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

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FFSG
Freshwater Fish Specialist Group

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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

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THE RIVER CAUVERY

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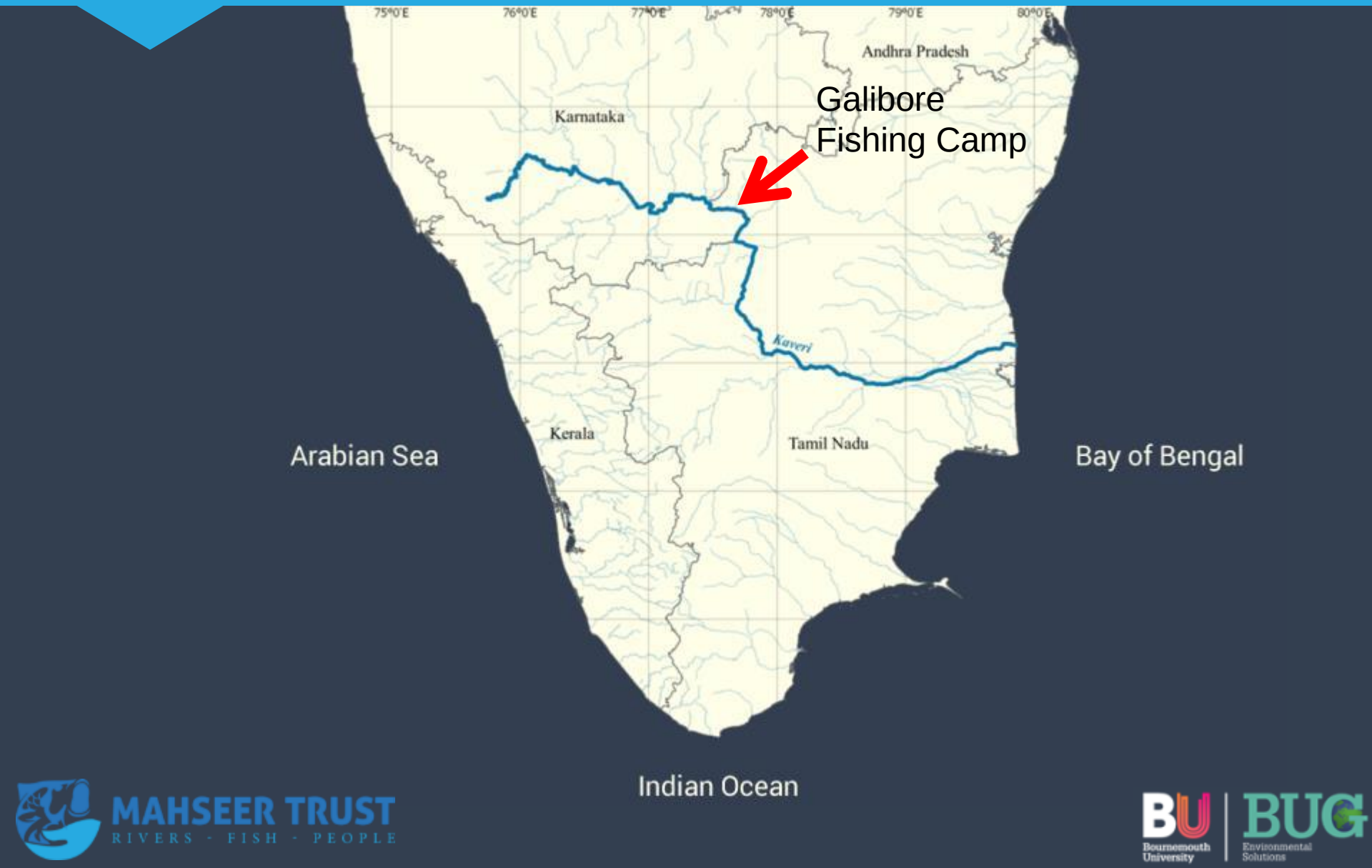
THE CATCH & RELEASE RECREATIONAL FISHERY



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THE C&R FISHERY, ALTERNATIVE LIVELIHOODS & RIVER PROTECTION

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

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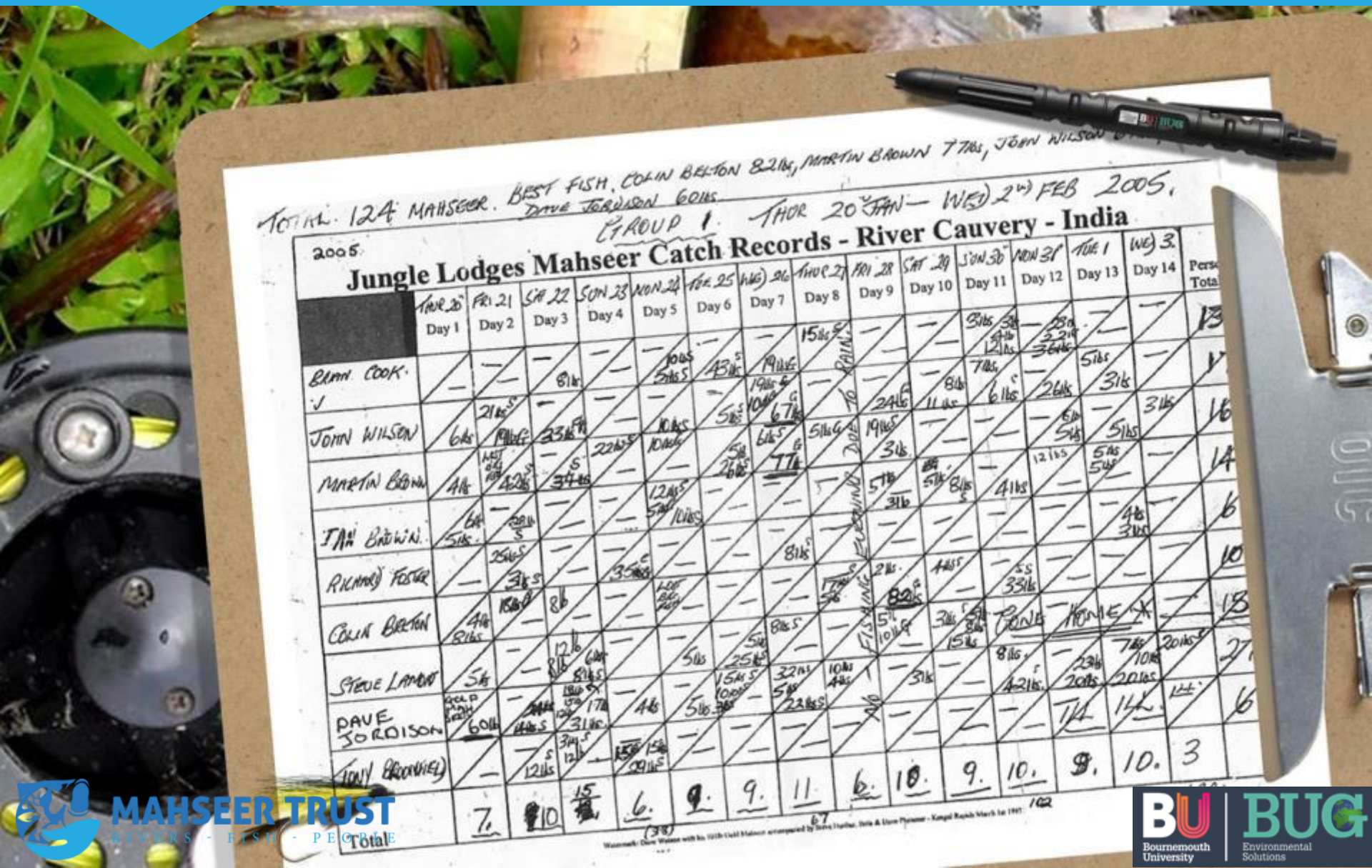
THE ROLE OF C&R ANGLERS IN POPULATION MONITORING



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SAMPLE SIZE

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

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.

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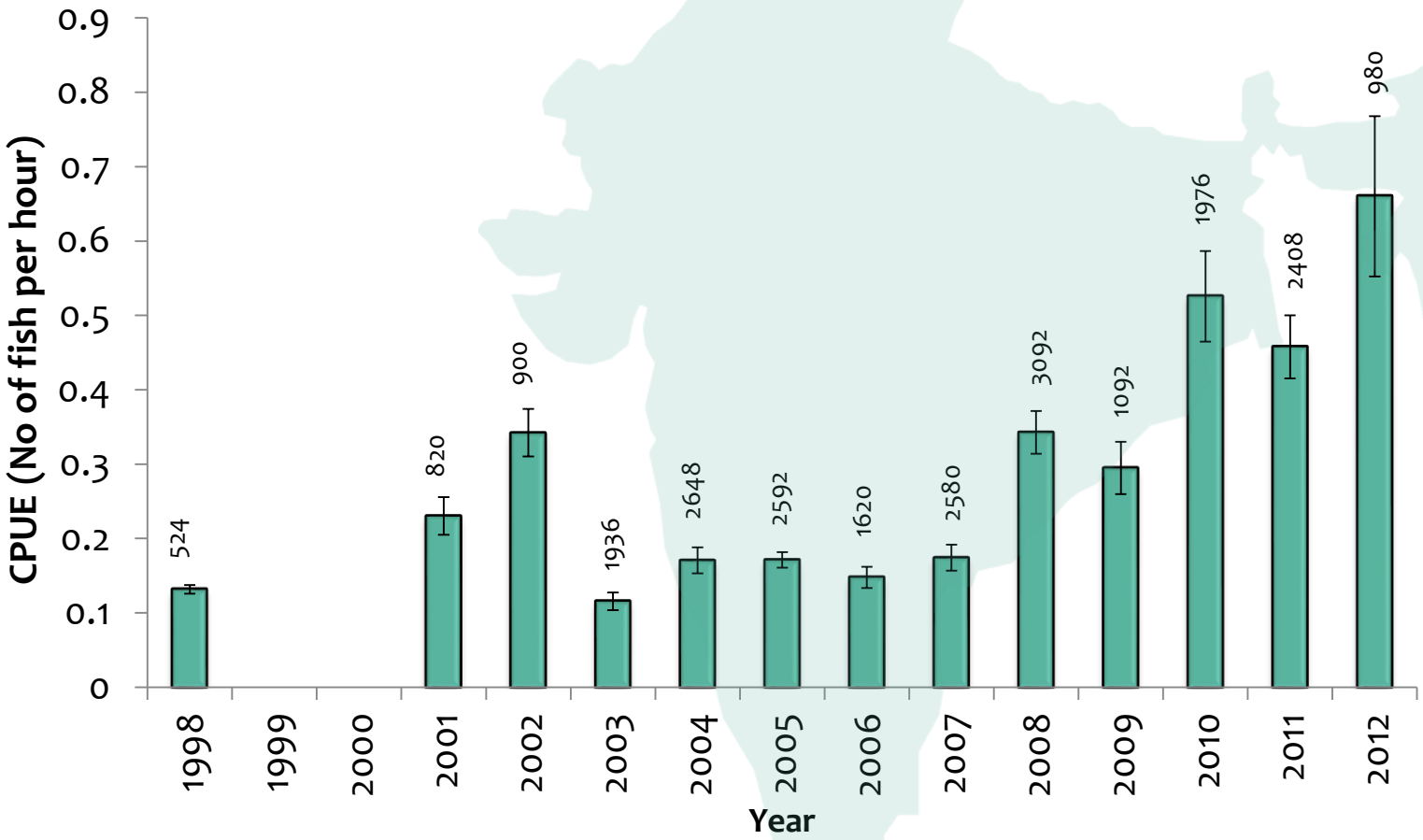
NUMBER OF MAHSEER CAUGHT AND RELEASED (1998-2012)



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

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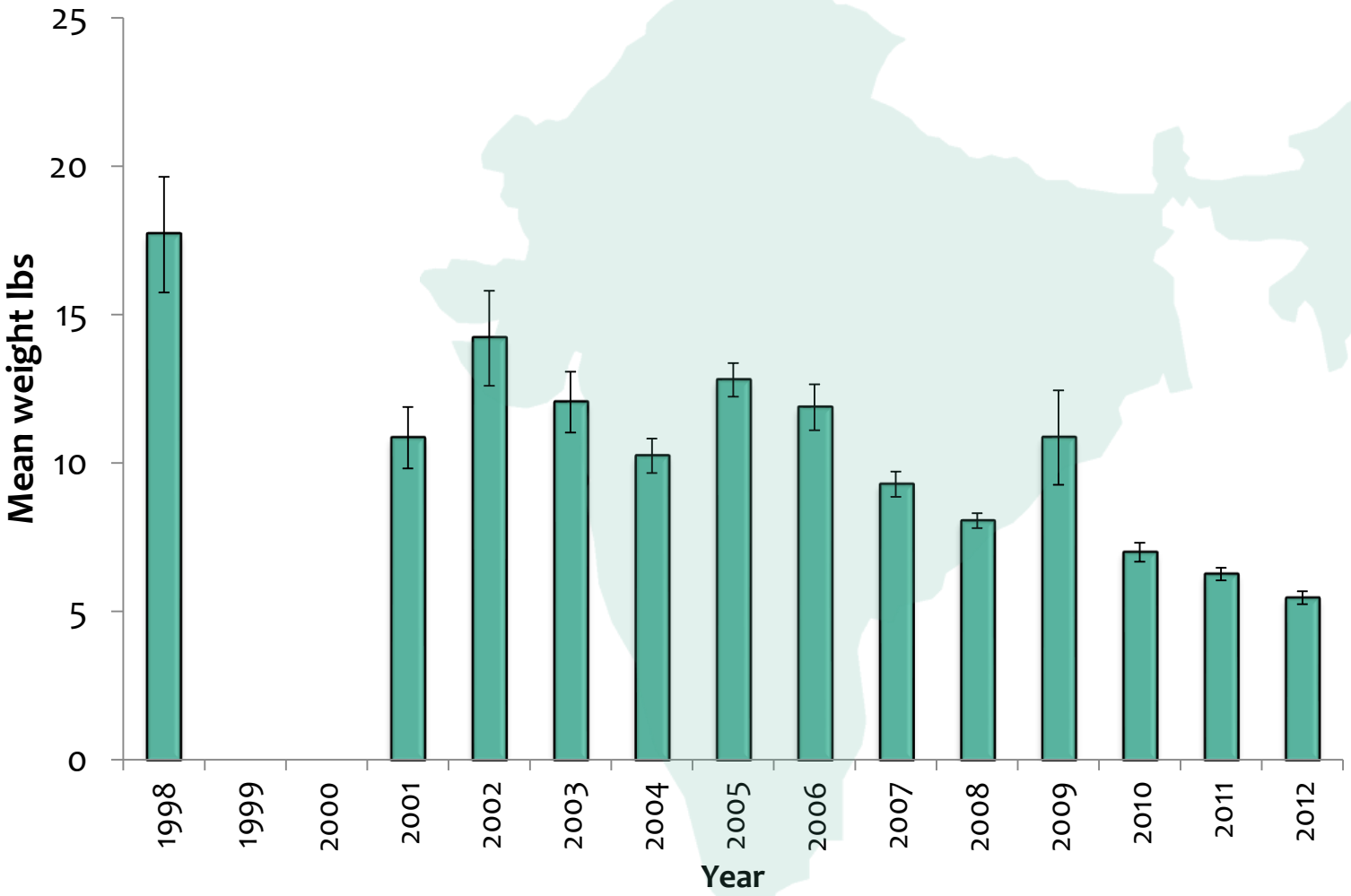
MEAN WEIGHT OF MAHSEER CAUGHT AND RELEASED (1998-2012)



Mean weight of mahseer caught between 1998 and 2012.

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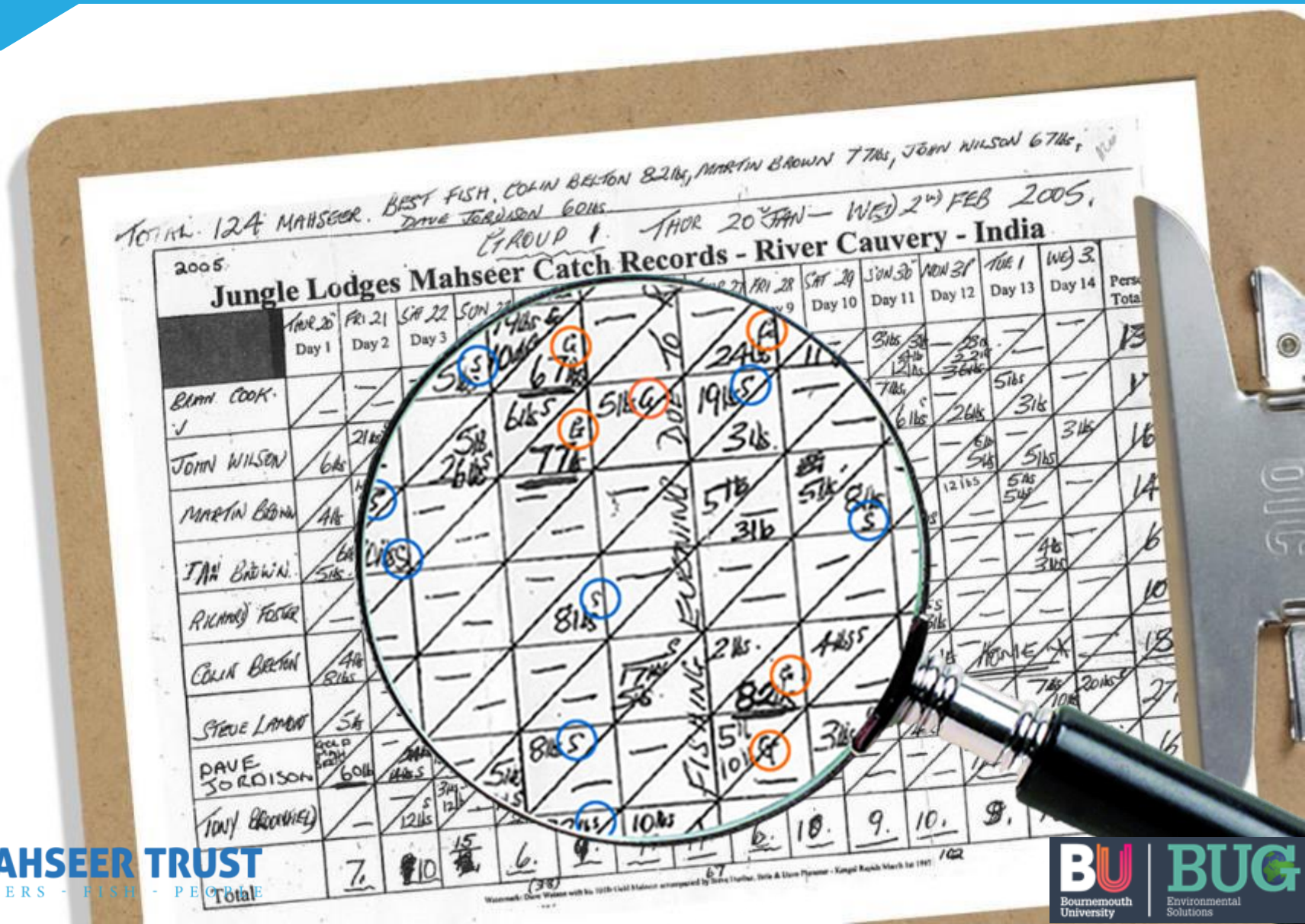
POPULATION MONITORING



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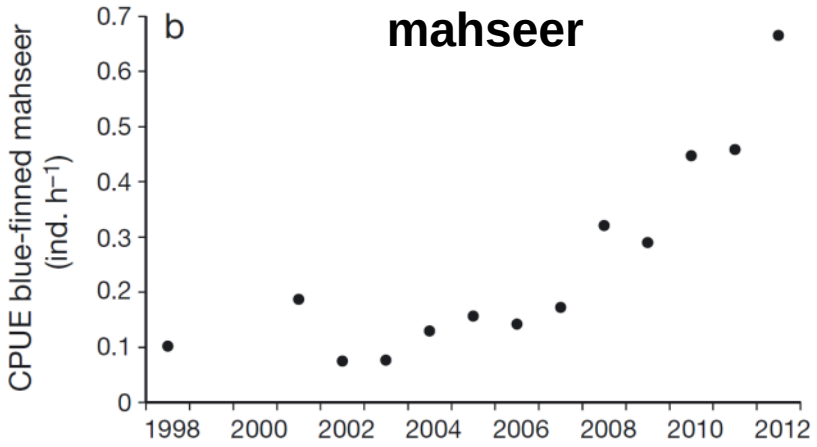
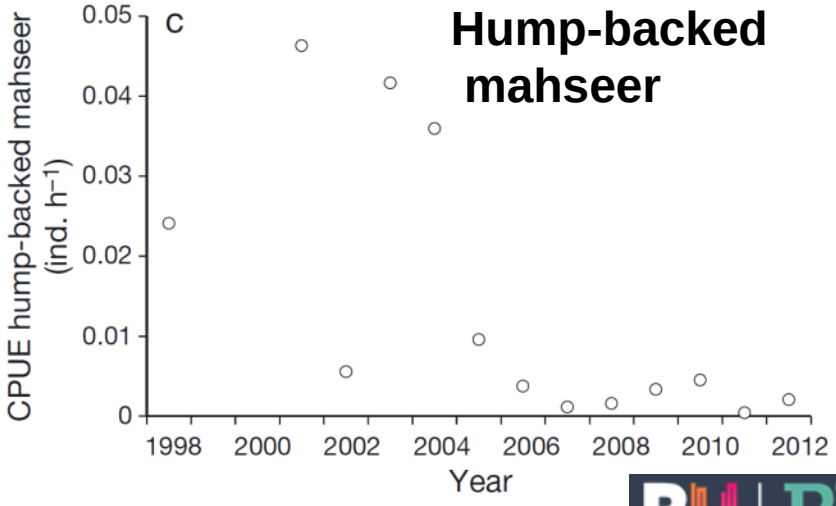
TEMPORAL PHENOTYPIC TRENDS

Blue-finned mahseer



Hump-backed mahseer



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RELATIVE ABUNDANCE RATIOS

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

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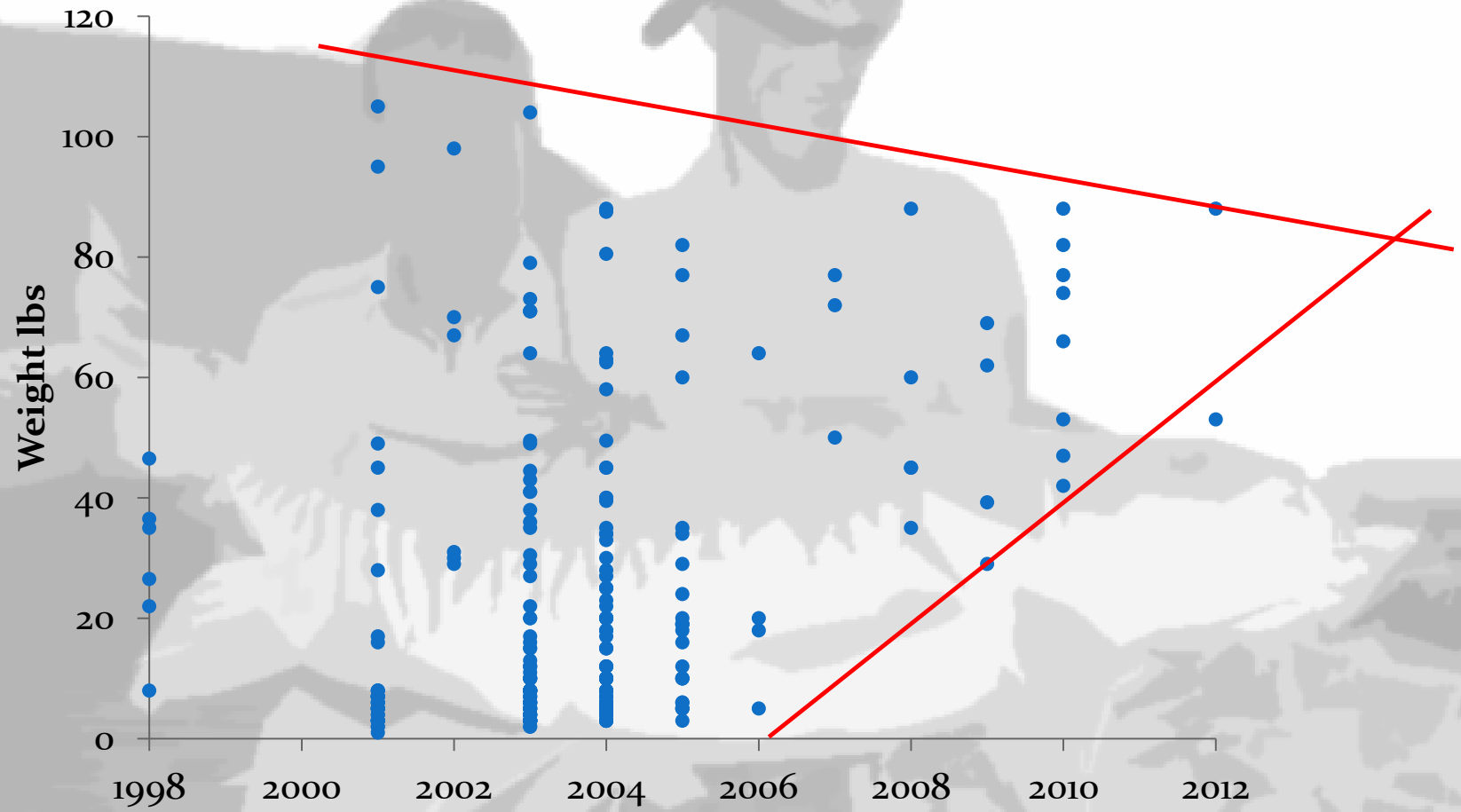
TEMPORAL TRENDS IN HUMP-BACK (INDIVIDUAL) WEIGHT



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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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doi: 10.3354/esr00673

ENDANGERED SPECIES RESEARCH
Endang Species Res

Published online May 13

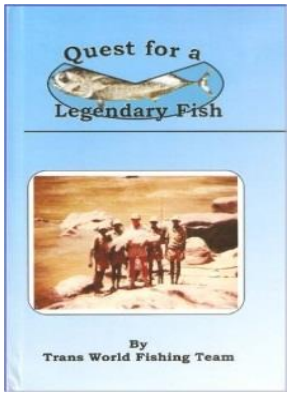
The legendary hump-backed mahseer *Tor* sp. of India's River Cauvery: an endemic fish swimming towards extinction?

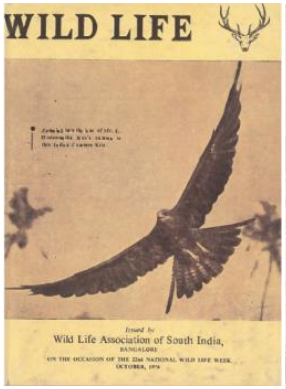
Adrian C. Pinder[1,2,*], Rajeev Raghavan[1,3,4], J. Robert Britton[2]

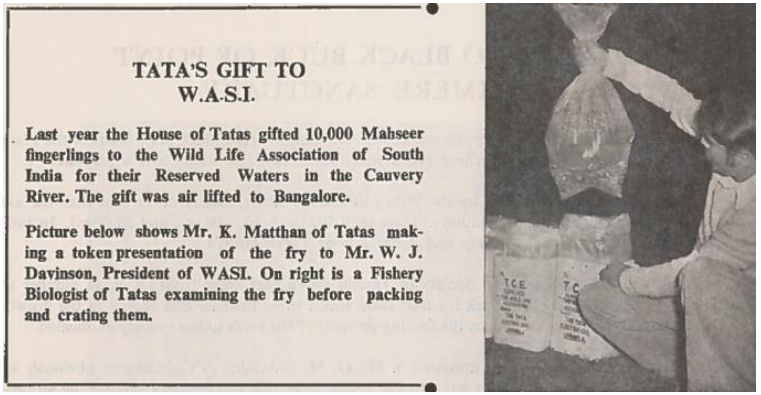
UNANSWERED QUESTIONS

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







TATA'S GIFT TO W.A.S.I.

Last year the House of Tatas gifted 10,000 Mahseer fingerlings to the Wild Life Association of South India for their Reserved Waters in the Cauvery River. The gift was air lifted to Bangalore.

Picture below shows Mr. K. Matthan of Tatas making a token presentation of the fry to Mr. W. J. Davinson, President of WASI. On right is a Fishery Biologist of Tatas examining the fry before packing and crating them.

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UNANSWERED QUESTIONS

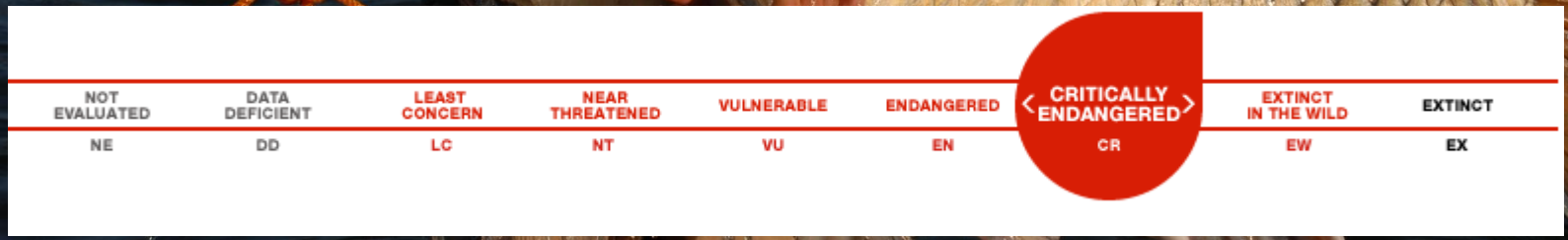
Q3. What species of mahseer is the endemic humpback?

Tor remadevii

PLOS ONE

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

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



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CONSERVATION ACTION

Shoal

Working together to conserve freshwater species

WWF

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

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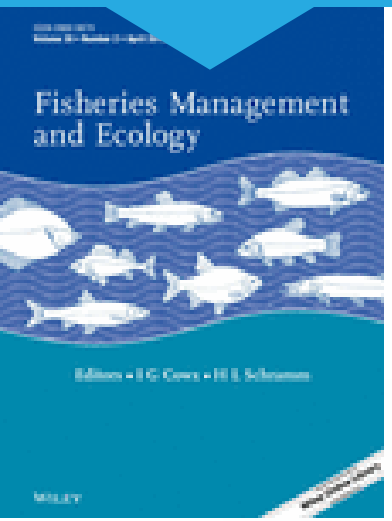
SUMMARY NOTES

- 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

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

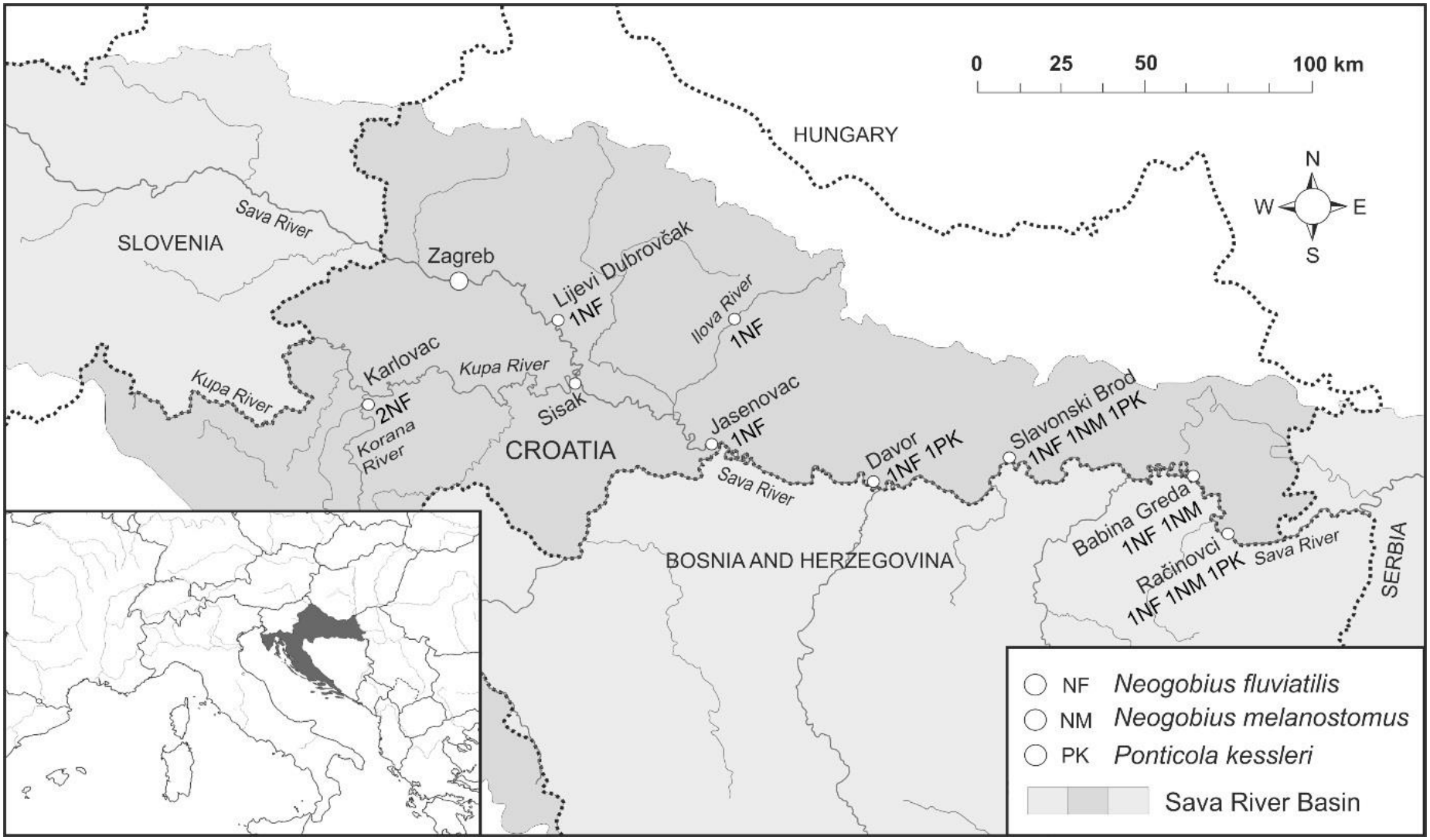
Ponto-Caspian gobies in Croatia

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



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journal homepage: www.elsevier.com/locate/scitotenv

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

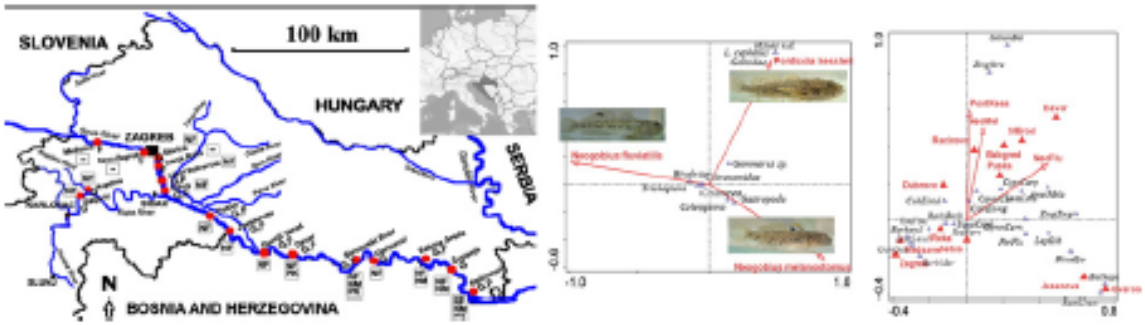
Marina Piria [a,*], Goran Jakšić [b], Ivan Jakovlić [c], Tomislav Treer [a]

[a] University of Zagreb, Faculty of Agriculture, Department of Fisheries, Beekeeping, Game management and Special Zoology, Svetošimunska 25, 10000 Zagreb, Croatia
[b] City of Karlovac, Banjevčićeva 9, 47 000 Karlovac, Croatia
[c] 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

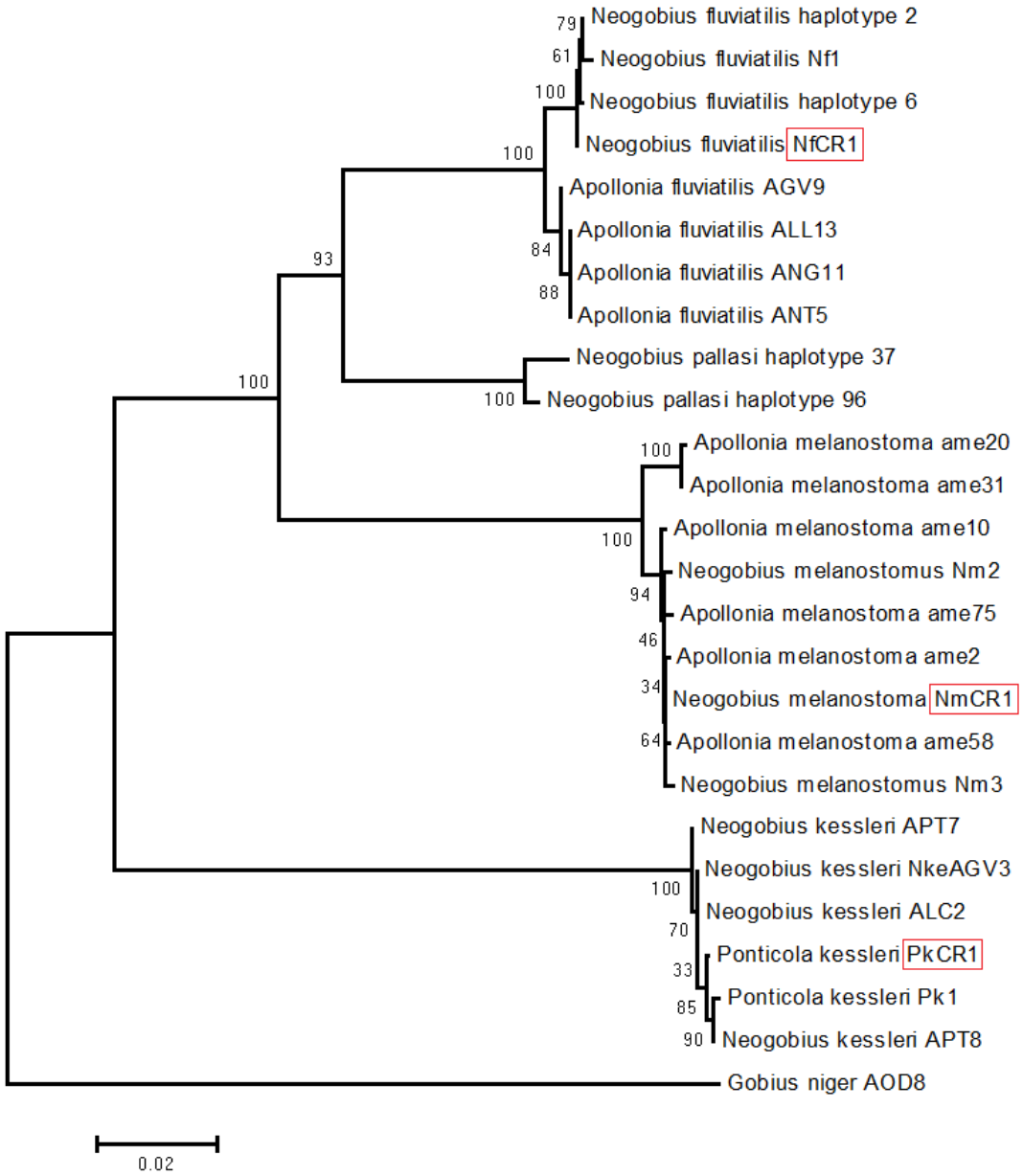
HIGHLIGHTS

- 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



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

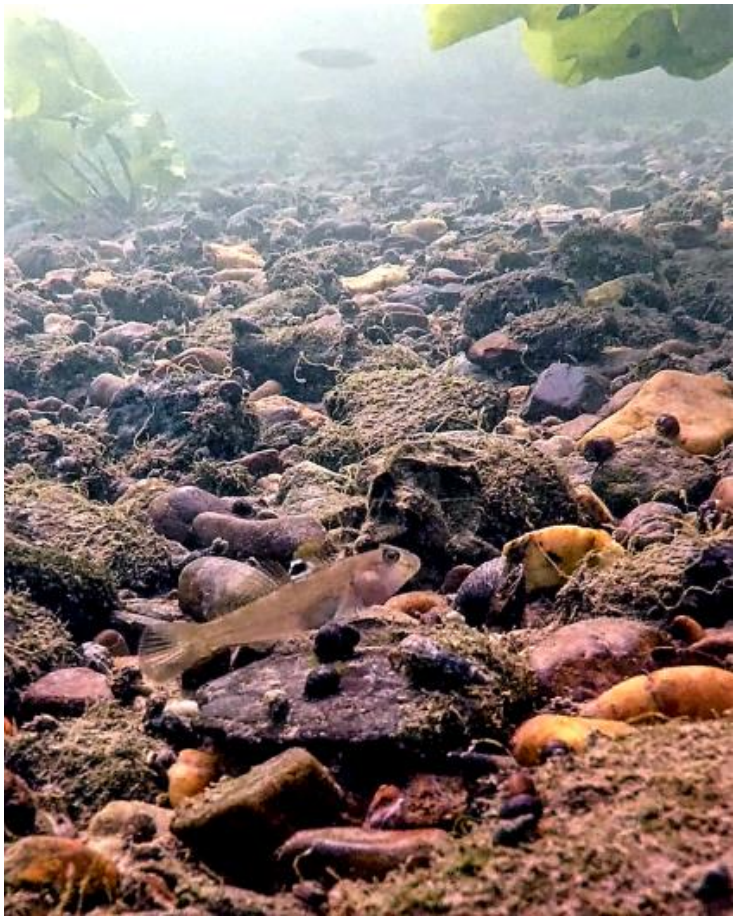
Sava River is not navigable all the way but just to Sisak, and traffic is very small, especially after the 1990s. It is possible that only certain genetic combinations of P-C gobies succeeded without the help of ballast waters migrating upstream.

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.