

# THE ROLE OF RECREATIONAL ANGLERS IN MONITORING THE ECOLOGICAL INTEGRITY OF AQUATIC SYSTEMS: A case study from South India

**Adrian C. Pinder**  
April 2019, Karlovac, Croatia



**MAHSEER TRUST**  
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# THE HUMP-BACKED MAHSEER

- One of 16 species of *Tor* – iconic yet highly threatened fishes distributed throughout South and Southeast Asia
- Grows >1.5m and >50kg
- Internationally revered by catch and release anglers
- Only found in South India's River Cauvery

# THE RIVER CAUVERY



# THE CATCH & RELEASE RECREATIONAL FISHERY



# THE C&R FISHERY, ALTERNATIVE LIVELIHOODS & RIVER PROTECTION



# THE ROLE OF C&R ANGLERS IN RIVER CONSERVATION: Galibore Fishing Camp 2010/11



# THE ROLE OF C&R ANGLERS IN POPULATION MONITORING

TOTAL: 124 MAHSEER. BEST FISH: COLIN BELTON 82lbs, MARTIN BROWN 77lbs, JOHN WILSON 60lbs, DAVE JORDISON 60lbs.  
 GROUP 1. THUR 20<sup>th</sup> JAN - WED 2<sup>nd</sup> FEB 2005.

2005

### Jungle Lodges Mahseer Catch Records - River Cauvery - India

	Tue 20 Day 1	Fri 21 Day 2	Sat 22 Day 3	Sun 23 Day 4	Mon 24 Day 5	Tue 25 Day 6	Wed 26 Day 7	Thu 27 Day 8	Fri 28 Day 9	Sat 29 Day 10	Sun 30 Day 11	Mon 31 Day 12	Tue 1 Day 13	Wed 3 Day 14	Pers Total
BLAIR COOK								15lbs			3lbs				13
JOHN WILSON	6lbs	21lbs	33lbs		10lbs	5lbs	6lbs	5lbs	19lbs				5lbs	3lbs	16
MARTIN BROWN	4lbs	42lbs	34lbs		12lbs	20lbs	77lbs		3lbs			12lbs	5lbs		14
JAN BROWN	6lbs	25lbs			5lbs	10lbs				5lbs				4lbs	6
RICHARD FOSTER		3lbs		35lbs				8lbs							10
COLIN BELTON	4lbs	15lbs	8lbs							82lbs					18
STEVE LAMONT	5lbs		12lbs	60lbs		5lbs	5lbs		32lbs	10lbs		8lbs	22lbs	7lbs	27
DAVE JORDISON	60lbs	44lbs	31lbs		4lbs	5lbs			22lbs				74lbs	14lbs	6
TONY BROOKFIELD		12lbs		15lbs											3
Totale	7.	10	15	6.	9.	9.	11.	6.	10.	9.	10.	9.	10.	3	102

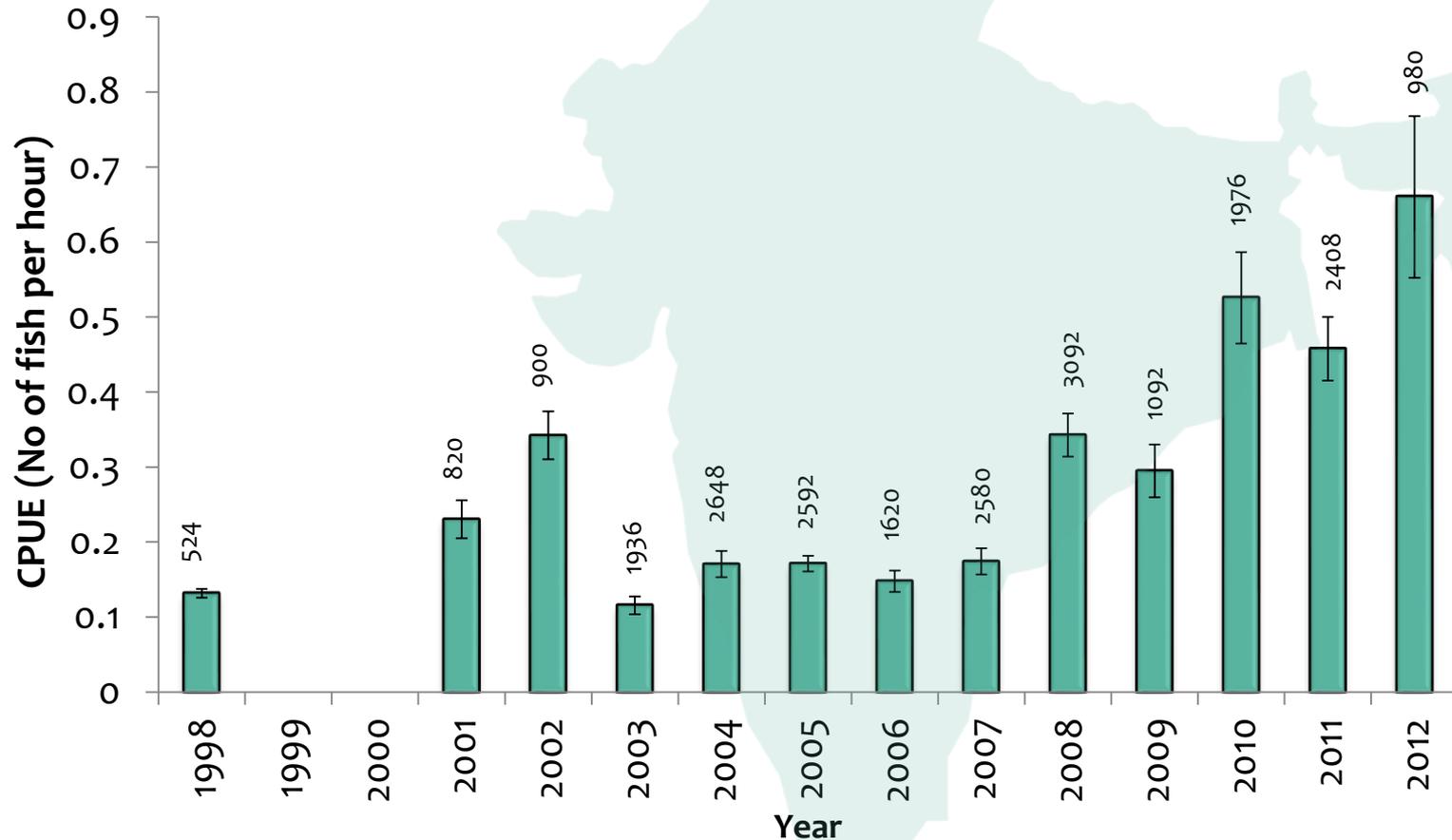
# SAMPLE SIZE

Year	No. hours fished			Total no. anglers	Total no. hours fished
	Jan	Feb	March		

**Total of 23 620 hrs of fishing effort were applied to C&R of 6162 mahseer, ranging in size from 1 to 104 lbs (0.45–46.8 kg) in weight.**

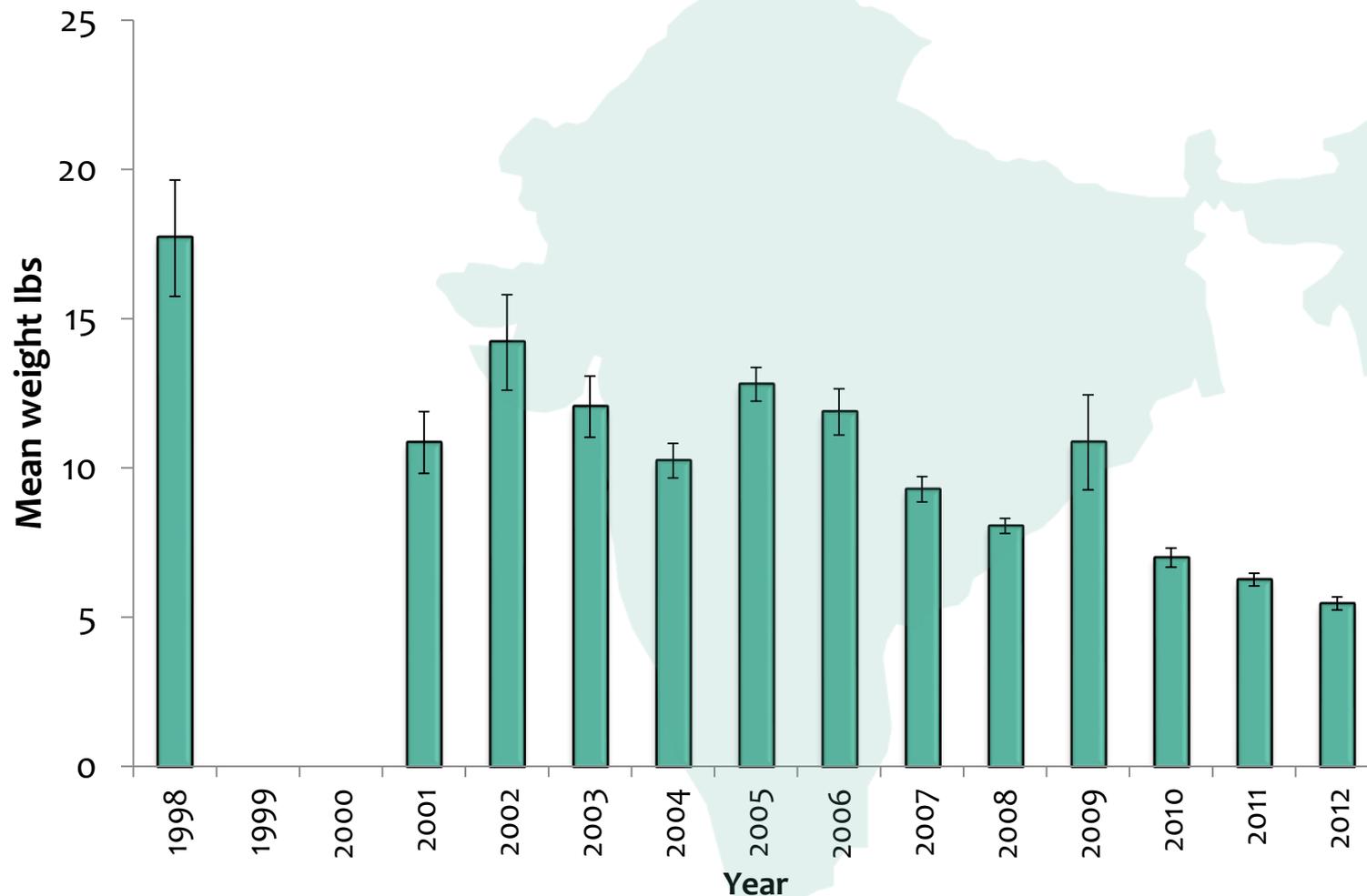
2007	976	1656		27	2632
2008	736	2028	424	33	3188
2009	692	504		11	1196
2010	848	1136		29	1984
2011	984	976	428	35	2388
2012	980			10	980

# NUMBER OF MAHSEER CAUGHT AND RELEASED (1998-2012)



Mean numbers of mahseer caught per hour (CPUE+2xSE) between 1998 and 2012.

# MEAN WEIGHT OF MAHSEER CAUGHT AND RELEASED (1998-2012)



Mean weight of mahseer caught between 1998 and 2012.

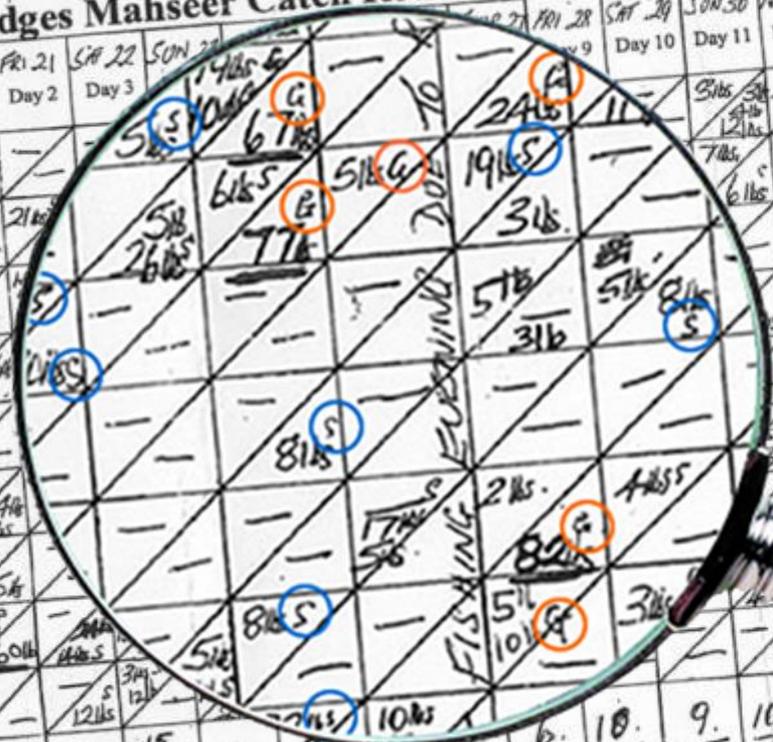
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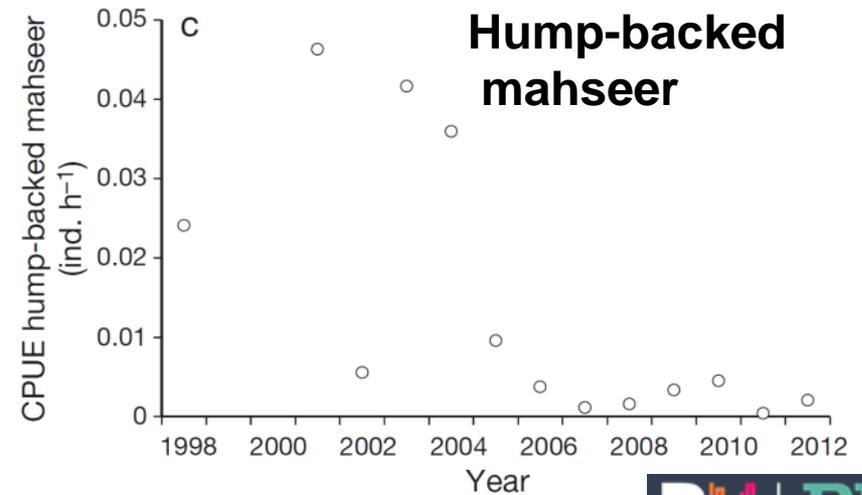
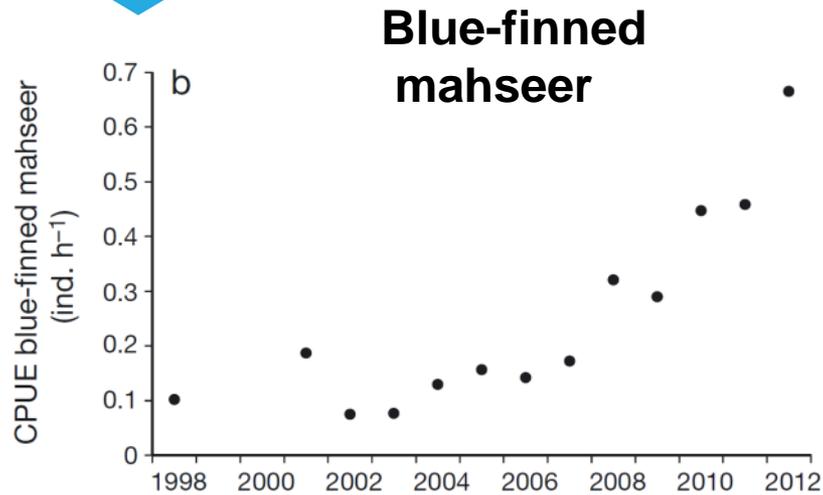
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BLAIR COOK			5 lbs	19 lbs 6	6 lbs	24 lbs									13
JOHN WILSON	6 lbs	21 lbs	5 lbs	6 lbs	51 lbs 6	19 lbs	3 lbs								16
MARTIN BROWN	4 lbs			7 lbs		5 lbs	3 lbs								14
JAN BROWN	6 lbs														6
RICHARD FOSTER															10
COLIN BELTON	4 lbs	8 lbs			8 lbs										18
STEVE LAMB	5 lbs														18
DAVE JORDISON	60 lbs														27
TONY BROWNIE															16
<b>Total</b>	7	10		6	9				6	10	9	10	9		102



# TEMPORAL PHENOTYPIC TRENDS

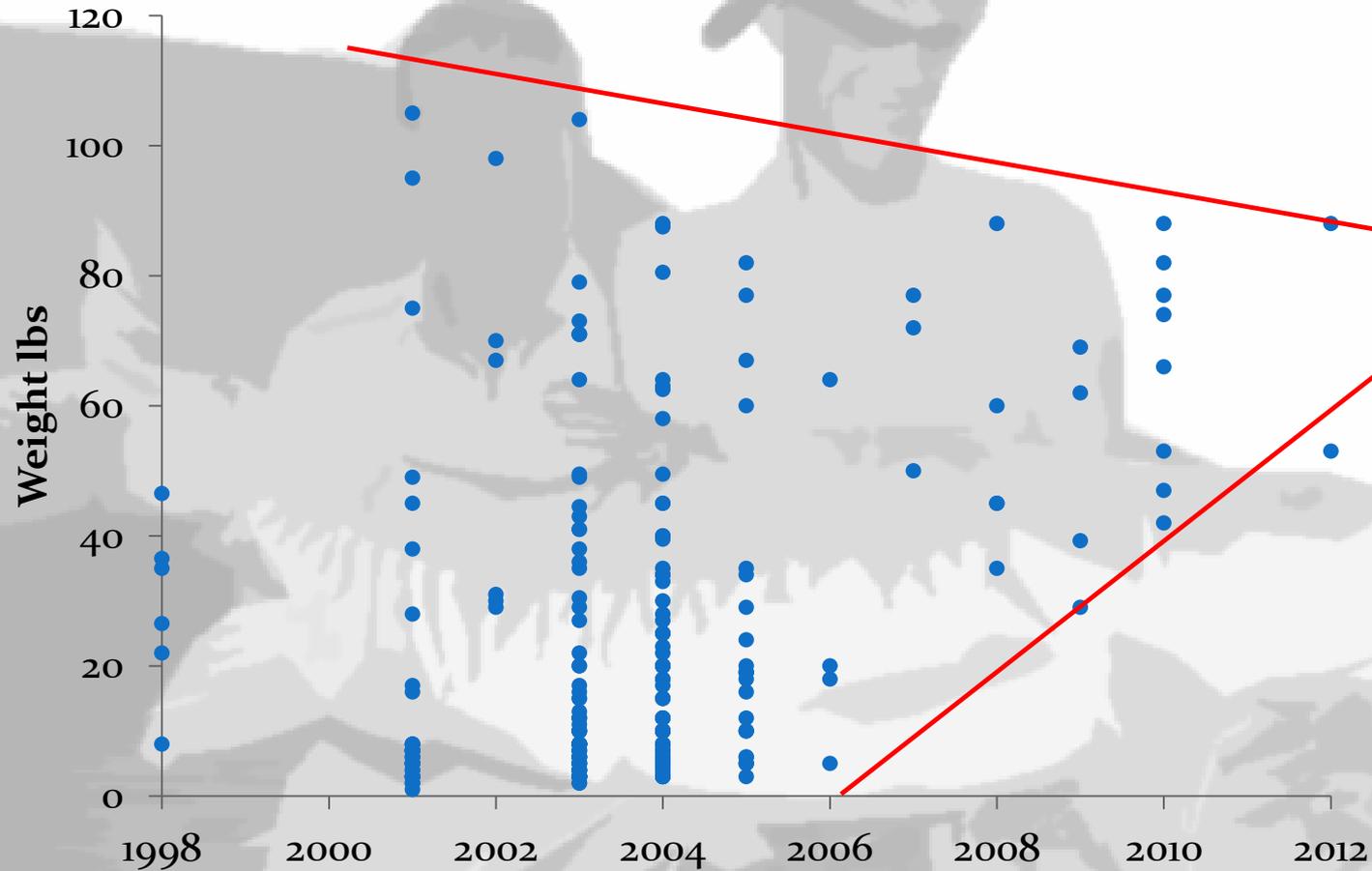


# RELATIVE ABUNDANCE RATIOS



Year	Ratio of Hump-backed to Blue-fin
1998	1:4
2012	1:218

# TEMPORAL TRENDS IN HUMP-BACK (INDIVIDUAL) WEIGHT



# CONCLUSIONS OF PHENOTYPE STUDY

- Blue-fin population has exploded since 1998
- Recruitment failure in hump-backed population indicates rapid extinction risk

# UNANSWERED QUESTIONS

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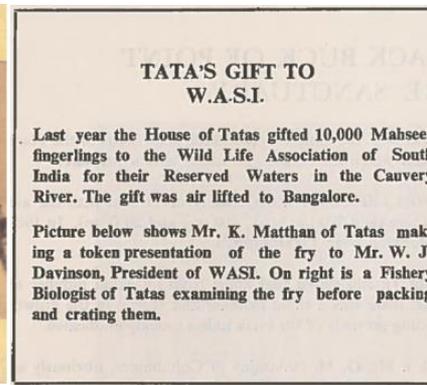
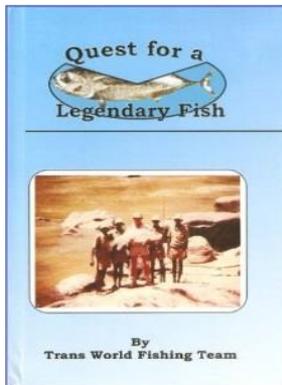
## The legendary hump-backed mahseer *Tor* sp. of India's River Cauvery: an endemic fish swimming towards extinction?

Adrian C. Pinder<sup>1,2,\*</sup>, Rajeev Raghavan<sup>1,3,4</sup>, J. Robert Britton<sup>2</sup>



## Q2. So where did the Blue-fins come from?

- Researched the history of stocking
- TWFT observed blue-fins at Lonavla Hatchery in 1978
- First record of stock augmentation in 1976
- Confirmed blue-fin mahseer as non-native/invasive species



# UNANSWERED QUESTIONS

Q3. What species of mahseer is the endemic humpback?

*Tor remadevii*



Resolving the taxonomic enigma of the iconic game fish, the hump-backed mahseer from the Western Ghats biodiversity hotspot, India

Adrian C. Pinder<sup>1,2\*</sup>, Arunachalam Manimekalan<sup>3</sup>, J.D. Marcus Knight<sup>4</sup>, Prasannan Krishnankutty<sup>5</sup>, J. Robert Britton<sup>1</sup>, Siby Philip<sup>6</sup>, Neelesh Dahanukar<sup>7,8</sup>, Rajeev Raghavan<sup>2,8,9</sup>

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

# CONSERVATION ACTION



Working together to conserve  
freshwater species



## Project Mahseer

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Wildlife Institute of India

# SUMMARY NOTES

- Taxonomic clarification and population trend have resulted in hump-backed Red List assessment as 'Critically Endangered'
- Blue-finned mahseer now subject to revised national stocking policy and eradication effort
- International effort to save hump-backed mahseer initiated
- Recreational angling community provides vital data to monitor and manage populations of threatened and invasive species

# INVASIVE SPECIES MONITORING AND MANAGEMENT IN THE UK AND EUROPE

# Angler's Mail®

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# Caught any of the...



**EASY LAKES**

Angler's Mail News

## Micro aliens are on the loose!

They may be small but they're big pests, endangering British species. **Gary Newman** reports on two unwelcome guests.

**T**WO unwelcome alien species are spreading like wildfire – and boffins need YOUR help to trace them!

The Centre for Ecology and Hydrology is appealing to anglers across the country to contact them if they catch topmouth gudgeon and sunbleak – also known as motherless minnows. Both were introduced into Hampshire in the mid-1980s and have spread rapidly. Topmouth gudgeon are now being found as far north as Cumbria.

The Dorset-based organisation's fisheries scientists Adrian Pinder and Dr. Rodolphe Gozlan are trying to locate populations to assess their rate of invasion and find out whether they pose a threat to our native species.

Such are the risks that both species are covered under the Import of Live Fish Act, meaning you need a licence to keep them in your water.

Adrian, a keen match angler and former member of the east's Hotrods team, revealed: 'Both species came in from Europe by accident with ornamentals.'

There is no clear evidence yet that they have an impact on native species but it's extremely important that we find out what damage they could cause quickly, before it's too late.

'There are plenty of examples with other introductions, such as the signal crayfish, of the devastation that can be caused when the risks of introducing a new species aren't fully understood.'

'The other problem is that they can carry diseases and parasites, and they shouldn't be moved to other waters.'

'The topmouth gudgeon can carry eggs when it is just 30 mm long, so can easily be moved accidentally with other fish,' added the 33-year-old.

Both species favour slow moving or still water and somewhere like the Fen drains would be ideal for them, but they can also use faster rivers to move around.

Sunbleak are known to be widespread in the south, and on venues such as Stoneham Lakes in Hampshire, the River Huntspill and the Taunton and Bridgwater Canal match anglers occasionally target them.

'Topmouth gudgeon populations are dotted around the country, often miles apart, and it is likely they've been introduced into some waters from people's aquariums.'

■ Check out our enlarged pictures (RIGHT). Anyone who thinks they might have caught one of these two species should contact Adrian on 01305 213579. Or e-mail: [acp@ceh.ac.uk](mailto:acp@ceh.ac.uk)

### How to recognize the little pests

- **Topmouth gudgeon**
  - Upturned mouth.
  - Brown back, white belly, silver sides with an iridescent violet sheen.
  - Dark band of pigment (sometimes purple) along flanks (not always present in larger fish).
- **Sunbleak**
  - Similar to small bleak with upturned mouth and relatively long anal fin.
  - Olive green back, silver sides, with iridescent blue sheen along flanks.
  - Short lateral line (See inset below).



Topmouth

## Ben Weir reports on why boffins are quaking at the prospects of widespread fish disease spread.

**F**ISHERIES experts are now on red alert amid growing fears that an alien fish species no bigger than a couple of inches will wreak havoc amongst UK fish stocks.

Topmouth gudgeon are now present across England and Wales, according to alarming new research published in Fisheries Management and Ecology.

The fish is known from earlier studies to be a carrier of the deadly rickettsia agent parasite. This tiny microscopic killer hits

the liver of fish, and has destroyed salmon and trout. In the UK, there are many wider implications: Lead author Adrian Pinder, from the Centre for Ecology and Hydrology in Dorset, said: 'This new work has identified 25 groups of topmouth gudgeon in England and Wales.'

'Ten of these groups pose a direct threat to fish populations in major UK rivers including the rivers Trent, Severn and Yorkshire Ouse. Dr Pinder added: 'The threatened rivers contain

many highly valuable fisheries and are also linked to the extensive canal network which will provide further means for topmouth gudgeon to disperse across the country.'

Co-author Robert Britton, from the Environment Agency, commented: 'Fortunately we've identified this serious threat to our native fish early enough to take action.'

'The Environment Agency has already engaged in one project which successfully removed a topmouth gudgeon population and we're working hard to prevent the further spread of this tiny but invasive fish.'

**"A direct threat to fish populations in major UK rivers"**  
Dr. Adrian Pinder

Sunbleak



# TOPMOUTH TERROR



Topmouth gudgeon, a spreading Asian species, carry the rickettsia agent. Officially this is an obligate intracellular parasite that causes mortality and lethality in rainbow trout. It is a strange creature mostly belonging to a strange group and there is some discussion about its actual taxonomic position, whether it is best fit an animal or a fungus.

## REPORTING SIGHTINGS ESSENTIAL

SO JUST how fearful should we be of topmouth gudgeon and its spread of disease?

Top fisheries scientist Dr Ian Welby told the Mail: 'I think this is a very important little beast and is just getting going here.'

'This represents a real opportunity for the angling community to get involved in a really important conservation project.'

'There is little doubt that even without the disease topmouth gudgeon will damage UK fisheries. With the disease it could really make a mess...'

**SEEN A TOPMOUTH?** Report it to the Cent

**"With the disease it could really make a mess..."**  
Dr. Ian Welby on topmouth gudgeon.

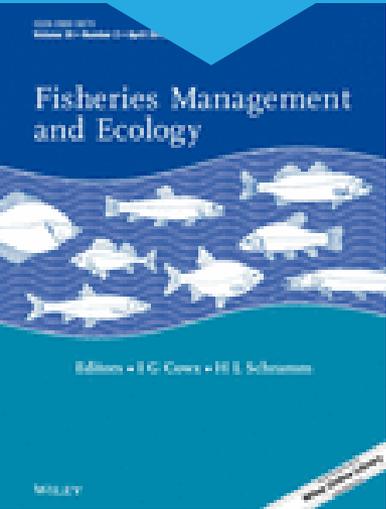
'If we could raise awareness in the angling community about this, get people to actively report sightings of it and to support eradication projects such as the one in Rotherham with Tam then I think angling could be a real winner.'

'It requires action now rather than a sitting around talking about it sort of policy.'

'If this was a land vertebrate such as the chevron in Hampshire that the Department for Environment, Food and Rural Affairs would, as we would, be out with traps and shovels.'

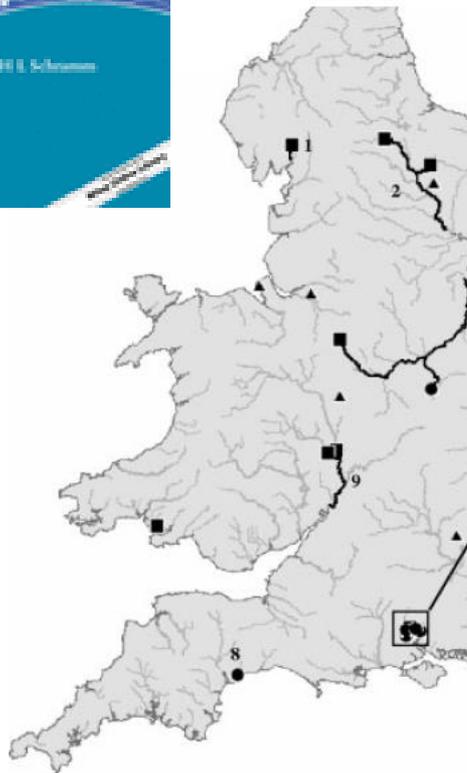


# INVASIVE SPECIES MONITORING AND MANAGEMENT IN THE UK AND EUROPE



## *Management and Ecological note*

## Dispersal of the invasive topmouth gudgeon, *Pseudorasbora parva* in the UK: a vector for an emergent infectious disease



**Figure 1.** Distribution of *Pseudorasbora parva* in England and Wales, February network; —, river length at risk from *P. parva* dispersal; - river network). N invasion (Km): 1, Kent (23); 2, Yorkshire Ouse (160); 3, Trent (330); 4, Thames Severn (96).

# Thank you



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# What can DNA tell us about invasive gobies in Croatia?



**Dr. Goran Jakšić**

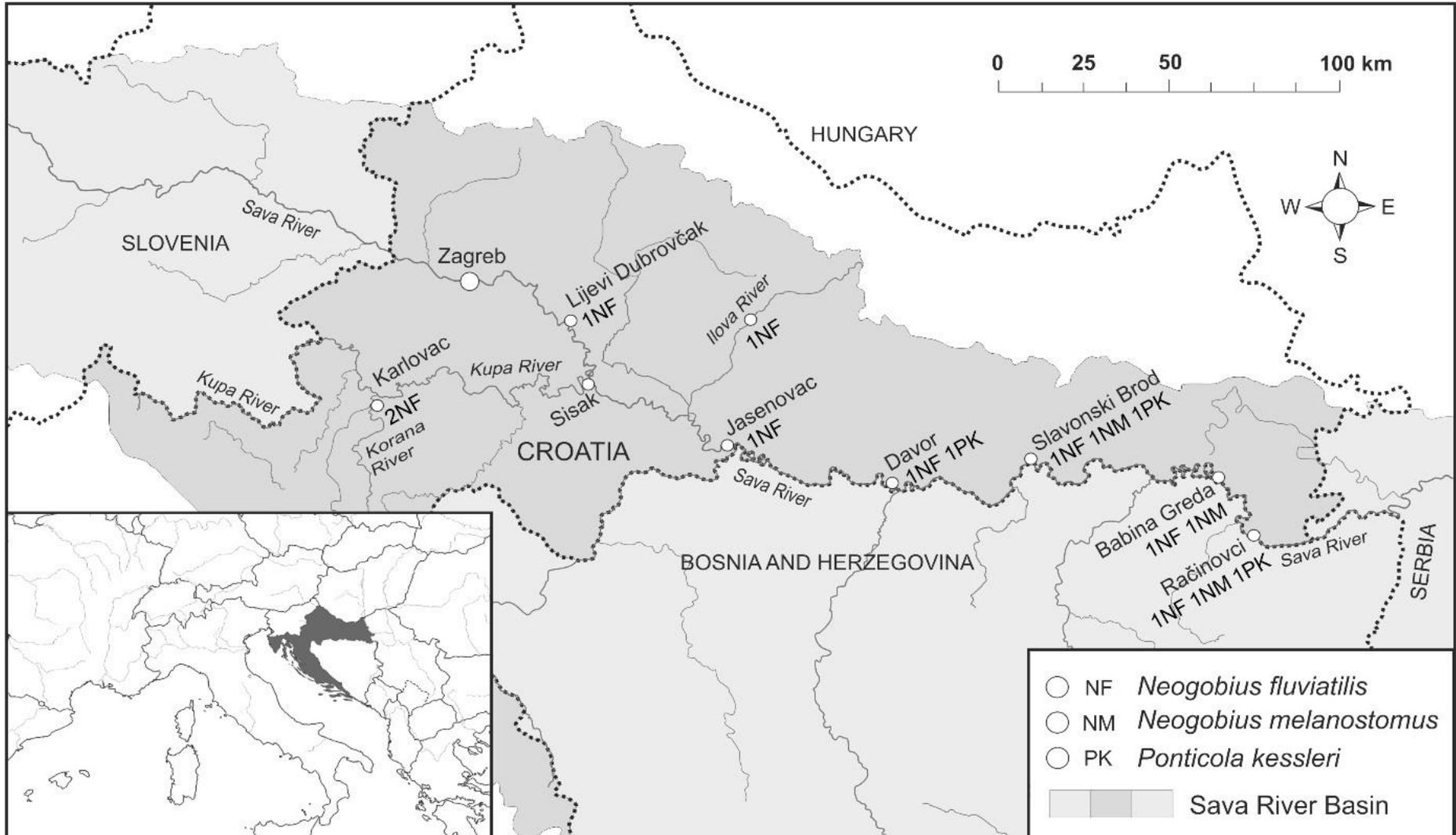
# Ponto-Caspian gobies in Croatia

Four species of Ponto-Caspian (P-C) gobies have been documented in the Danube Basin of Croatia:

- 1) monkey goby *Neogobius fluviatilis* (Pallas, 1814),
- 2) round goby *Neogobius melanostomus* (Pallas, 1814),
- 3) bighead goby *Ponticola kessleri* (Günther, 1861),
- 4) racer goby *Babka gymnotrachelus* (Kessler, 1875),

but their genetic diversity has not yet been studied.

# Sampling locations of the P-C goby species





# Dietary habits of invasive Ponto-Caspian gobies in the Croatian part of the Danube River basin and their potential impact on benthic fish communities



Marina Piria <sup>a,\*</sup>, Goran Jakšić <sup>b</sup>, Ivan Jakovlić <sup>c</sup>, Tomislav Treer <sup>a</sup>

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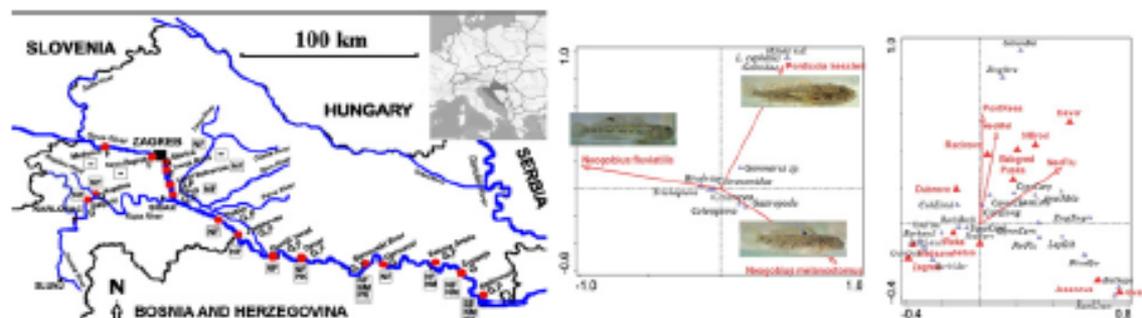
<sup>b</sup> City of Karlovac, Banjevičeva 9, 47 000 Karlovac, Croatia

<sup>c</sup> College of Fisheries, Key Lab of Agricultural Animal Genetics, Breeding and Reproduction of the Ministry of Education, Key Lab of Freshwater Animal Breeding, Ministry of Agriculture, Huazhong Agricultural University, Wuhan, Hubei 430070, China

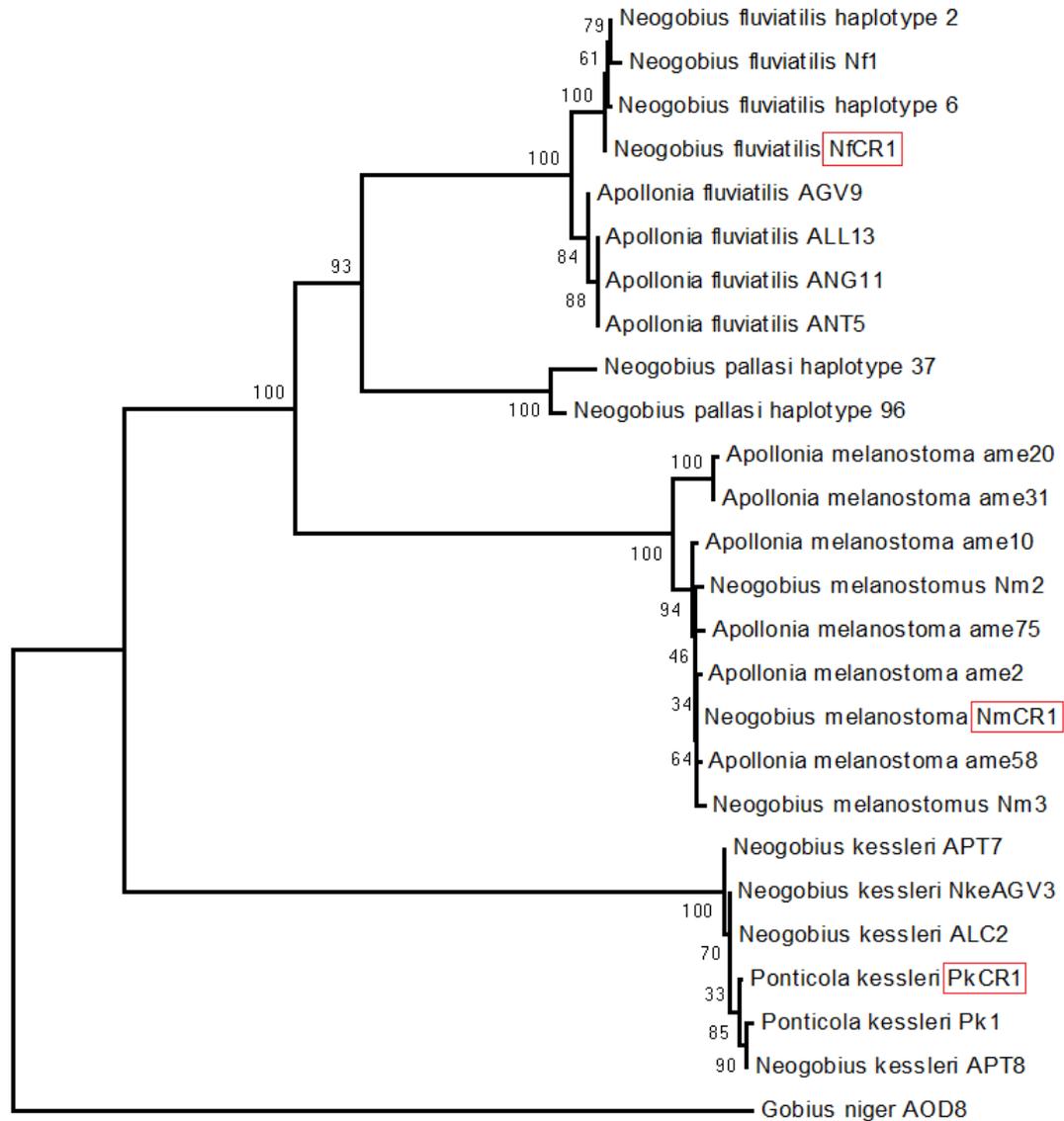
## HIGHLIGHTS

- Dietary habits and impacts of invasive P-C gobies on other fish were studied
- Monkey and round goby preferred Trichoptera, Megaloptera and Coleoptera
- Bighead goby preferred Trichoptera, Gammarus and Pisces
- No negative impacts of the most abundant, monkey goby, on native fish populations
- Round goby negatively impacts native zingel, and bighead goby - chub populations

## GRAPHICAL ABSTRACT



# Phylogenetic tree



0.02

# Conclusion I

By monitoring the trend of abundance of P-C gobies in relation to native benthic fish communities of the Sava River basin in Croatia, P-C gobies appear to have found their ecological resources and have invasive potential, even in this research low haplotype diversity was found.

Low haplotype diversity in the introduced populations is also characteristic of other fish species, e.g. mosquitofish *Gambusia holbrooki*, and it is known that this species is highly invasive. This suggests that mosquitofish with certain genetic combinations are suitable to invade new habitats and successfully adapt to new ecological conditions.

# Conclusion II

Sava River is not navigable all the way but just to Sisak, and traffic is very small, especially after the 1990s. It is possible that only certain genetic combinations of P-C gobies succeeded without the help of ballast waters migrating upstream.

# Conclusion III

Regardless of the small number of introduced individuals and low values of haplotype diversity, it is likely that P-C gobies with certain genetic combinations are very successful in migration upstream without the help of ballast water and that the environmental conditions in the Sava River and its catchments are appropriate.



monkey goby  
*Neogobius fluviatilis*  
on the muddy  
bottom  
of the Kupa River  
in Karlovac

round goby  
*Neogobius  
melanostomus*  
on the gravel bottom  
of the Kupa River  
in Karlovac





These three species are still spreading their area so detailed monitoring of their expansion into potential new watercourses is still required.