents fished in still water coarse and trout fisheries most heavily.
- For visitors, river fishing, whether for salmon, trout or coarse fish, was far more important.
- Anglers came to Wales from every region in England, especially the adjacent North West and West Midlands.
- Only 10 percent of the days fished by Welsh anglers were to waters in England. These were mainly river and still water coarse fisheries in the North West, West Midlands and South West. It is possible that a significant proportion of these were to fisheries within the Wye and Dee catchments which are within the Environment Agency Wales region.

Q: What if there were 1,000 more days fishing by English visitors to Wales? What impact would this have on the Welsh economy and how would this vary between coarse, trout and salmon and sea trout fishing?

A: Provided that it was all new expenditure to Wales and in a similar pattern to that observed in 2005, this would generate:

	Coarse fishing	Trout fishing	Salmon and sea trout fishing
Household income (GVA) (£/1,000 days)	£16,000	£36,000	£30,000
Jobs (FTEs/1,000days)	0.6	1.6	1.4

Q: What if salmon and sea trout fishing were to stop in Wales as the result of *Gyrodactylus salaris?* What impact would this have on the Welsh economy?

A: Some angling activity would transfer to English regions and elsewhere (assuming they were unaffected) and to other types of fishing. So the net loss per year in Wales would be 140 jobs and £2.7 million in household income.

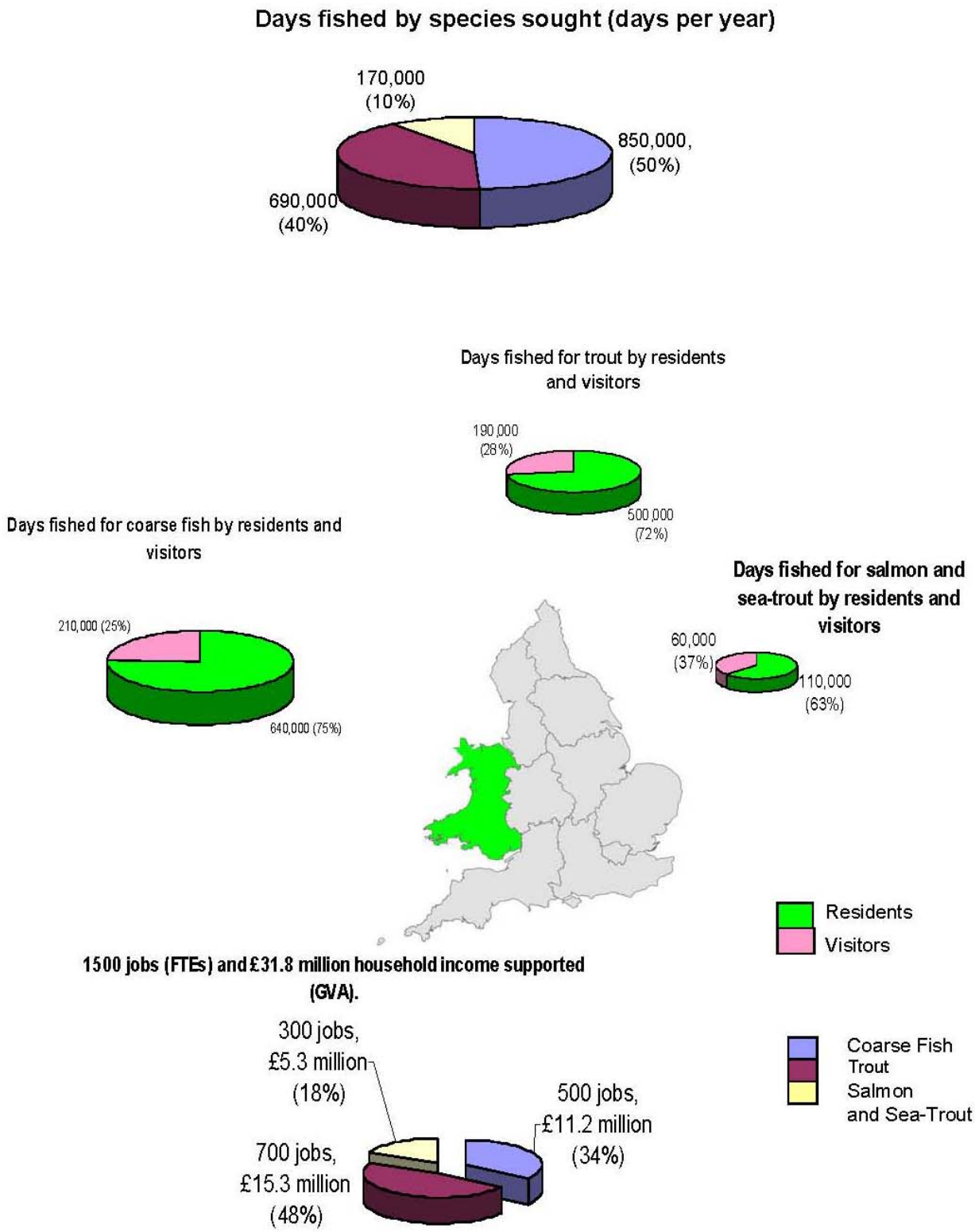


Figure 8. Days fished for different species in Wales by residents and visitors, showing their economic impact in the region

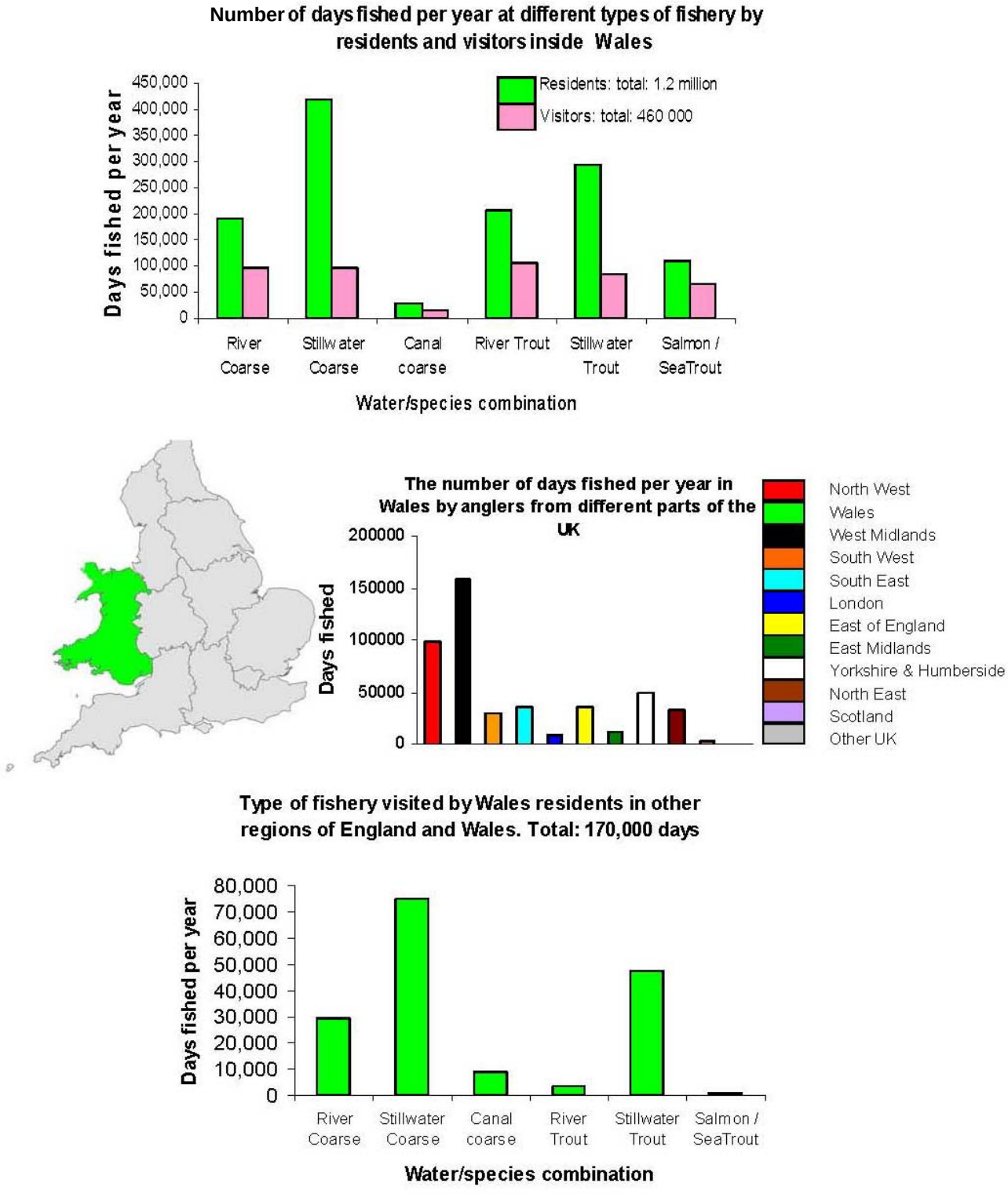


Figure 9. The types of fishery visited in Wales by resident and visiting anglers; origins of anglers visiting Wales from other parts of the UK; and the types visited in other regions of England and Wales by Wales residents

West Midlands

- The West Midlands region was second only to the South East for the number of resident, licensed anglers and to the East Midlands for the level of angling activity.
- Of 4.8 million days fished on inland waters in the region in 2005, most (95 per cent) were spent coarse fishing on rivers, still waters and canals.
- There were 131,896 licence holders resident in the region in 2005. Only the South East region had more.
- Anglers' annual expenditure on fishing inland waters in the West Midlands totalled about £190 million, supporting approximately 4,200 jobs and almost £100 million of household income.
- Although most of the angling activity was by residents, there were almost half a million days fished by visiting anglers, more than to Wales.
- Visiting anglers came from most other parts of England and Wales, except the North East and London. Although not an adjacent region, anglers from the East of England contributed a surprisingly large number of days, mostly for coarse fishing on rivers in the region. It is possible that barbel fishing was the attraction as there are few opportunities for this species in the East of England.
- Although still dominated by coarse fishing, game fishing on rivers was proportionately more important for trips by West Midlands residents to other regions.

Q: What if there were 1,000 more days coarse fishing by visitors to the West Midlands? What impact would this extra trip expenditure have on the regional economy?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing
Household income (GVA) (£)/1,000 days	17,000
Jobs (FTEs)/1,000 days	0.7

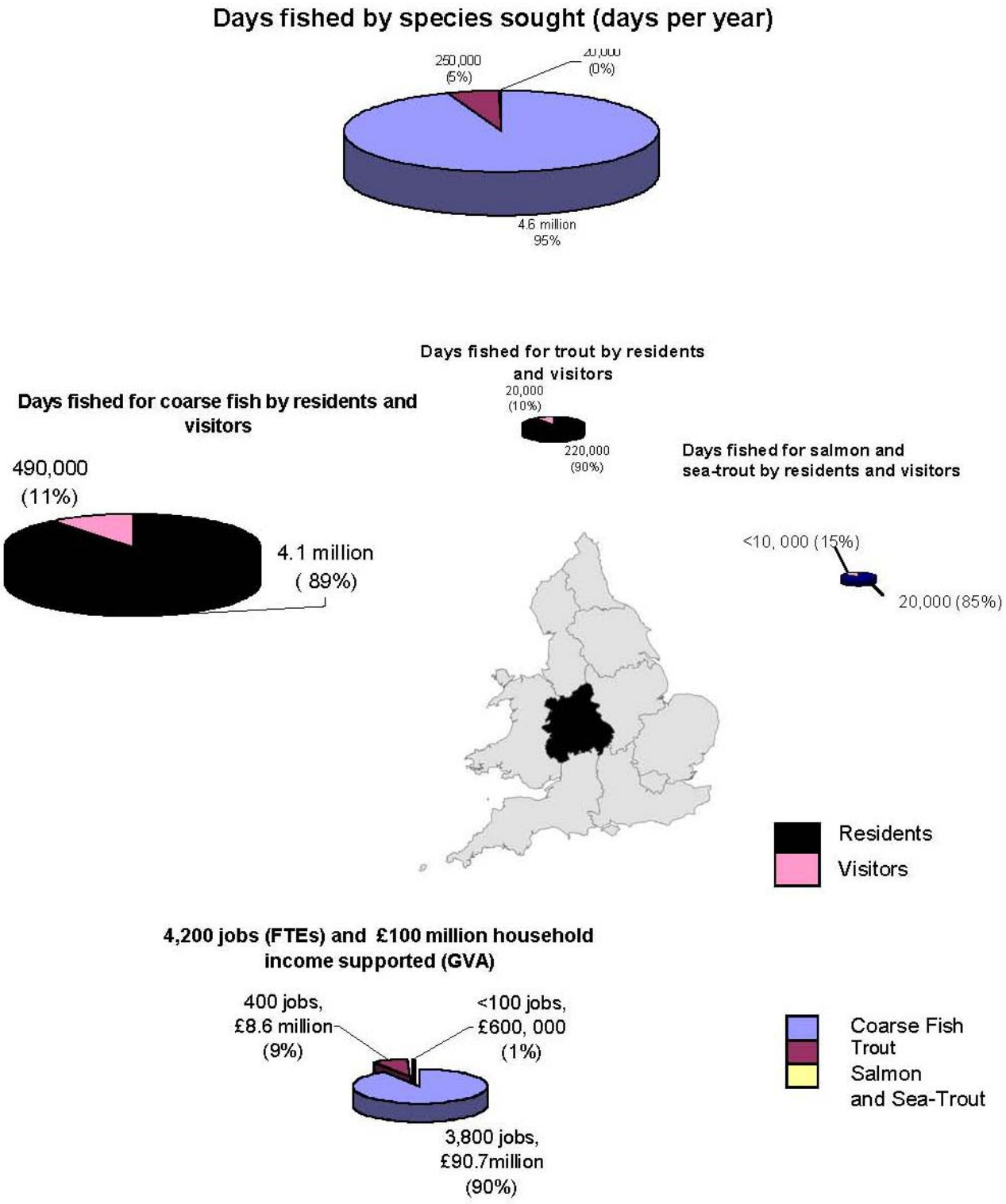


Figure 10. Days fished for different species in the West Midlands by residents and visitors, showing their economic impact in the region

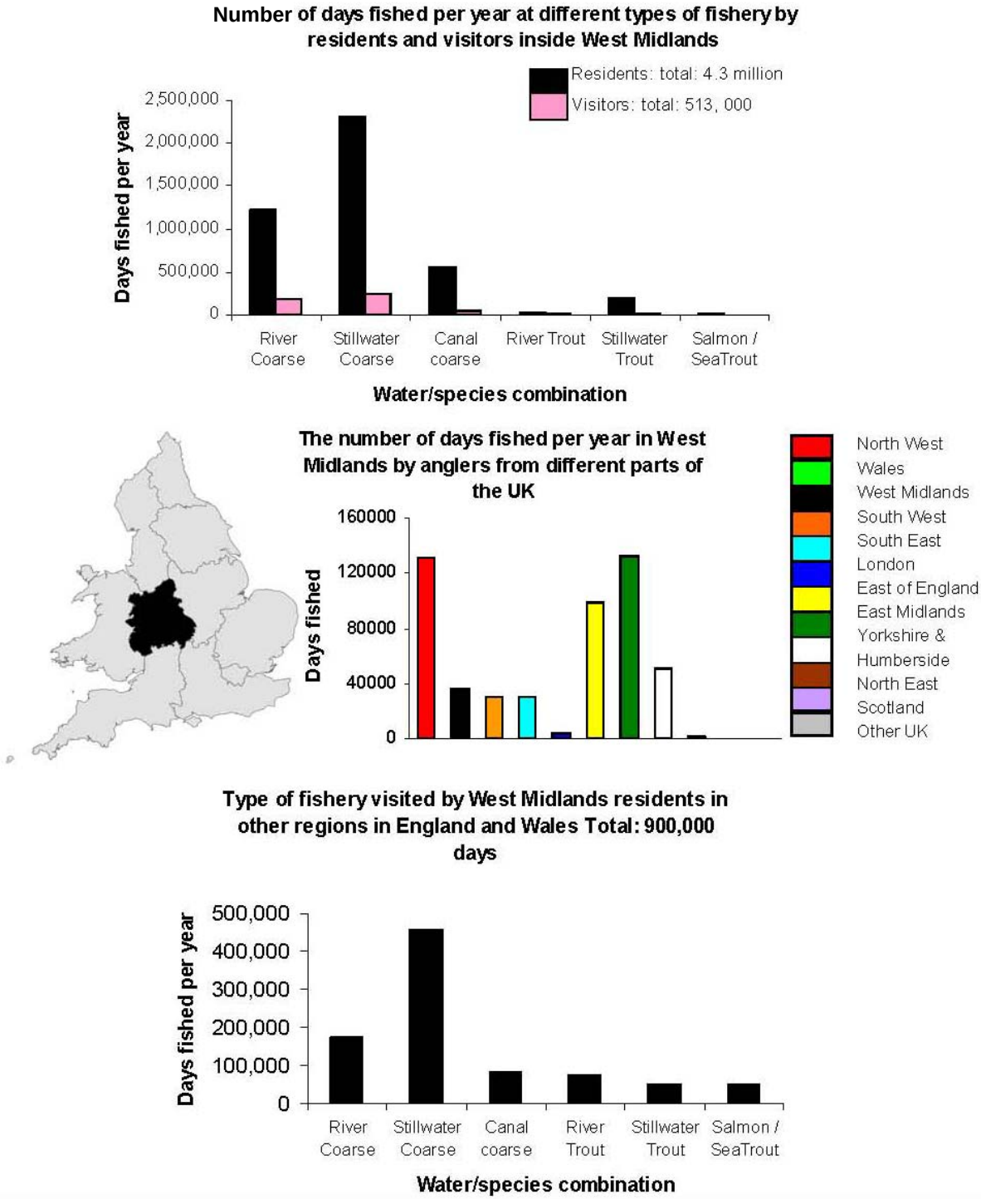


Figure 11. The types of fishery visited in the West Midlands by resident and visiting anglers; origins of anglers visiting West Midlands from other parts of the UK; and the types visited in other regions of England and Wales by West Midlands residents

South West

- Of 2.7 million days fished on inland waters in the South West in 2005, 81 per cent were spent coarse fishing.
- Half a million days were spent game fishing, mostly for trout on still waters.
- There were 87,801 licence holders resident in the South West in 2005 but visiting anglers accounted for a quarter of all the days fished and of the economic activity generated.
- Anglers' annual expenditure on fishing inland waters in the South West totalled about £100 million, supporting approximately 2,300 jobs and £50 million of household income.
- Visiting anglers came mainly from the South East, London and the West Midlands. River fishing, especially for trout, was proportionately more important for visitors than residents but for both groups, coarse fishing on still waters accounted for most days.
- Average trip expenditure recorded for visiting salmon and sea trout anglers was very high: £175/day, compared to £40 for visitors who fished for trout and £36 for coarse fish.
- Anglers who lived in the South West mostly fished in the region; only 11 per cent of their days fished were in other regions. This amounted to 260,000 days fished, mainly on coarse fisheries.

Q: What if there were 1,000 more days fishing by visitors to the South West? What impact would this extra trip expenditure have on the regional economy and how would this vary between coarse, trout and salmon and sea trout fishing?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing	Trout fishing	Salmon and sea trout fishing
Household income (GVA) (£)/1,000 days	19,000	16,000	95,000
Jobs (FTEs)/1,000 days	0.8	0.7	4.2

Q: What if salmon and sea trout fishing were to stop in the South West as the result of *Gyrodactylus salaris?* What impact would this have on the regional economy?

A: Some angling activity would transfer to other regions (assuming they were unaffected) and to other types of fishing. So the net loss per year in the South West would be 75 jobs and £1.7 million in household income, about 60 per cent of the economic activity supported by salmon and sea trout angling.

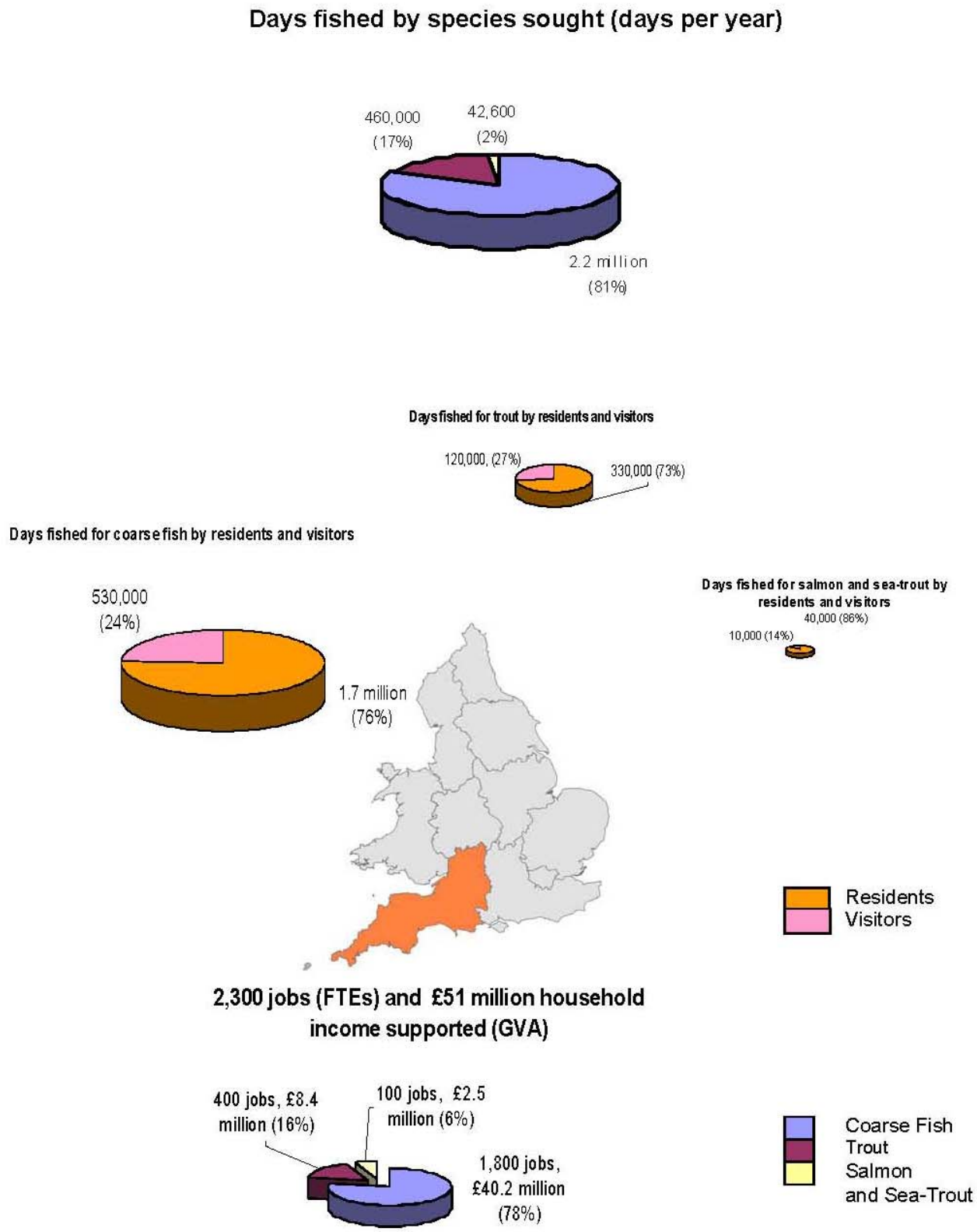
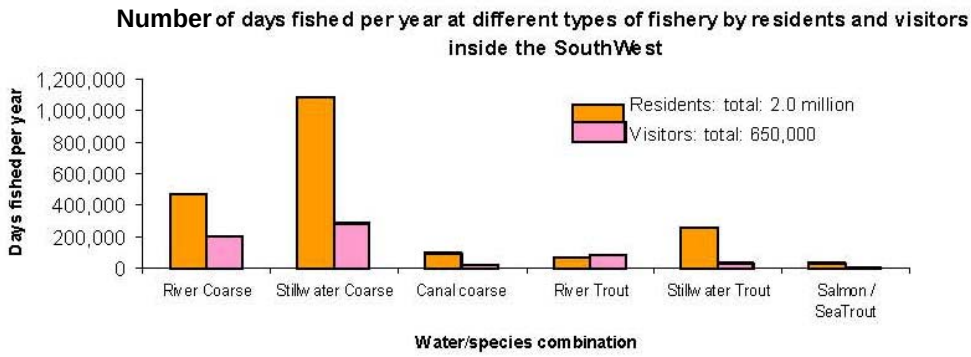
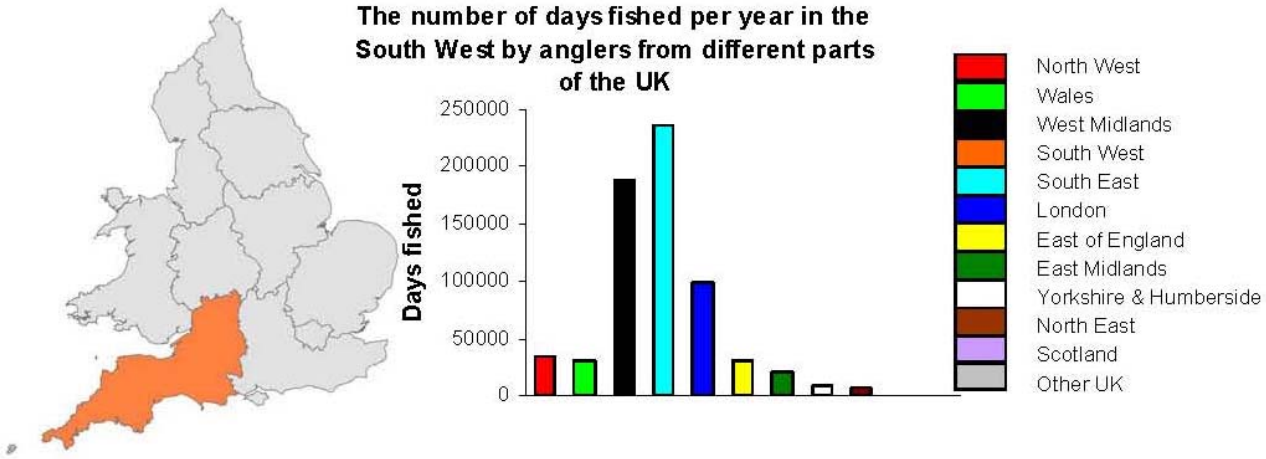


Figure 12. Days fished for different species in the South West by residents and visitors, showing their economic impact in the region





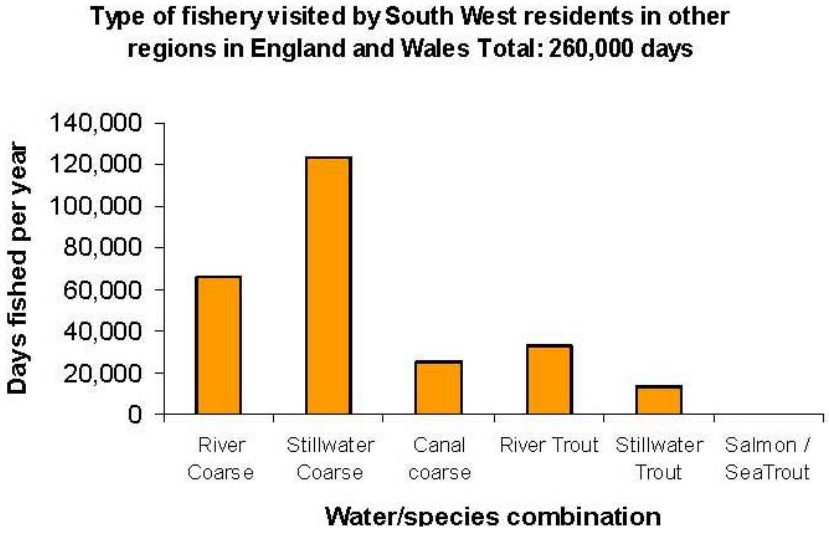


Figure 13. The types of fishery visited in the South West by resident and visiting anglers; origins of anglers visiting the South West from other parts of the UK; and the types visited in other regions of England and Wales by South West residents.

South East

- The South East region had just under 160,000 resident licence holders in 2005, more than any other region.
- Coarse fishing accounted for 90 per cent of the 4.5 million days fished on inland waters in the South East in 2005.
- Game fishing was dominated by trout fishing on still waters with only an estimated 6,000 days fished for salmon or sea trout angling.
- Anglers' annual expenditure on fishing inland waters in the South East totalled almost £200 million, supporting approximately 4,200 jobs and £100 million of household income.
- Visiting anglers generated almost a third of the days fished in the region. They came mainly from London but with significant numbers from the adjacent South West and the East of England. For both residents and visitors, coarse fishing on still waters accounted for most days.
- Trout fishing contributed more, on average, to household income in the region. Trout angling accounted for 14% of the economy activity supported, though only 10% of the days fished.
- Anglers who lived in the South East fished mostly in the region but 17 percent of their days fished were in other regions. This still amounted to 590,000 days fished, mainly coarse fishing on rivers.

Q: What if there were 1,000 more days fishing by visitors to the South East? What impact would this extra trip expenditure have on the regional economy and how would this vary between coarse, trout and salmon & sea trout fishing?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing	Trout fishing
Household income (GVA) (£)/1,000 days	15,000	19,000
Jobs (FTEs)/1,000 days	0.7	0.7

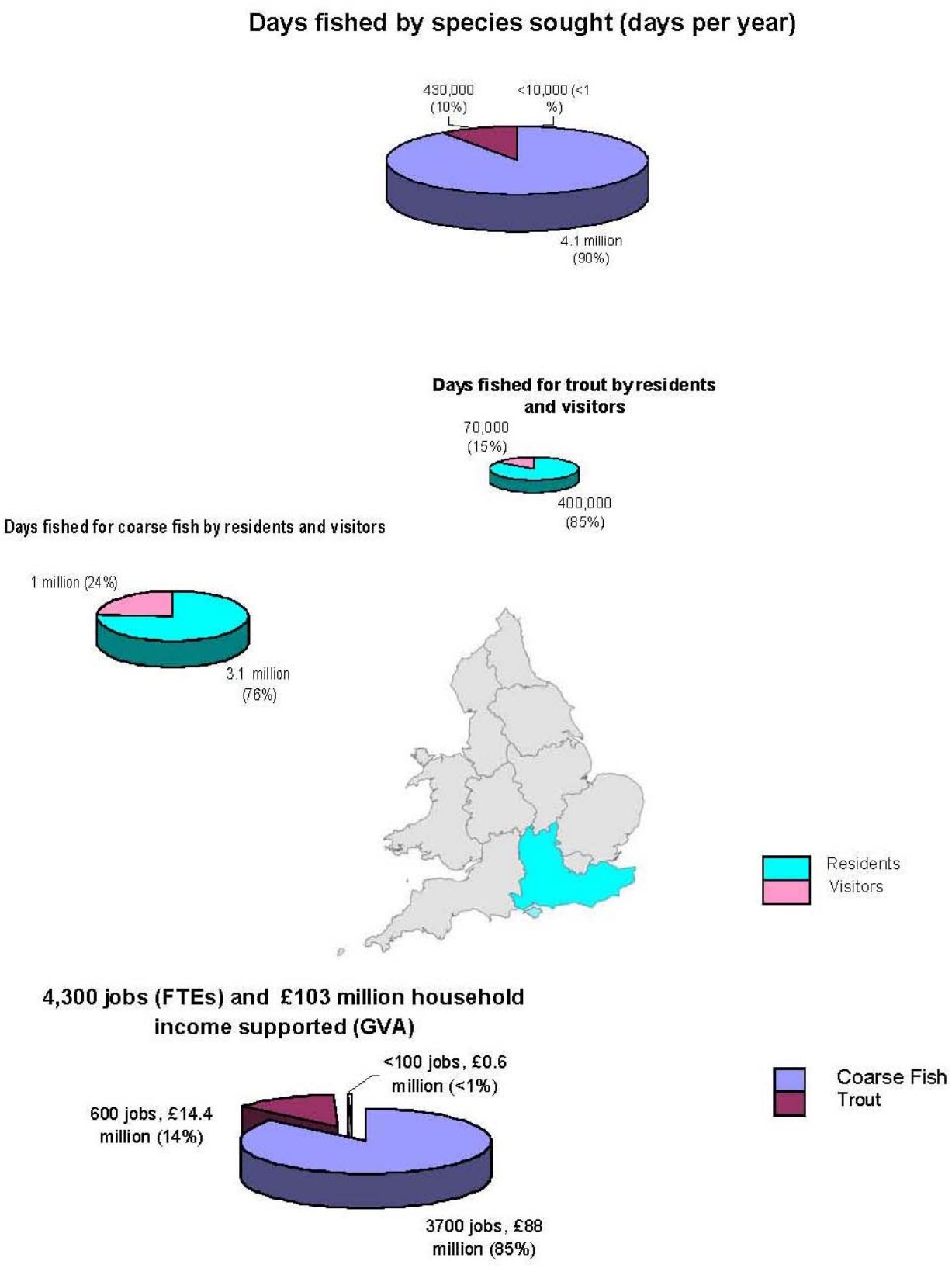


Figure 14. Days fished for different species in the South East by residents and visitors, showing their economic impact in the region.

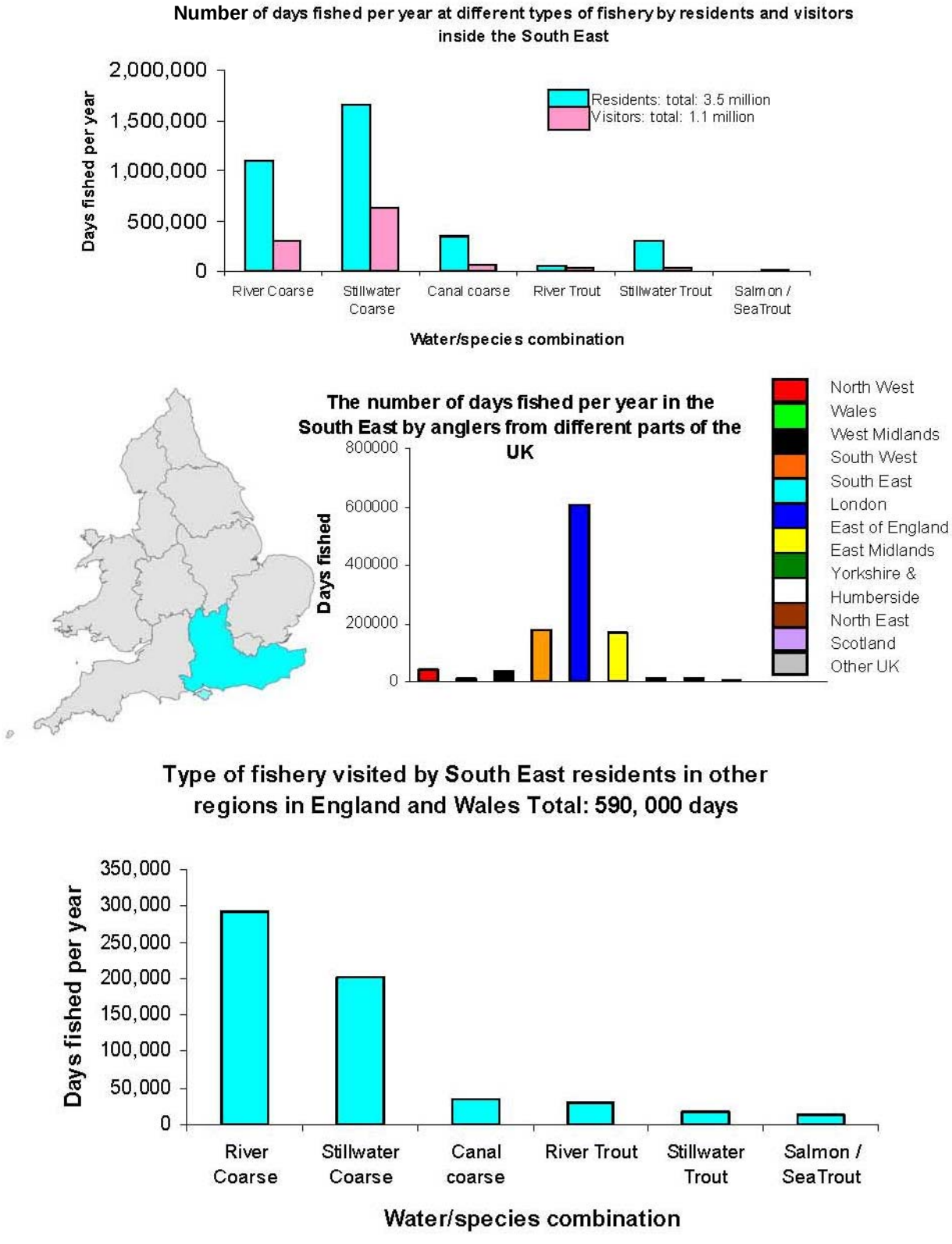


Figure 15. The types of fishery visited in the South East by resident and visiting anglers; origins of anglers visiting the South East from other parts of the UK; and the types visited in other regions of England and Wales by South East residents.

London

- London had 42,000 resident licence holders in 2005, only 5,000 fewer than in Wales.
- However, Londoners only fished for 910,000 days compared to 1.4 million days fished by anglers living in Wales.
- No doubt, much of the disparity is due to the angling opportunities available, given the urban nature of London.
- More than 90 per cent of the days fished by Londoners were outside the region, mainly to the adjacent South East, East of England and South West regions. Only 70,000 of their days were fished in London, mostly coarse fishing on the river though the canals were relatively important. Indeed London was the only region where residents did more coarse fishing in rivers than on still waters. This may reflect limited angling opportunities in the capital.
- Visiting anglers apparently generated four times more fishing activity in London than residents. Given the propensity for resident anglers to fish outside the region, it seems likely that visiting anglers had other reasons than fishing for visiting the region.
- Not surprisingly, angling makes only a very small contribution to London's economy, of which coarse angling formed the largest - £12.4 million and 400 jobs. This doesn't, of course, include the impact of expenditure in London made by anglers, whether residents or visitors, on fishing outside the capital.

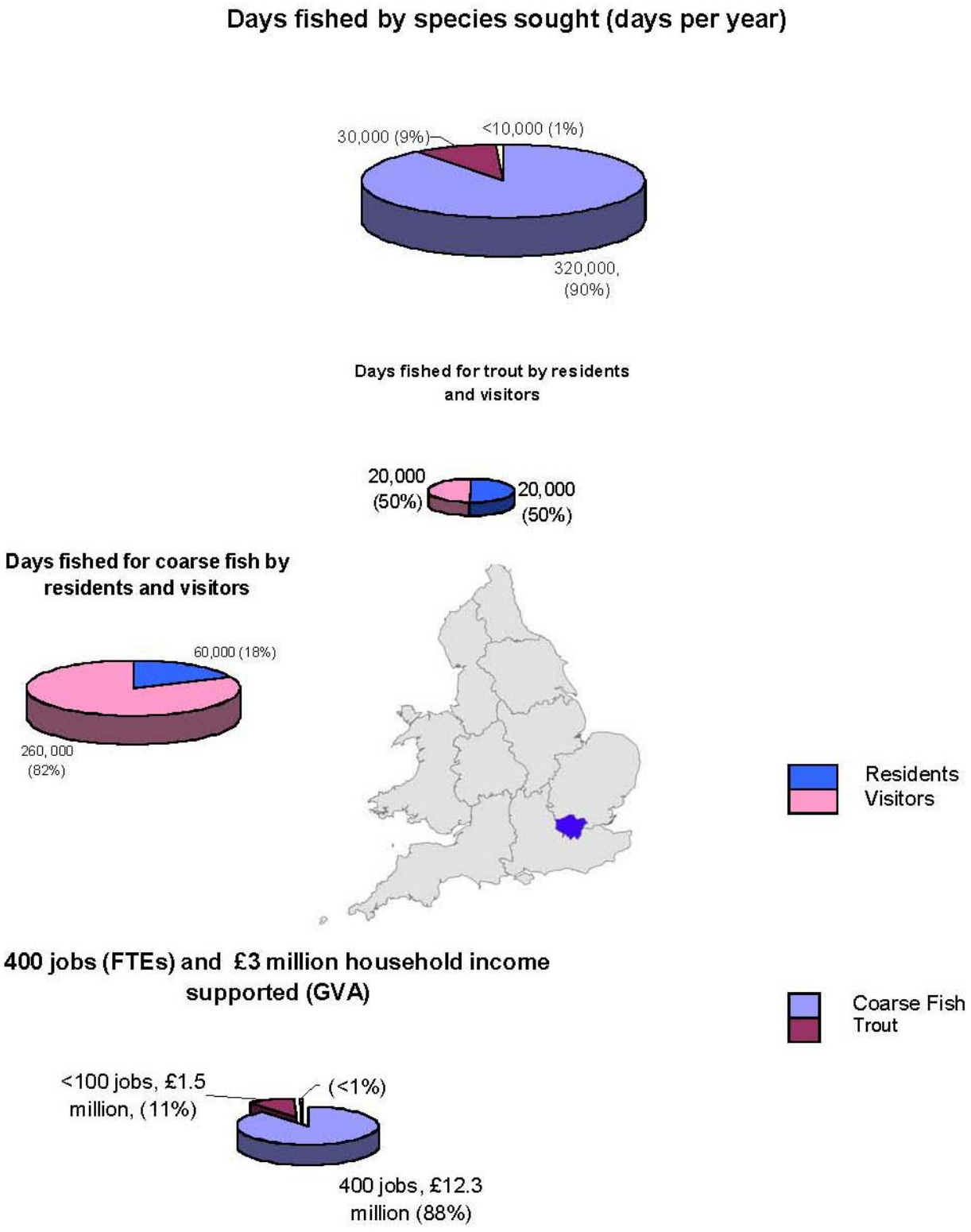


Figure 16. Days fished for different species in London by residents and visitors, showing their economic impact in the region.

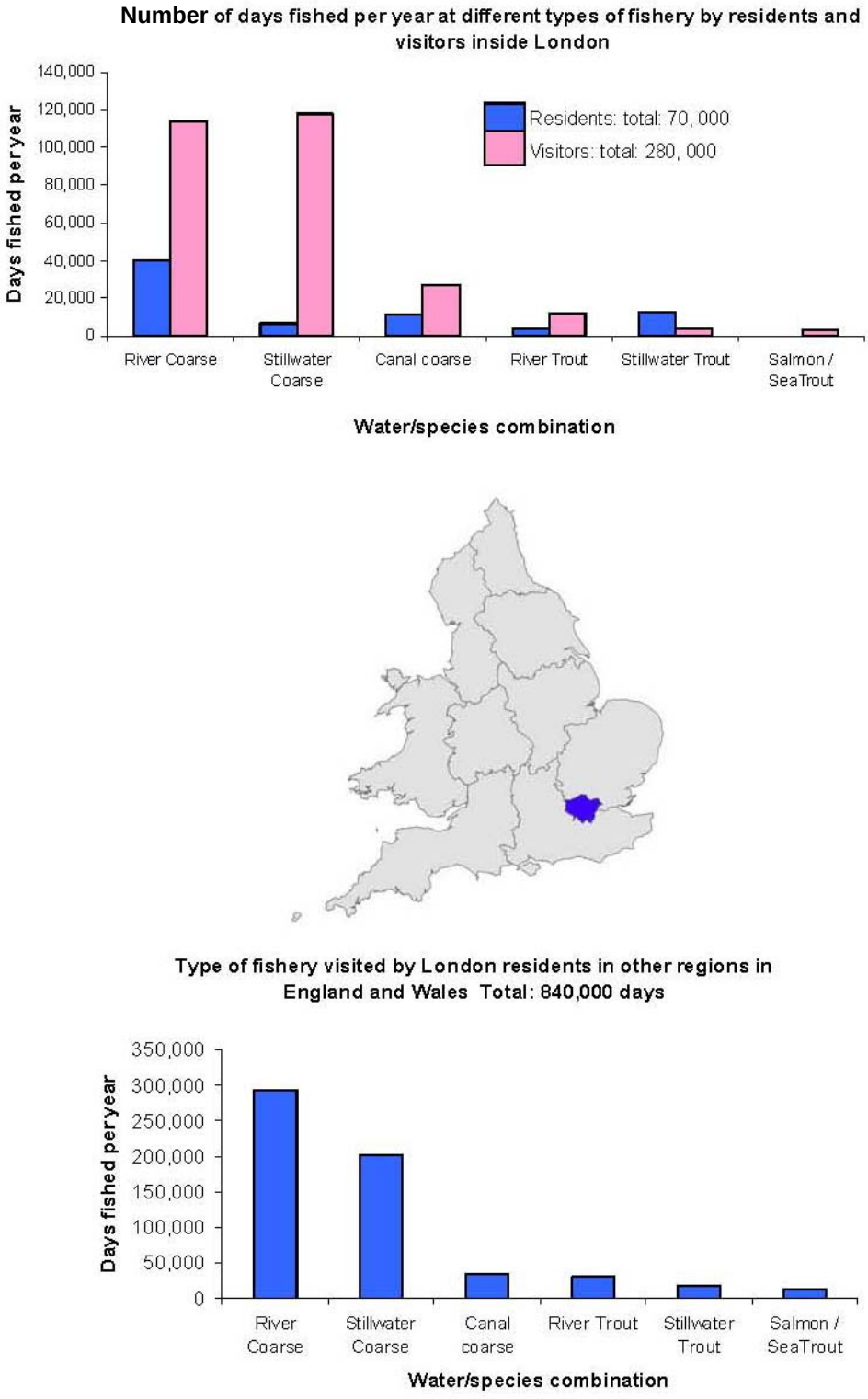


Figure 17. The types of fishery visited in London by resident and visiting anglers; and the types visited in other regions of England and Wales by London residents

East of England

- The East of England region had just under 115,692 resident licence holders in 2005, a similar number to the North West or Yorkshire and Humberside.
- However, the level of angling activity (2.3 million days) in the region was lower than in the North West (4.0 million days) or in Yorkshire and Humberside (3.5 million days).
- Given the limited game angling opportunities in the region, it is not surprising that coarse fishing accounted for 98 per cent of the 2.3 million days fished.
- Anglers' annual expenditure on fishing inland waters in the East of England totalled almost £110 million, supporting approximately 2,100 jobs and £52 million of household income.
- Visiting anglers generated almost half a million days fishing, a fifth of the days fished in the region. They came mainly from the adjacent regions: East Midlands, London and the South East but with a significant proportion from the West Midlands and Yorkshire and Humberside. East of England rivers and still waters were important for residents and visitors alike. The region contains the Broads system which may have been a significant attraction.
- A large proportion, 41 per cent, of the days fished by resident anglers were to other regions. About 1.2 million days were to coarse fisheries, both still waters and rivers, mostly to waters in the adjacent East Midlands.
- Overall, angling in the East of England presents a conflicting picture. The number of anglers is large but the level of angling activity relatively low in the region, with extensive migration to other regions. Nonetheless there are clearly attractions for visitors. The distribution of the population and angling opportunities may be worth further examination.

Q: What if there were 1,000 more days coarse fishing by visitors in the East of England? What impact would this extra trip expenditure have on the regional economy?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing
Household income (GVA) (£)/1,000 days	16,000
Jobs (FTEs)/1,000 days	0.6

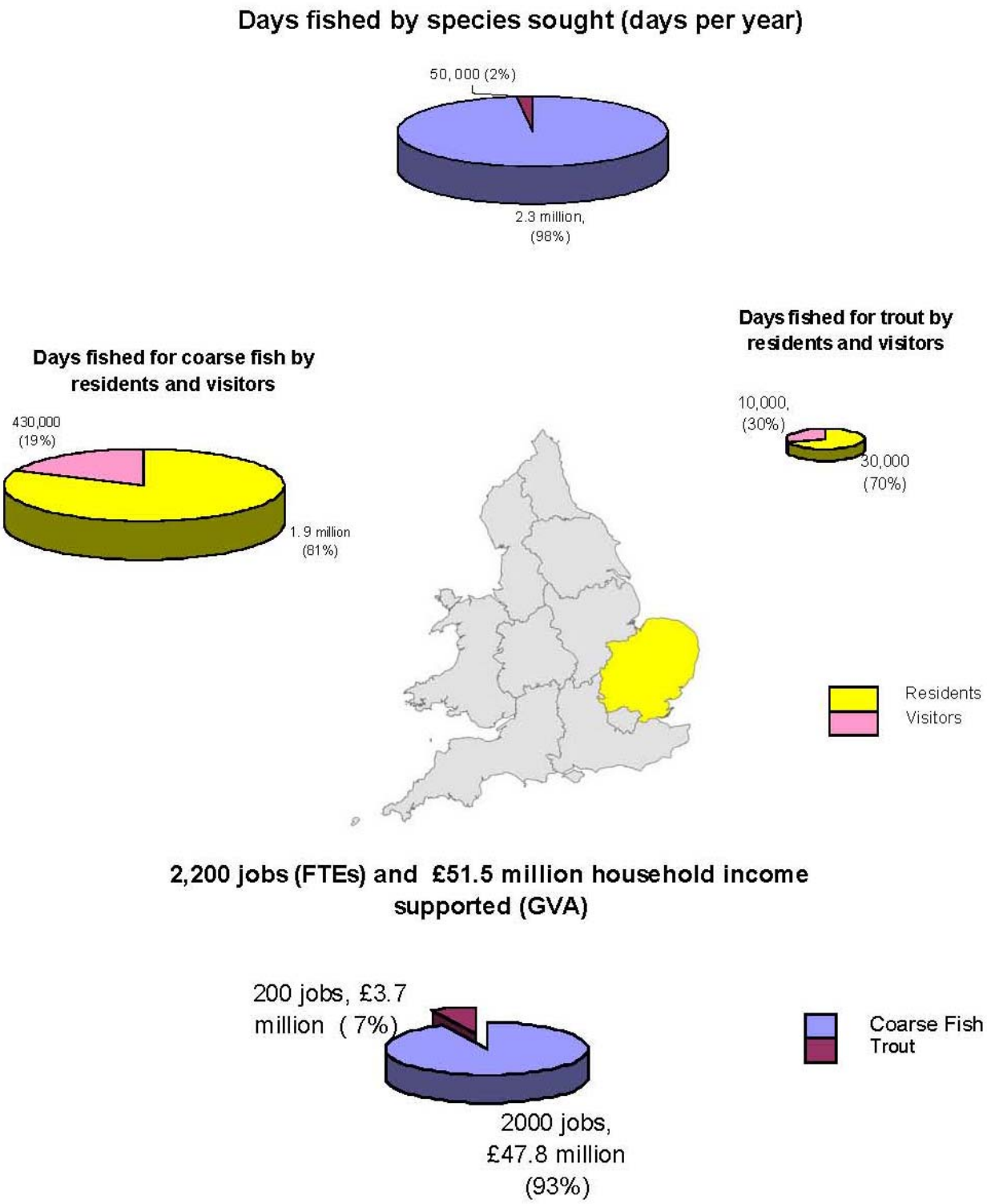


Figure 18. Days fished for different species in the East of England by residents and visitors, showing their economic impact in the region

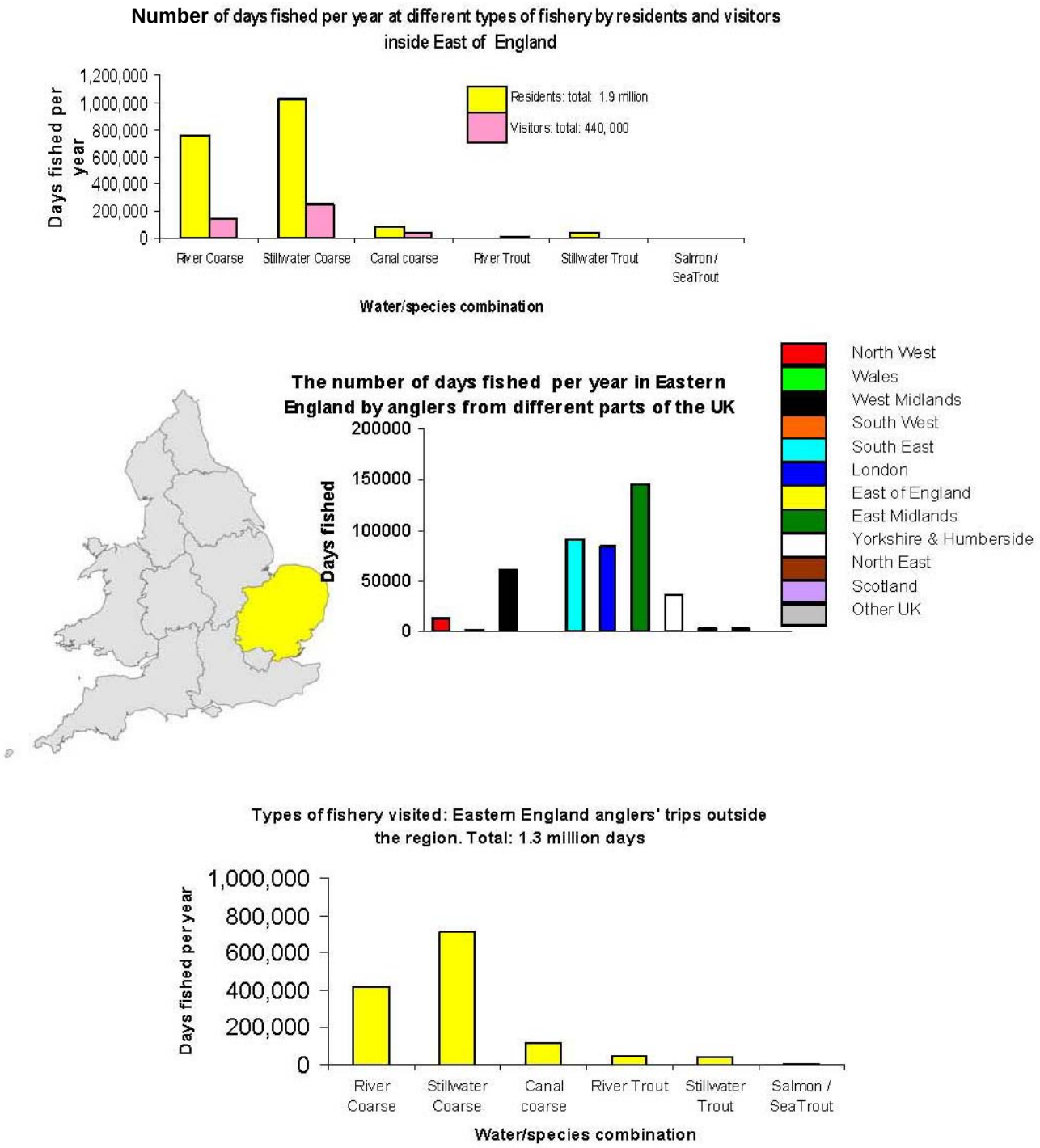


Figure 19. The types of fishery visited in the East of England by resident and visiting anglers; origins of anglers visiting East of England from other parts of the UK; and the types visited in other regions of England and Wales by East of England residents.

East Midlands

- There were five million days fished in the East Midlands in 2005, more than any other region.
- The region only had 108,511 resident licence holders and visiting anglers accounted for a third of all the fishing activity.
- Although dominated by coarse fishing on still waters, rivers and canals, there were over 400,000 days fished for trout, mainly on still waters by residents.
- Anglers' annual expenditure on fishing inland waters in the East Midlands totalled £157 million, supporting about 3,300 jobs and £78 million of household income.
- Visiting anglers came mainly from the adjacent regions: the East of England, Yorkshire & Humberside, and the West Midlands. River fishing was proportionately more important for visitors than residents but, for both groups, coarse fishing on still waters accounted for most days.
- The average trip expenditure by visitors in the region wasn't high, at about £25 per day.
- Resident anglers fished mainly in the East Midlands; only 11 percent of their days fished were in other regions. This amounted to 400,000 days fished, mainly on coarse fisheries.
- River fishing was proportionately more important for residents' trips outside the region.

Q: What if there were 1,000 more days fishing by visitors in the East Midlands? What impact would this extra trip expenditure have on the regional economy and how would it vary between coarse and trout fishing?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing	Trout fishing
Household income (GVA) (£)/1,000 days	13,000	8,000
Jobs (FTEs)/1,000 days	0.5	0.4

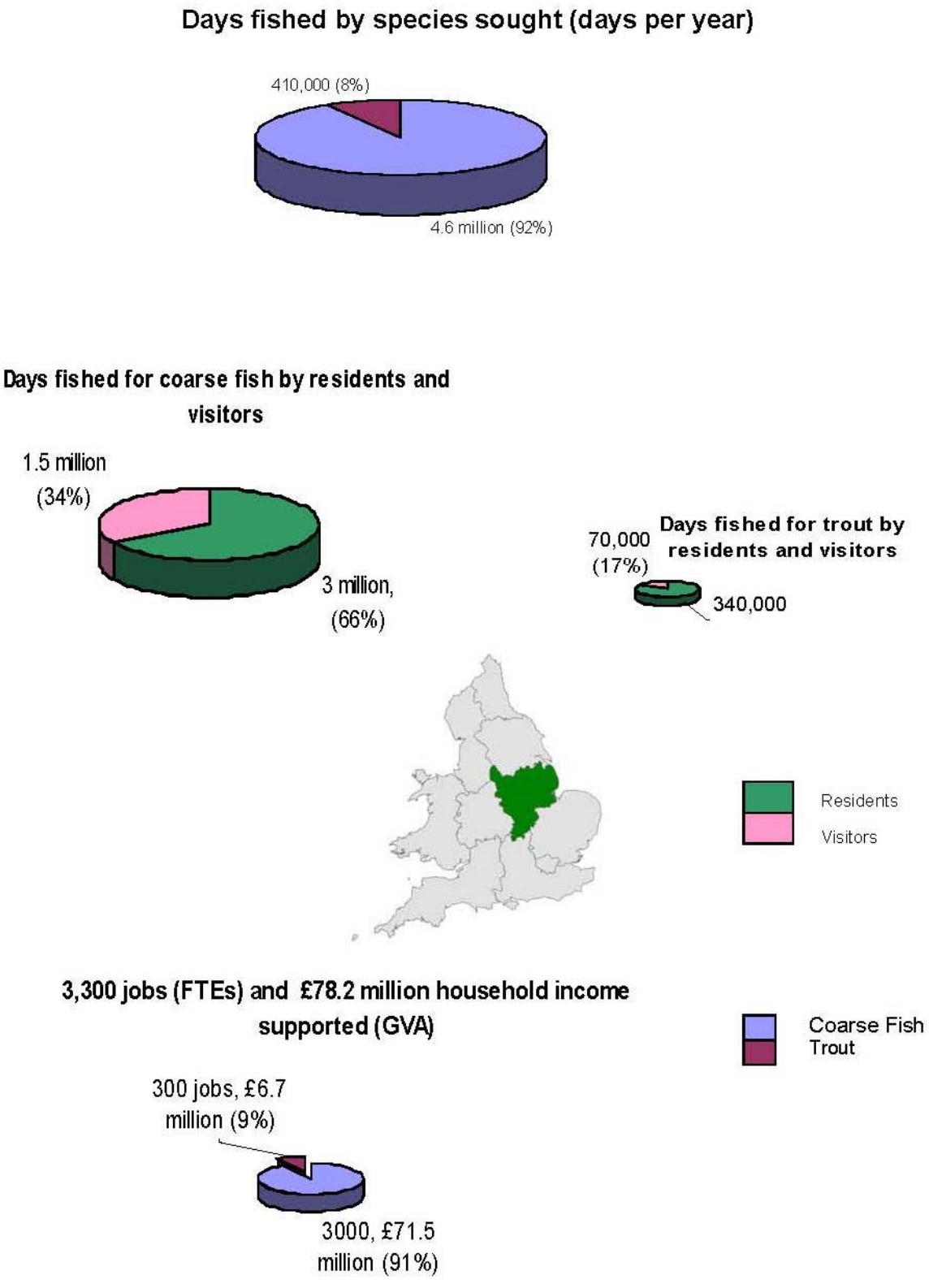
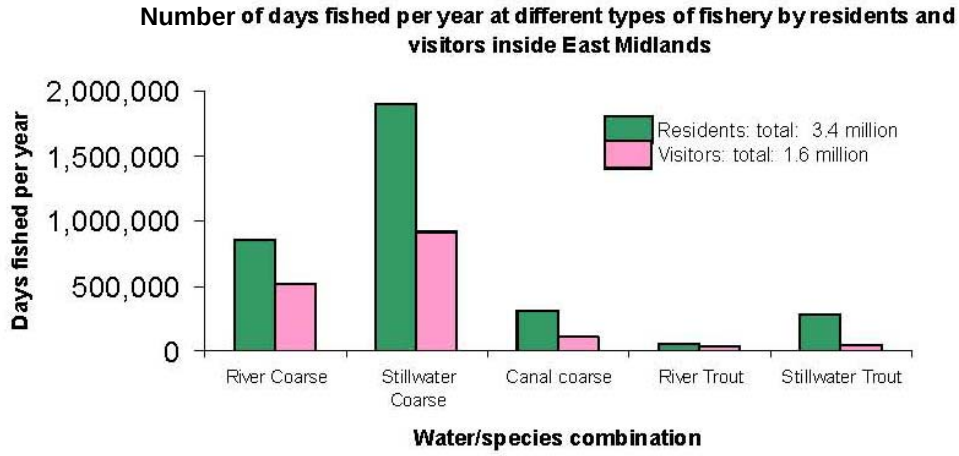
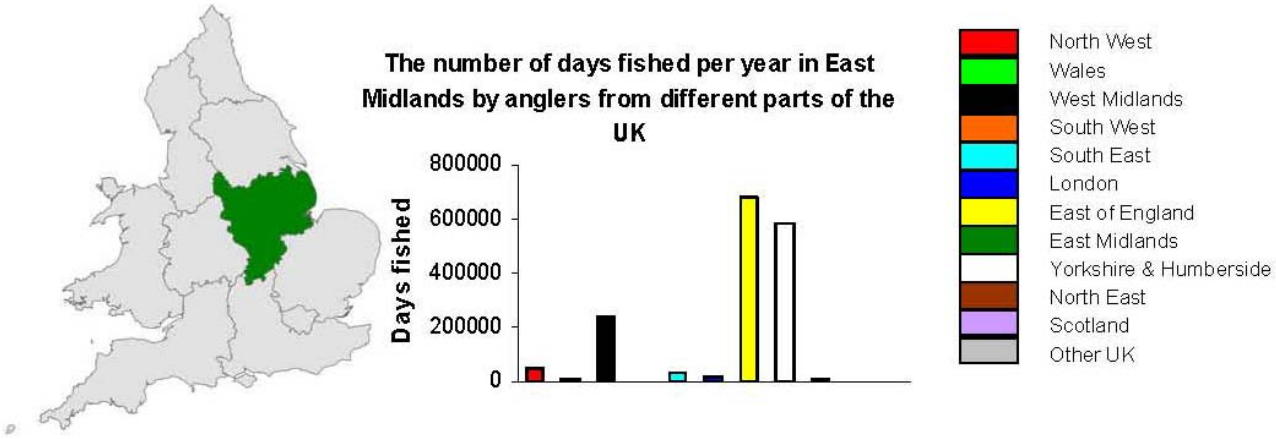


Figure 20. Days fished for different species in the East Midlands by residents and visitors, showing their economic impact in the region.





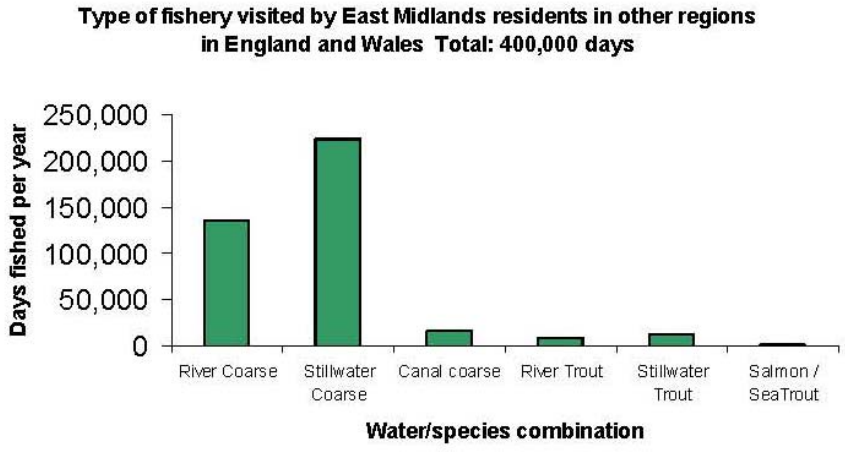


Figure 21. The types of fishery visited in the East Midlands by resident and visiting anglers; origins of anglers visiting East Midlands from other parts of the UK; and the types visited in other regions of England and Wales by East Midlands residents

Yorkshire and Humberside

- There were 3.5 million days fished in Yorkshire and Humberside in 2005, 90 per cent of which were generated by the 116,485 resident licence holders.
- As in all regions, coarse fishing activity predominated, spread across still waters, rivers and canals.
- Around 370,000 days were fished for trout, and unlike any other region there were more days trout fished on rivers than on still waters.
- Anglers' annual expenditure on fishing inland waters in Yorkshire and Humberside totalled £134 million, supporting about 3,100 jobs and £75 million of household income.
- Ninety per cent of the days fished were by residents. Visiting anglers came mainly from the adjacent North East and North West regions but also from the East of England and the West Midlands.
- Coarse fishing on still waters accounted for most days fished but river fishing, whether for coarse fish or trout, was also important for both groups.
- Resident anglers fished quite extensively elsewhere: 24 per cent of their days fished were outside the region. This amounted to a million days fished, mainly on coarse fisheries.
- Game fishing was proportionately more important for residents' trips outside the region than inside.

Q: What if there were 1,000 more days fishing by visitors in Yorkshire and Humberside? What impact would this extra trip expenditure have on the regional economy and how would it vary between coarse and trout fishing?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing	Trout fishing
Household income (GVA) (£)/1,000 days	16,000	15,000
Jobs (FTEs)/1,000 days	0.6	0.6

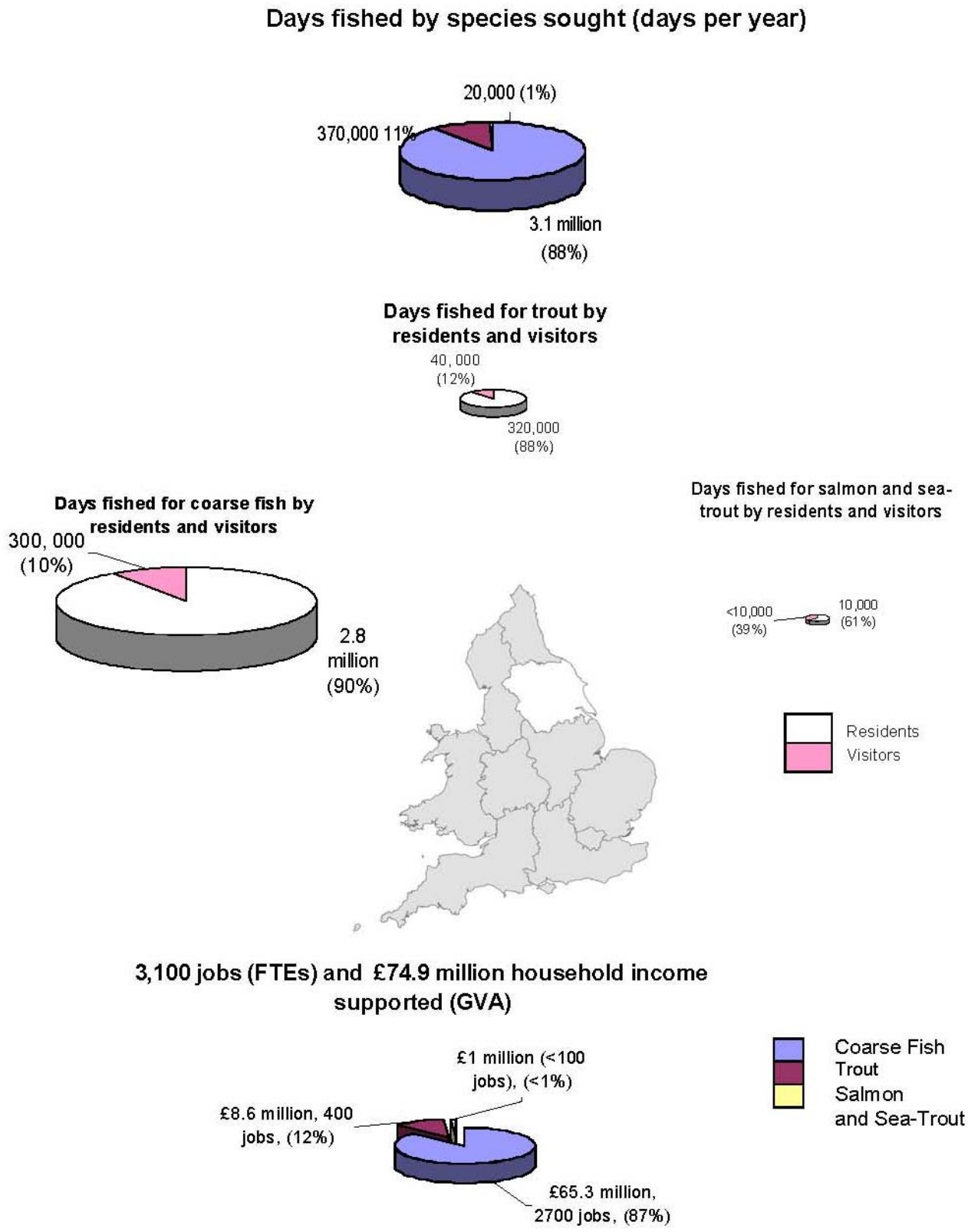


Figure 22. Days fished for different species in Yorkshire and Humberside by residents and visitors, showing their economic impact in the region.

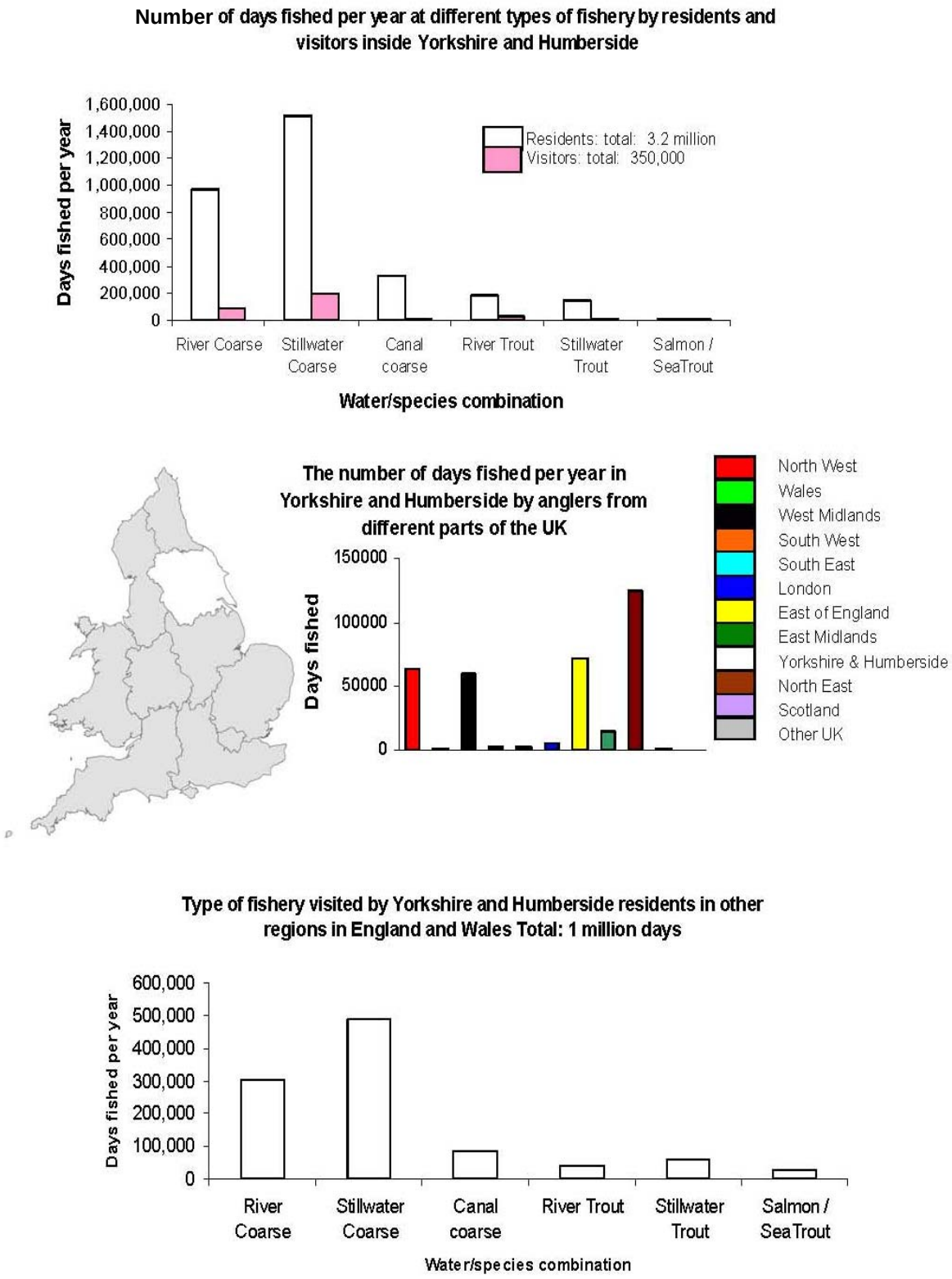


Figure 23. The types of fishery visited in Yorkshire and Humberside by resident and visiting anglers; origins of anglers visiting Yorkshire and Humberside from other parts of the UK; and the types visited in other regions of England and Wales by Yorkshire and Humberside residents.

North-East

- Of 1.3 million days fished on inland waters in the North East region in 2005, 70 per cent were spent coarse fishing.
- Some 370,000 days were spent game fishing, mostly for trout on still waters. Evens so, the North East was second only to the North West and Wales for the number of days fished for salmon and sea trout.
- There were only 37,951 licence holders resident in the North East in 2005, the lowest number of any region.
- Visiting anglers apparently accounted for 520,000 days fished: 40 per cent of all the days fished in the region. However, it would seem that some anglers who took part in the survey were unclear about the boundaries of the North East government office region. There were 44,000 days recorded as fished by visitors on canals, yet the region doesn't have any canals. It is likely that these trips should have been allocated to Yorkshire and Humberside.
- Anglers' annual expenditure on fishing inland waters in the North East totalled £46 million, supporting approximately 940 jobs and £21 million of household income. Salmon and sea trout angling accounted for 15 per cent of this economic activity.
- Visiting anglers came mainly from the adjacent regions, Yorkshire and Humberside and the North West but with substantial proportions from the West Midlands and East of England.
- Game fishing on rivers was relatively more important for visitors than for residents.
- Average trip expenditure recorded for visiting salmon and sea trout anglers was high: £118 per day, compared to £44 for visitors who fished for trout and £18 for coarse fish.
- For residents anglers, 23 per cent of their days fished were in other regions, some 223,000 days, and mostly to still water coarse fisheries.

Q: What if there were 1,000 more days fishing by visitors to the North East? What impact would this extra trip expenditure have on the regional economy and how would this vary between coarse, trout and salmon and sea trout fishing?

A: Provided that it was all new expenditure to the region and in a similar pattern to reported trips, this would generate:

	Coarse fishing	Trout fishing	Salmon and sea trout fishing
Household income (GVA) (£)/1,000 days	9,000	16,000	48,000
Jobs (FTEs)/1,000 days	0.4	0.7	2.2

Q: What if salmon and sea trout fishing were to stop in the East as the result of *Gyrodactylus salaris?* What impact would this have on the regional economy?

A: Some angling activity would transfer to other regions (assuming they were unaffected) and to other types of fishing. So the net loss per year in the North East would be 80 jobs and £1.8 million in household income, about 60 per cent of the economic activity supported by salmon and sea trout angling.

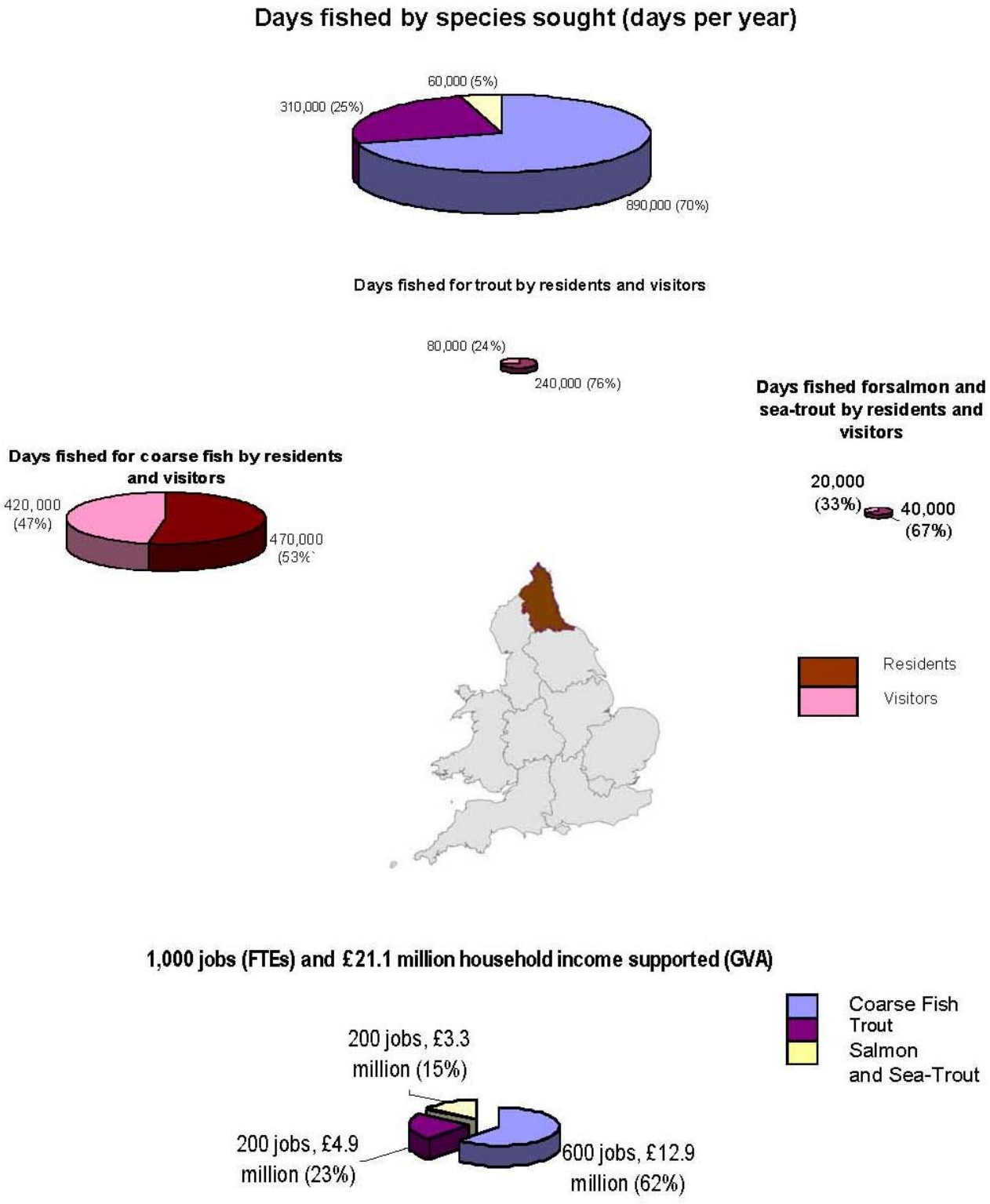


Figure 24. Days fished for different species in the North East by residents and visitors, showing their economic impact in the region

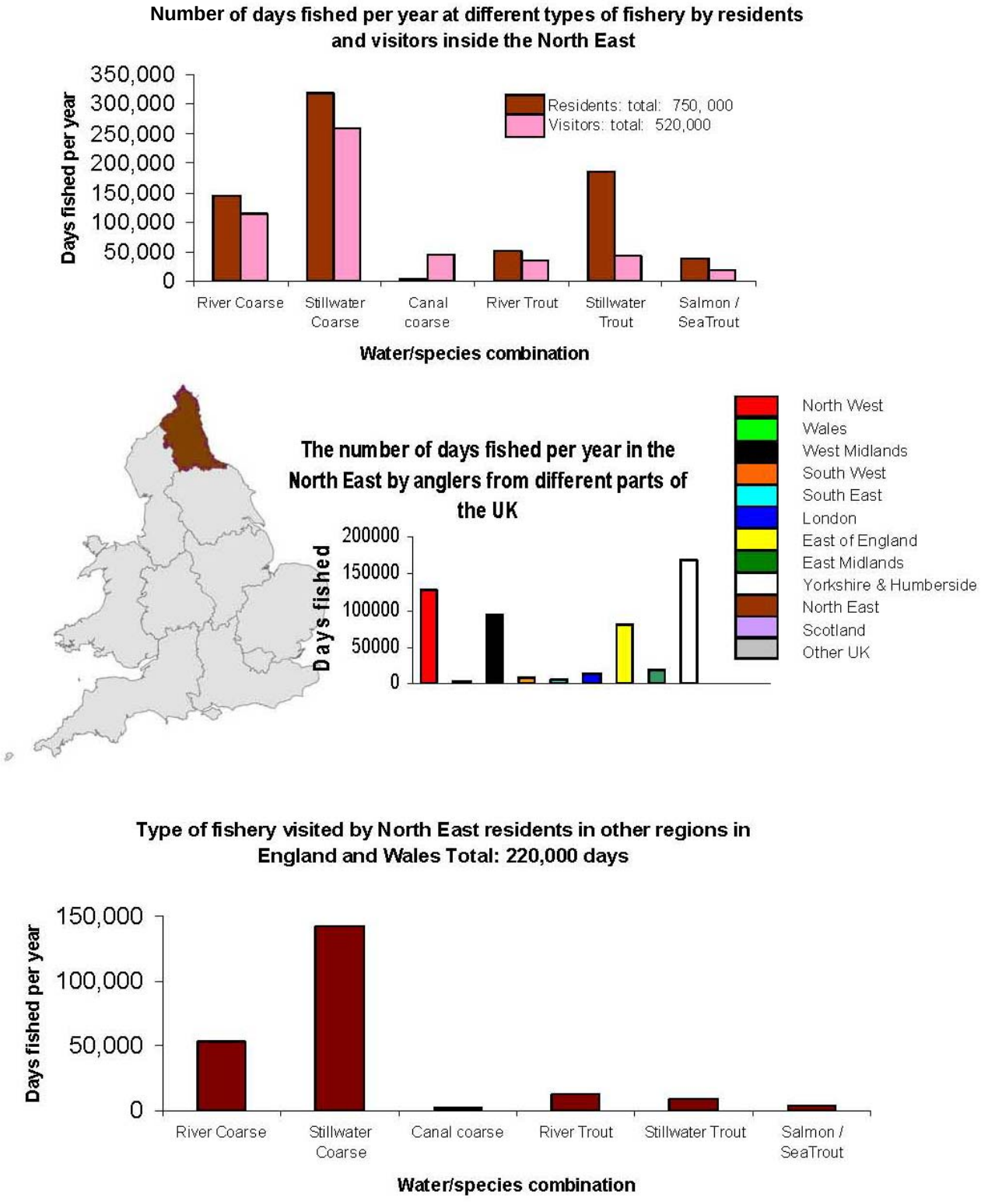
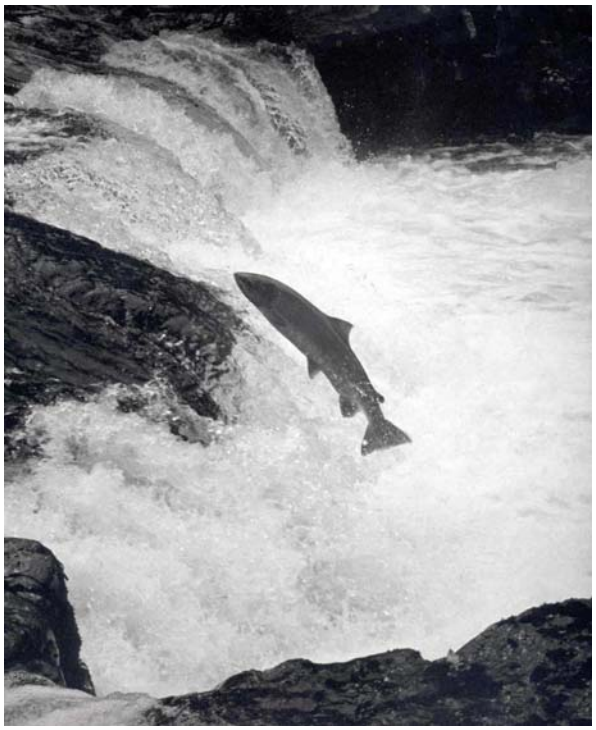


Figure 25. The types of fishery visited in the North East by resident and visiting anglers; origins of anglers visiting the North East from other parts of the UK; and the types visited in other regions of England and Wales by North East residents

Total economic value of salmon, other fish and river quality

Uses and perceptions of rivers



An icon of a healthy river ecosystem – a leaping salmon

Figure 26 shows the locations of towns and cities where the public were interviewed about rivers and fish, and the salmon rivers referred to in the questionnaire.

Eighty-eight per cent had never taken part in freshwater angling but half had walked by a river more than once a month. Half also claimed to have seen fish in rivers they had visited and 71 per cent had seen anglers.
Half of respondents said that they would feel benefit if fish stocks in rivers in England and Wales were generally better; this figure increased to 80 per cent for a named river, usually one close to where they lived. When people were asked how they felt they would benefit, most responses included environmental quality and healthy fish stocks. Such ‘non-use’ values ranked higher than values linked to fishing.

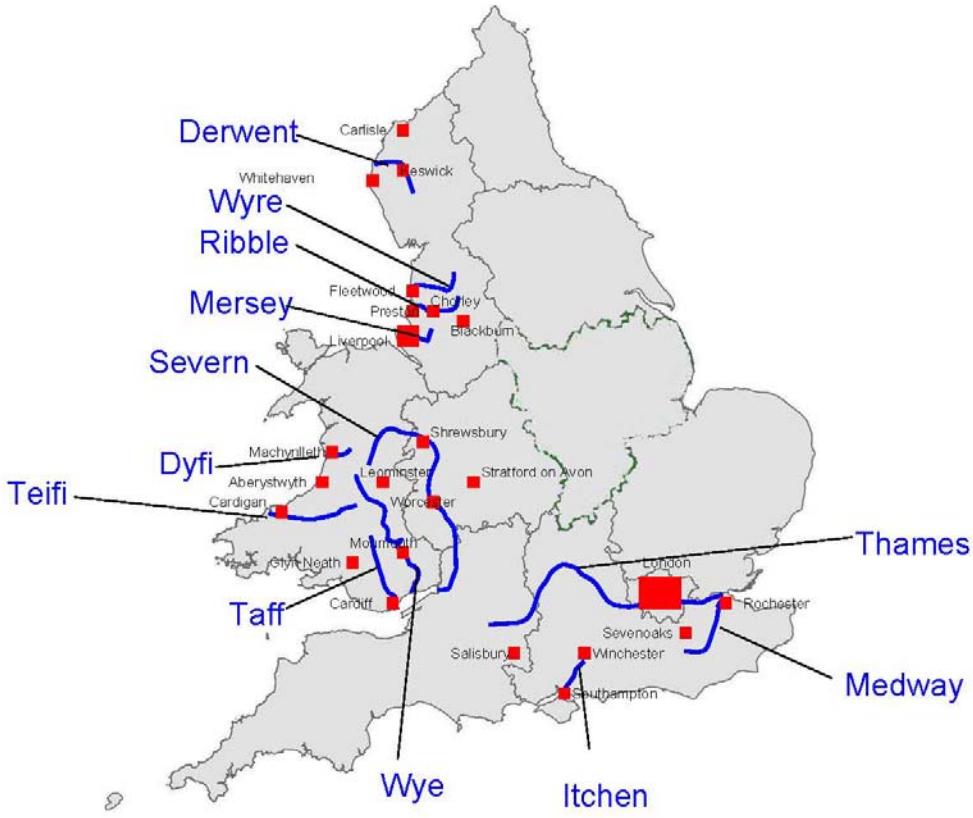


Figure 26. General public survey: salmon rivers and interview locations

People were asked to rate the environmental quality of a named river as ‘good’, ‘moderate’, ‘poor’ or ’dead’, considering the amounts of water in the river, wildlife and pollution. Only the Wye had a majority of responses (54 per cent) as ‘good’. Otherwise, rivers were perceived on average to be of ‘moderate’ quality.

The upper reaches of the R. Wye

	Good	Moderate	Poor	Dead
Proportion who said river fell in this category	21%	55%	23%	1%

Even the Thames (the lowest ranked) was considered to be of 'moderate' or 'good' quality by 60 percent of those asked about the river.

Total economic value of salmon: extra willingness-to-pay to protect against a severe decline in salmon stocks

The study of economic impact of angling indicated a net loss of 400 jobs with £10 million in household income across England and Wales if salmon angling had to stop. The parasite *Gyrodactylus salaris* could cause a severe decline in stocks, leading to such a scenario.

This loss of economic activity, however, provides little indication of the loss in benefits from salmon to society that would result from a severe decline in stocks. The survey of the general public estimated such a loss in value. This summary does not describe in detail the methods used, but considerable efforts were made to obtain valid and accurate responses, including checks built into the questionnaire. Advice on the survey design and treatment of the results were obtained from leaders in the field. Those interested in the methods are advised to read the contractors' report.

People were asked if their household would be prepared to pay towards protecting salmon stocks from severe decline (95 per cent) due to disease and, if so, how much every year for 25 years.

About two-thirds of the sample stated that they would be prepared to pay an additional sum through tax or water rates to avoid a severe decline in salmon stocks in England and Wales generally.

The average amount per household was £15.80 extra per year, but this should not be considered as typical as there was a wide spread of responses. Half of the sample were only prepared to pay five pounds or less; and almost a third of people were not willing to pay anything. However, five per cent were prepared to pay £100 or more per year.

The overall sum people were willing to pay tended to be higher if they went boating on rivers; had special interests such as angling; were better educated or were wealthier. There appeared to be no purely regional trends in whether people were willing to pay or indeed how much.

The total extra willingness-to-pay to prevent a severe decline in salmon stocks was estimated as:

£15.80 x 22.3 million households **= £350 million per year for England and Wales**

Treasury guidance can be used to capitalise this annual value, indicating that the present value of this extra willingness-to-pay over 25 years would be about **£6 billion**.

These two figures, annual or capitalised, indicate the total economic value of 95 percent of the salmon stocks in England and Wales.

Marginal changes in fishery quality

Nationwide, severe, sudden decline in salmon stocks is an extreme example of potential changes. The study looks at proportional changes in value to help assess more gradual changes in fishery quality. The 911 people from the different locations were asked their willingness to pay for different levels of improvement in general river quality; in salmon stocks; and in stocks of other fish species, for their named rivers. Four levels of quality were considered – 'no fish' or 'dead'; 'poor'; 'moderate', and 'good'. Figures 27a to 27c show people's relative willingness to pay for the three components.

For general **river quality**, people saw little value in moving a river from 'dead' to 'poor' quality, but placed a great deal of importance on moving from 'poor' to 'moderate'. They placed less (though not insignificant) value on moving from 'moderate' to 'good'.

For **salmon** stocks, however, there was perceived value in improving a river from having 'no salmon' to having some. Again, while the biggest proportional change was from 'poor' to 'moderate' salmon stocks, the increase to 'good' was still substantial.

For **other fish species** the pattern was different again. There was no value placed on improving from 'no fish' to 'poor quality'. There was a big jump in value on achieving 'moderate' stocks' and even bigger jump on moving from 'moderate' to 'good' stocks of fish.

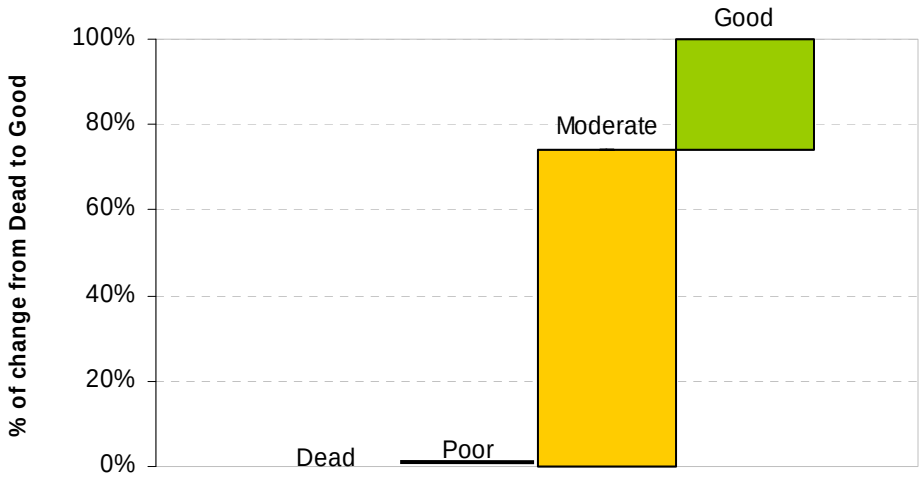
The lower river Aire in Yorkshire in 1983, then heavily polluted but now supports a thriving coarse fishery and salmon have been sighted recently

These marginal changes may have significance for fishery managers and for water managers when considering cost-benefits of improvement programmes, especially in the light of the European Water Framework Directive which requires that all water bodies shall be at good ecological status, rather than merely moderate.

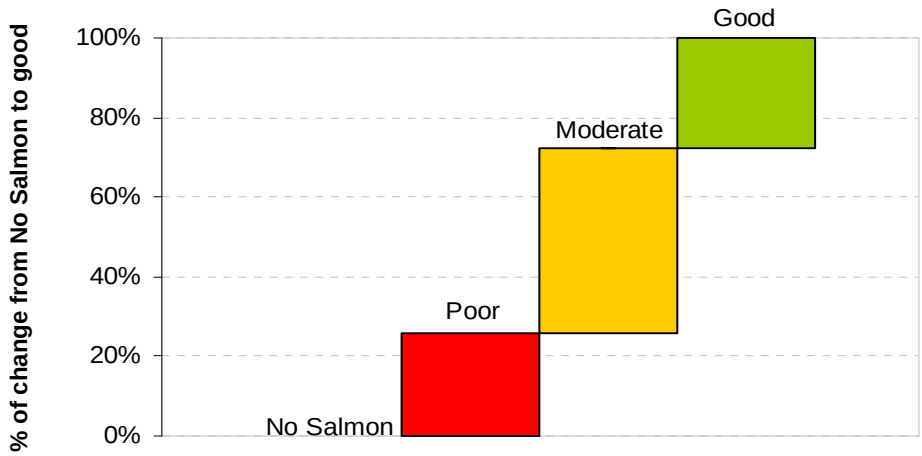
When the converse – protecting rivers from deterioration – was considered, willingness-to-pay to prevent a river deteriorating from 'moderate' to 'dead' status was over two-and-a-half times greater than for improvement over a similar range. This sends a clear

message to the authorities that the public place greater importance on protecting environments from harm than upon improving existing quality.

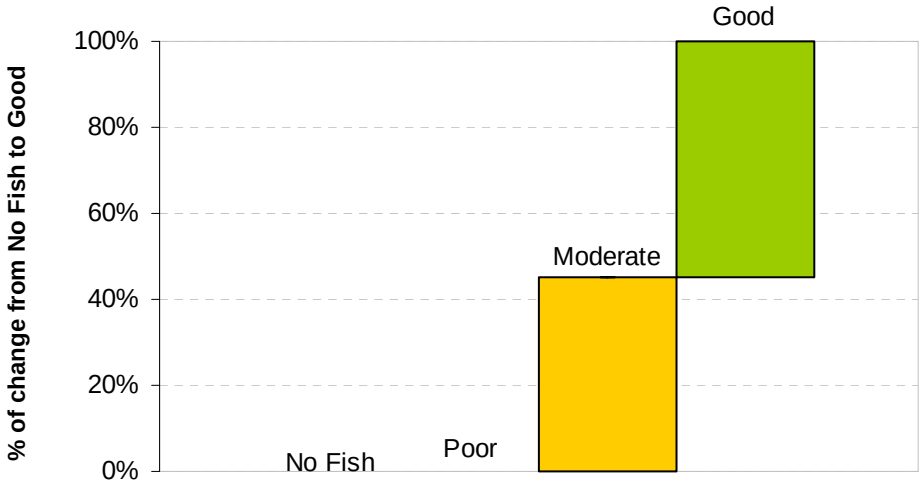
a) Willingness-to-pay to move between different levels of river quality



b) Willingness-to-pay to move between different levels of salmon stocks



c) Willingness-to-pay to move between different levels of fish stocks, other than salmon



Figures 27a-27c. Relative willingness-to-pay for levels of improvement in a) general river quality b) salmon stocks c) fish other than salmon

Health and social welfare aspects of angling

For most people, angling is perceived as a recreation. But does it contribute to their physical and psychological welfare and what might that be worth in economic terms? This study only had sufficient funding to ask some preliminary questions on welfare in the survey of rod licence holders.

Physical exercise obtained from angling

Playing a good fish – light or moderate exercise?

To test the extent to which angling is a source of physical activity, licence holders were asked to place their angling activity in one of four categories. Most (85 per cent) considered participation in angling to be a light activity (like walking for pleasure, pleasure boating) or moderate exercise (like kayaking, gardening, bowling, walking for exercise). Only six per cent regarded angling as vigorous activity (like running, swimming, cycling, racquet sports) whilst nine per cent regarded angling as basically inactive. This may reflect the different styles of angling practised. To try and elicit whether angling has a net benefit to health via physical exercise, anglers were asked what types of activities they would do if unable to fish.

Though the analysis is limited, there is no general picture of increased physical exercise from angling. Overall:

- 30 percent would gain more exercise from angling
- 33 percent would gain more from their alternative activity
- 36 would gain the same.

The significance of this exercise for health may depend on the lifestyle of the individual angler.

Psychological benefits

A successful evening fishing session – a break from everyday life

Rod licence holders were asked to score a series of statements about angling from 1 'strongly disagree' to 5 'strongly agree':

- I enjoyed the trip (4.9)
- I appreciated the break from my everyday life (4.8)
- I felt more relaxed after the trip (4.6)
- I enjoyed meeting other anglers (4.3)
- I felt healthier after the trip (4.2)
- I appreciated the solitude (4.2)
- I obtained physical exercise from the trip (3.9)

These are listed in order of the average scores obtained, shown in brackets. A score of three would indicate neither agreement nor disagreement. Most anglers in the survey agreed with all of the statements, and strongly with the first three. This preliminary work suggests significant contributions to psychological welfare from angling.

Appendix A: Summary table of economic activity

		North East	North West	Yorks & Humber	West Midlands	East Midlands	East of England	London	South East	South West	Wales	England & Wales[1]
Angler days ('000s)	**Coarse**	889	3,474	3,117	4,592	4,580	2,296	317	**4,093**	2,182	847	26,387
	Trout	314	431	368	249	409	49	33	**434**	455	692	3,434
	S & ST	57	108	20	18	0	0	3	**6**	43	175	429
	ALL	1,260	4,013	3,505	4,859	4,989	2,344	353	**4,533**	2,680	1,714	30,250
Gross angler expenditure (£'000s)	**Coarse**	£26,208	£117,128	£115,447	£175,685	£140,400	£101,648	£21,141	**£170,669**	£78,171	£24,731	£971,228
	Trout	£12,131	£16,336	£16,478	£16,473	£16,761	£8,280	£2,486	**£26,951**	£19,145	£37,666	£172,707
	S & ST	£7,228	£7,655	£1,694	£1,142	£0	£0	£138	**£1,233**	£6,261	£11,607	£36,958
	ALL	£45,567	£141,119	£133,618	£193,300	£157,161	£109,929	£23,765	**£198,853**	£103,577	£74,004	£1,180,893
Income (GVA) supported (£'000s)	**Coarse**	£12,938	£67,042	£65,303	£90,772	£71,415	£47,881	£12,336	**£87,907**	£40,200	£11,204	£804,203
	Trout	£4,858	£7,985	£8,642	£8,604	£6,757	£3,744	£1,487	**£14,380**	£8,373	£15,307	£147,603
	S & ST	£3,224	£4,216	£1,026	£598	£0	£0	£84	**£613**	£2,922	£5,294	£28,612
	ALL	£21,020	£79,243	£74,970	£99,974	£78,173	£51,625	£13,907	**£102,900**	£51,495	£31,805	£980,418
Employment supported (FTEs)	**Coarse**	573	2,736	2,730	3,829	3,039	1,986	397	**3,657**	1,760	501	30,580
	Trout	216	331	363	362	297	160	48	**560**	366	689	5,628
	S & ST	146	180	46	27	0	0	3	**24**	130	263	1,179
	ALL	935	3,247	3,139	4,218	3,336	2,146	448	**4,241**	2,255	1,454	37,386

[1] Because of different multiplier effects, estimates of GVA and FTE are not summations of individual regions. Only angler days and gross expenditures can be summed across regions and species.

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Published by:

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Email: enquiries@environment-agency.gov.uk
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