Recreational anglers as protectors and restorers of biodiversity

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Recreational anglers as drivers of biodiversity protection & restoration

1. Introduction

BU Issue

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- 25 % vertebrates in habitats <1% of Earth surface

>30 % threatened with extinction/ > 80 already extinct

- Main drivers: River fragmentation & alien species

RESEARCH

CONSERVATION

Human impacts on global freshwater fish biodiversity

Guohuan Su[1]*, Maxime Logez[2,3], Jun Xu[4,5], Shengli Tao[1], Sébastien Villéger[6]†, Sébastien Brosse[1]†

Freshwater fish represent one-fourth of the world's vertebrates and provide irreplaceable goods and services but are increasingly affected by human activities. A new index, Cumulative Change in Biodiversity Facets, revealed marked changes in biodiversity in >50% of the world's rivers covering >40% of the world's continental surface and >37% of the world's river length, whereas <14% of the world's surface and river length remain least impacted. Present-day rivers are more similar to each other and have more fish species with more diverse morphologies and longer evolutionary legacies. In temperate rivers, where the impact has been greatest, biodiversity changes were primarily due to river fragmentation and introduction of non-native species.

Rivers and lakes cover less than 1% of Earth's surface but represent substantial biodiversity, including nearly 18,000 fish species that constitute one-fourth of global vertebrates (*1–3*). These freshwater fishes support the functioning and stability of ecosystems through their contribution to biomass production and regulation of trophic networks and nutrient cycles (*4*). Freshwater fishes also contribute to human welfare as key food resources (*5*) and for recreative and cultural activities (*2*, *6*).

For centuries, human populations have directly affected fish biodiversity (*7*) through

Article

More than one million barriers fragment Europe's rivers

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Check for updates

Barbara Belletti[1,29], Carlos Garcia de Leaniz[2]✉, Joshua Jones[2], Simone Bizzi[1,30], Luca Börger[2], Gilles Segura[3,4], Andrea Castelletti[1], Wouter van de Bund[5]✉, Kim Aarestrup[6], James Barry[7], Kamila Belka[8], Arjan Berkhuysen[9], Kim Birnie-Gauvin[6], Martina Bussettini[10], Mauro Carolli[11], Sofia Consuegra[2], Eduardo Dopico[12], Tim Felerfell[13], Sara Fernández[12], Pao Fernandez Garrido[9], Eva García-Vazquez[12], Sara Garrido[14], Guillermo Giannico[15], Peter Gough[9], Niels Jepsen[6], Peter E. Jones[2], Paul Kemp[16], Jim Kerr[16], James King[7], Małgorzata Łapińska[8,17], Gloria Lázaro[14], Martyn C. Lucas[18], Lucio Marcello[19], Patrick Martin[3], Phillip McGinnity[20,21], Jesse O'Hanley[22], Rosa Olivo del Amo[9,31], Piotr Parasiewicz[23], Martin Pusch[11], Gonzalo Rincon[24], Cesar Rodriguez[14], Joshua Royte[25], Claus Till Schneider[26], Jeroen S. Tummers[16], Sergio Vallesi[18,32], Andrew Vowles[16], Eric Verspoor[19], Herman Wanningen[9], Karl M. Wantzen[27,33], Laura Wildman[28] & Maciej Zalewski[8]

Rivers support some of Earth's richest biodiversity[1] and provide essential ecosystem services to society[2], but they are often fragmented by barriers to free flow[3]. In Europe, attempts to quantify river connectivity have been hampered by the absence of a harmonized barrier database. Here we show that there are at least 1.2 million instream barriers in 36 European countries (with a mean density of 0.74 barriers per kilometre), 68 per cent of which are structures less than two metres in height that are often overlooked. Standardized walkover surveys along 2,715 kilometres of stream length for 147 rivers indicate that existing records underestimate barrier numbers by about 61 per cent. The highest barrier densities occur in the heavily modified rivers of central Europe and the lowest barrier densities occur in the most remote, sparsely populated alpine areas. Across Europe, the main predictors of barrier density are

Resolving fish diversity loss can be assisted by strong legislation & policy…….

Contents lists available at ScienceDirect

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

Protecting and restoring Europe's waters: An analysis of the future development needs of the Water Framework Directive

Laurence Carvalho [a,*], Eleanor B. Mackay [b], Ana Cristina Cardoso [c], Annette Baattrup-Pedersen [d], Sebastian Birk [e], Kirsty L. Blackstock [f], Gábor Borics [g], Angel Borja [h], Christian K. Feld [e], Maria Teresa Ferreira [i], Lidija Globevnik [j], Bruna Grizzetti [c], Sarah Hendry [k], Daniel Hering [e], Martyn Kelly [l], Sindre Langaas [m], Kristian Meissner [n], Yiannis Panagopoulos [o], Ellis Penning [p], Josselin Rouillard [q], Sergi Sabater [r], Ursula Schmedtje [s], Bryan M. Spears [a], Markus Venohr [t], Wouter van de Bund [c], Anne Lyche Solheim [m]

[a] NERC Centre for Ecology & Hydrology (CEH), Edinburgh, UK

LIVING RIVERS EUROPE

For an ambitious Water Framework Directive

Living Rivers Europe

European Union's water policy fitness check in 2018

Freshwater is an extremely limited resource on our planet and is critical to a large part of the Earth's biological diversity. Healthy freshwater ecosystems play an important role in providing society with a large number of services such as water purification, carbon sequestration, food provision and flood protection. Yet, freshwater ecosystems such as wetlands, lakes and rivers, are experiencing the biggest loss of wildlife on the planet. Abundance of freshwater species has shrunk by 81% since the 1970's.

The implementation of the EU Water Framework Directive (WFD), the EU's main legislation governing the management of its freshwater resources, has led to some dramatic improvements in water ecosystems and the wildlife dependent on them. However, the objective of the WFD of achieving good status for *all* Europe's waters by 2015 has been missed by a long shot. Today only about 50% of Europe's waters are estimated to be in good condition. Unsustainable agriculture, hydropower, flood defence and navigation are recognised as the main pressures preventing Europe's waters to recover.

POLICY PERSPECTIVE | Open Access

Ambitious Advances of the European Union in the Legislation of Invasive Alien Species

Joscha Beninde, Marietta L. Fischer, Axel Hochkirch, Andreas Zink

First published: 07 November 2014 | https://doi.org/10.1111/conl.12150 | Citations: 24

Editor:

Julie Lockwood

……and conservation management…..

The Ageing of Infrastructure and Ideologies: Contestations Around Dam Removal in Spain

Lena Hommes

Water Resources Management (WRM) Group, Department of Environmental Sciences, Wageningen University, Wageningen, The Netherlands; lena.hommes@wur.nl

ABSTRACT: This paper analyses the discussions surrounding dam removal in Spain and, specifically, ongoing contestations around the Toranes Dam. Engaging with scholarship about the temporalities of infrastructure and

Sustainability > Volume 4 > Navigating trade-offs between dams and river conservation

Navigating trade-offs between dams and river conservation

Published online by Cambridge University Press: **10 August 2021**

M.L. Thieme, D. Tickner, G. Grill, J.P. Carvallo, M. Goichot, J. Hartmann, J. Higgins, B. Lehner, M. Mulligan, C. Nilsson, K. Tockner, C. Zarfl and J. Opperman

Review

The effectiveness of non-native fish removal techniques in freshwater ecosystems: a systematic review

Authors: Trina Rytwinski, Jessica J. Taylor, Lisa A. Donaldson, J. Robert Britton, David R. Browne, Robert E. Cresswell, Mark Lintermans, Kent A. Prior, Marlow G. Pellatt, Chantal Vis, and Steven J. Cooke | AUTHORS INFO & AFFILIATIONS

Publication: Environmental Reviews • 25 September 2018 • https://doi.org/10.1139/er-2018-0049

46 521 GET ACCESS

NOAA Technical Memorandum NMFS-NWFSC-127

Fish-Habitat Relationships and the Effectiveness of Habitat Restoration

….and shifts in practices

Catch-and-release science and its application to conservation and management of recreational fisheries

S. J. COOKE

Department of Biology, Carleton University, Ottawa, ON, Canada

H. L. SCHRAMM

US Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University, MS, USA

Original Articles

Understanding the Fish Harvesting Decisions by Anglers

Len Hunt, Wolfgang Haider & Kim Armstrong

Pages 75-89 | Published online: 29 Oct 2010

Download citation https://doi.org/10.1080/10871200290089355

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Abstract

This paper examined whether angling catch behaviors, angler characteristics, and angler evaluations could explain the decisions by anglers to harvest caught

Related

People also read

All based on strong evidence based science

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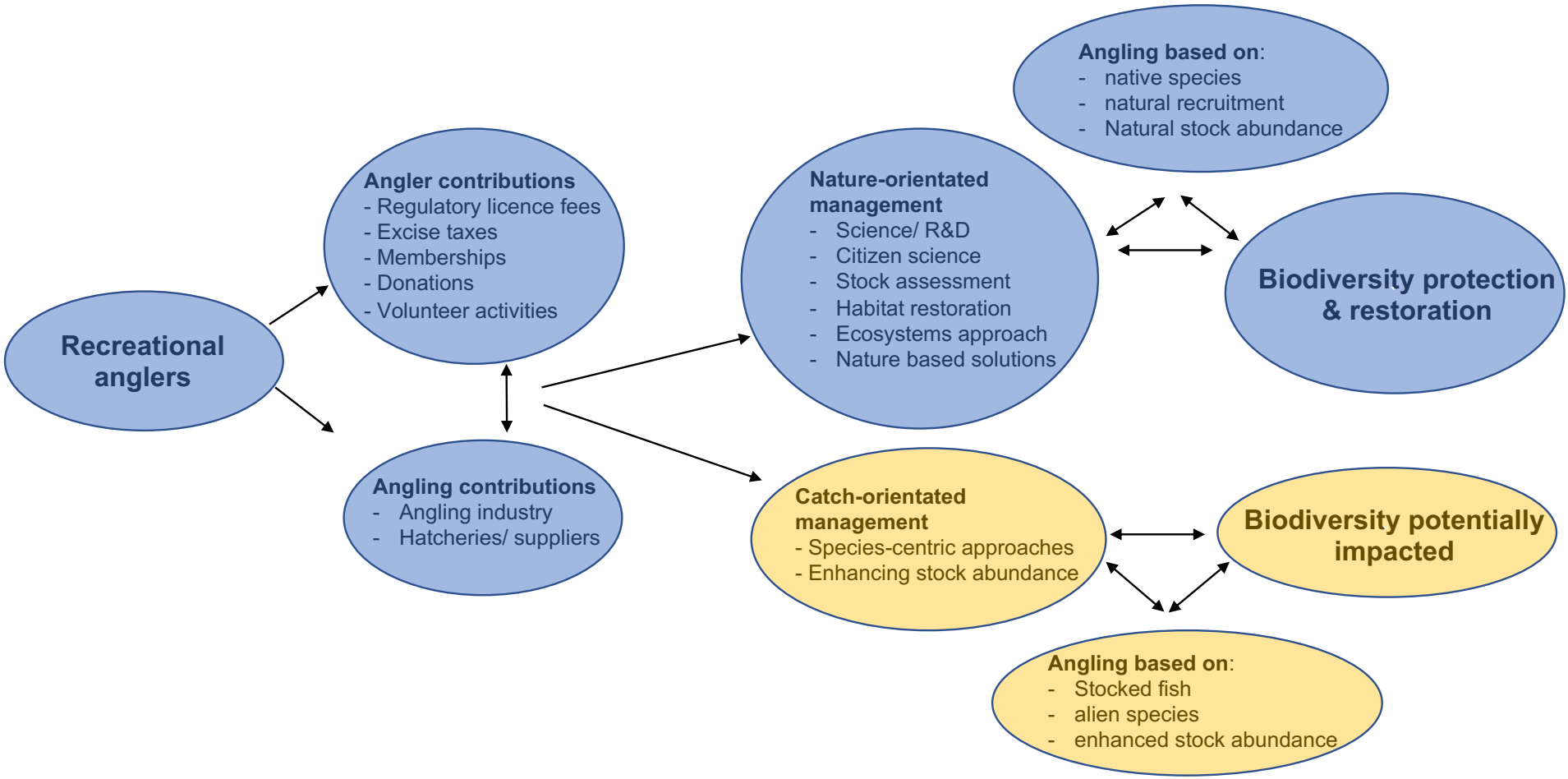
Recreational anglers as drivers of biodiversity protection & restoration

2. Angling & aquatic biodiversity

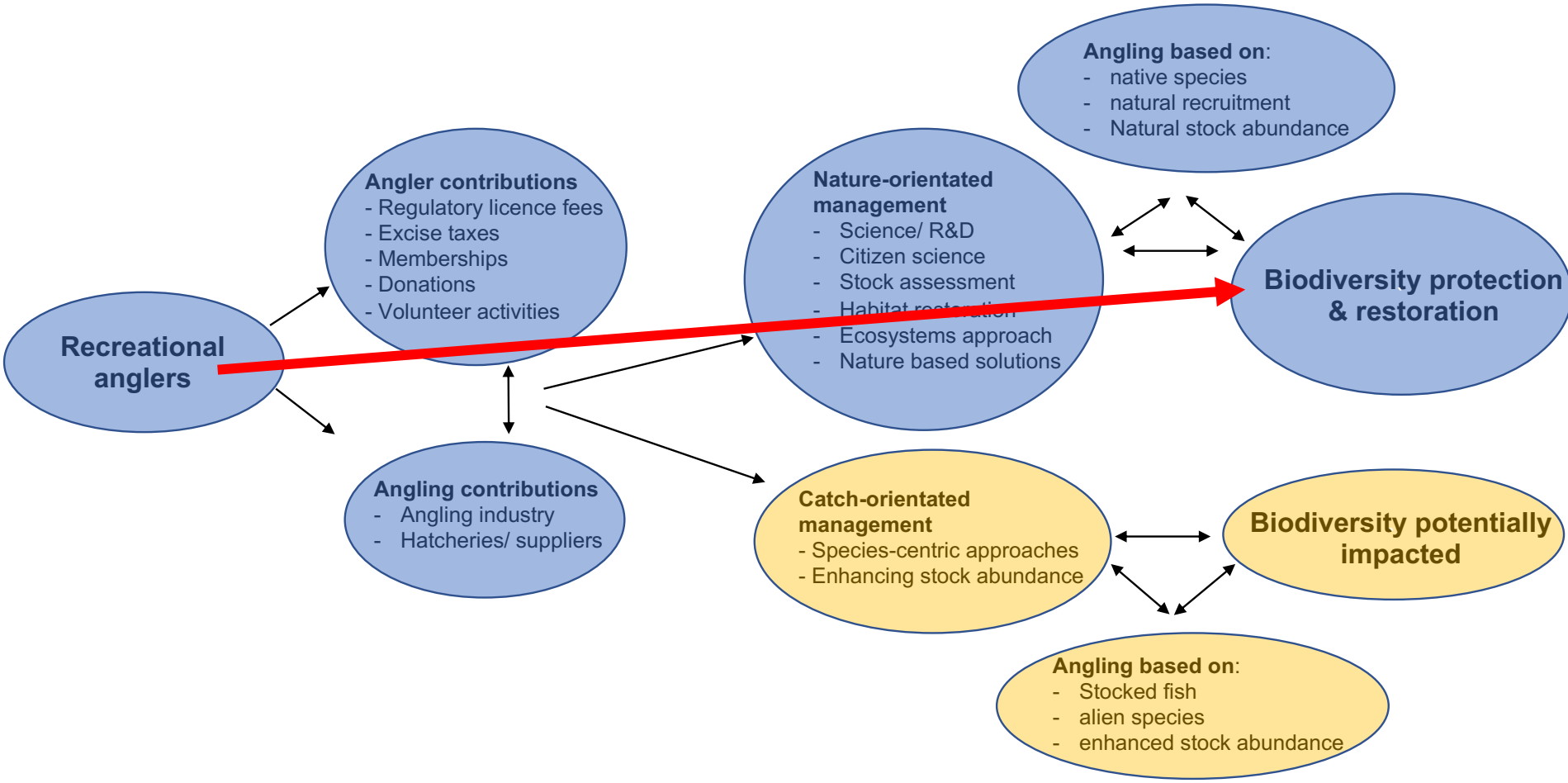
High angling participation….

- At least 10% of the global population exploit fish recreationally
- Europe: >16 million participants (as high as 24 million)
- Promotes human well-being & mental health through connecting people with nature
- High socio-economic values/ strong contributor to rural economies

Angler influences on biodiversity



Angler influences on biodiversity



CAMPAIGNS

17 November 2022

Water Quality Monitoring Network inspires local campaign to clean-up polluted river

A Cheshire angling club has launched a local campaign to clean up the River Bollin following W Quality Monitoring Network (WQMN) tests they carried out as part of the Angling Trust's Anglers Against Pollution initiative.

The tests conducted by members of Mottram St. Andrew Fly Fishing Club, founded and chaired by Gra Society Conservation Officer Ron Taylor, provided evidence that there was heavy pollution of the Bollin.

United Utilities' Prestbury Water Treatment Plant is immediately above the club's stretch of the river and regularly been seen discharging raw sewage through storm overflows. The company admitted there ha 114 spillages in 2021 and 34 so far this year up to 13 September.

The stretch of water was home to a good head of trout and chub, but the club says few are now caught algal growth can clearly be seen along the bed of the river.

The club involved the Parish Council and enlisted the support of Macclesfield MP David Rutley who hel arrange a tour of the treatment plant to try to understand why discharges were being allowed to continu

CAMPAIGNS

26 October 2022

Bringing Back Bigger Bass – Angling Trust, Bass Anglers Sportfishing Society and Save Our Seabass Participate in Bass FMP Co-Design Workshops

Representatives from the Angling Trust, Bass Anglers Sportfishing Society and Save Our Seabass have participated in the next phase of stakeholder analysis for the upcoming bass fishery management.

As part of developing the bass fishery management plan, Defra has commissioned Policy Lab to conduct stakeholder analysis and engagement. Over the past two weeks, the latest stage of the stakeholder engagement process took place – the co-design workshops – which saw a series of in-person and online workshops discussing potential priorities for the bass fishery management plan with the ambition of reaching consensus for a variety of possible management solutions. Attendees were identified using a random compute generator.

The bass fishery management plan is one of the first to be developed – a so-called "frontrunner". Bass is an important species to many recreational sea anglers, and bass angling is a valuable part of the social and economic contribution that sea angling makes to coastal communities. With bass stocks still recovering, the government must seize this opportunity to develop an ambitious bass fishery management plan that maximise

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3. Examples of anglers as protectors & restorers of biodiversity



Anglers as protectors and restorers of biodiversity

- Already heard today about nature protection & restoration schemes

- To avoid repetition, my focus is on how angler practice & engagement can protect & restore biodiversity……

Anglers as protectors and restorers of biodiversity

- Only time for three examples today:

A. Catch & release angling protects threatened species and their fisheries (practice change)

B. Contributing knowledge for data-poor species (contributing to evidence based science)

C. Angler river-fly monitoring initiative protects/ restores aquatic biodiversity (citizen science)

A. Catch & release angling

- Captured fish returned alive/ any stress response is short-term
- Good angling practices result in negligible mortality
- Returned fish continue contributing to spawning stock
- Adoption by anglers rapidly becomes a ’social norm’
- Highly important for promoting population sustainability while maintaining fishery value

Atlantic salmon *Salmo salar*

NASCO	Council *Report of the ICES Advisory Committee*	CNL(21)11 Agenda item: 3 d)

ICES Advice on fishing opportunities, catch, and effort
Northeast Atlantic ecoregions
Published 7 May 2021
Version 2: 13 may 2021

ICES CIEM

North Atlantic salmon stocks

Introduction

Main tasks

At its 2020 Statutory Meeting, ICES resolved (C. Res. 2019/2/ACOM21) that the Working Group on North Atlantic Salmon (WGNAS, chaired by Dennis Ensing, UK) would meet in Copenhagen, Denmark, 21–31 March 2021 to consider questions posed to ICES by the North Atlantic Salmon Conservation Organization (NASCO). Due to the COVID-19 pandemic, the working group met via web conference to address these questions.

Mortality of Atlantic salmon after catch and release angling: assessment of a recreational Atlantic salmon fishery in a changing climate

Authors: Travis E. Van Leeuwen, J. Brian Dempson, Chantelle M. Burke, Nicholas I. Kelly, Martha J. Robertson, Robert J. Lennox, Torgeir B. Havn, Martin Svenning, ... SHOW ALL | AUTHORS INFO & AFFILIATIONS

Publication: Canadian Journal of Fisheries and Aquatic Sciences • 8 June 2020 • https://doi.org/10.1139/cjfas-2019-0400

Abstract

Human activities have the potential to accelerate population-level decline by contributing to climate warming and decreasing the capacity of species to survive warming temperatures. Here we build a predictive model to test interactions between river warming and catch and release mortality in recreational fisheries for Atlantic salmon (*Salmo salar*) by compiling and analyzing published data. We then test whether warming has occurred in rivers where angling occurs and whether angling opportunities have been restricted through increased river closures due to high water temperatures. We find that catch and release mortalities are low (<0.05) at cool river temperatures (<12 °C). At river temperatures often leading to fishery closures (between 18 and 20 °C), mortalities range from 0.07 to 0.33 (mean = 0.16). River temperatures on the east and southeast coasts of Newfoundland have warmed, leading to an increase in fishery closures in recent years. By contrast,

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B. Contributing knowledge for data-poor species

- Large freshwaters challenging for stock assessment

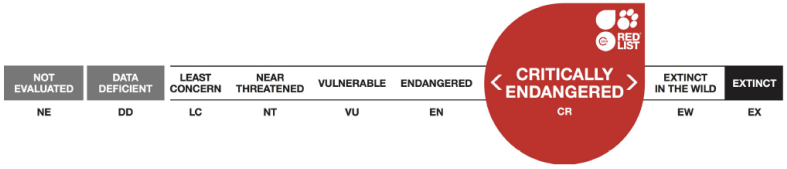
- Results in data-poor species/ lack of science-led policy

Angler catch data preventing extinctions

The IUCN Red List of Threatened Species™
ISSN 2307-8235 (online)
IUCN 2008: T56096394A56717605
Scope: Global
Language: English

***Tor remadevii,* Hump-backed Mahseer**

Assessment by: Pinder, A., Katwate, U., Dahanukar, N. & Harrison, A.



Without the recreational anglers, this species of mega-fauna would now be extinct

Angler catch data preventing extinctions

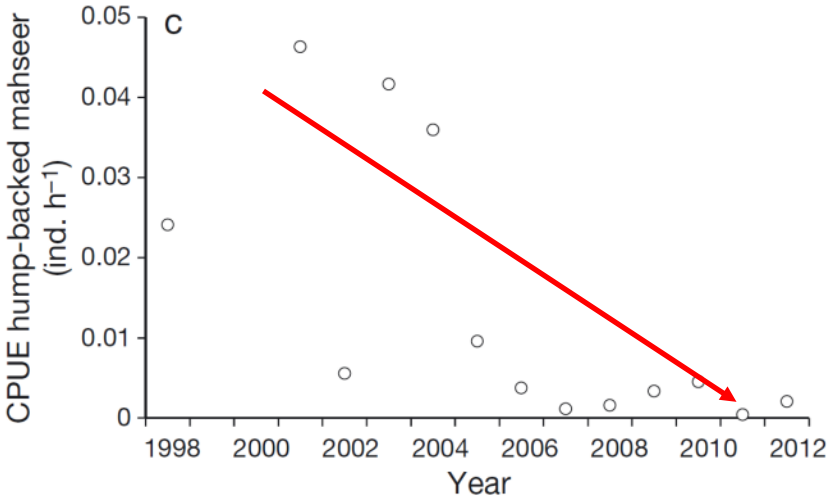
2013:

- Species undescribed to science

- No data on population size/ trends

Angler catch data preventing extinctions

We sourced catch data from angling camps…..
….starting point that lead to their CE Red listing assessment in 2019



From scientific obscurity to conservation priority: Research on angler catch rates is the catalyst for saving the hump-backed mahseer *Tor remadevii* from extinction

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

[1]Faculty of Science and Technology, Bournemouth University, Fern Barrow, Poole, Dorset, UK
[2]Mahseer Trust, c/o The Freshwater Biological

Abstract

1. The mahseer (*Tor* spp.) fishes of South and Southeast Asia are iconic megafaunal species that are highly valued by recreational anglers. Knowledge on their

Anglers as protectors and restorers of biodiversity

C. Angler river-fly monitoring

- Anglers are the ultimate citizen scientists
- Eyes & ears of water-side
- Passionate about natural resources
- Has been harnessed for the benefit of biodiversity…..

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Anglers' Riverfly Monitoring Initiative (ARMI): A UK-wide citizen science project for water quality assessment

Stephen J. Brooks[1,5], Ben Fitch[2,6], John Davy-Bowker[3,7], and Soraya Alvarez Codesal[4,8]

- > 2000 volunteers monitor biological water quality in > 1600 sites
- Early detection of water pollution/ complements statutory assessments
- Assisted in prosecutions/ fines supporting restoration

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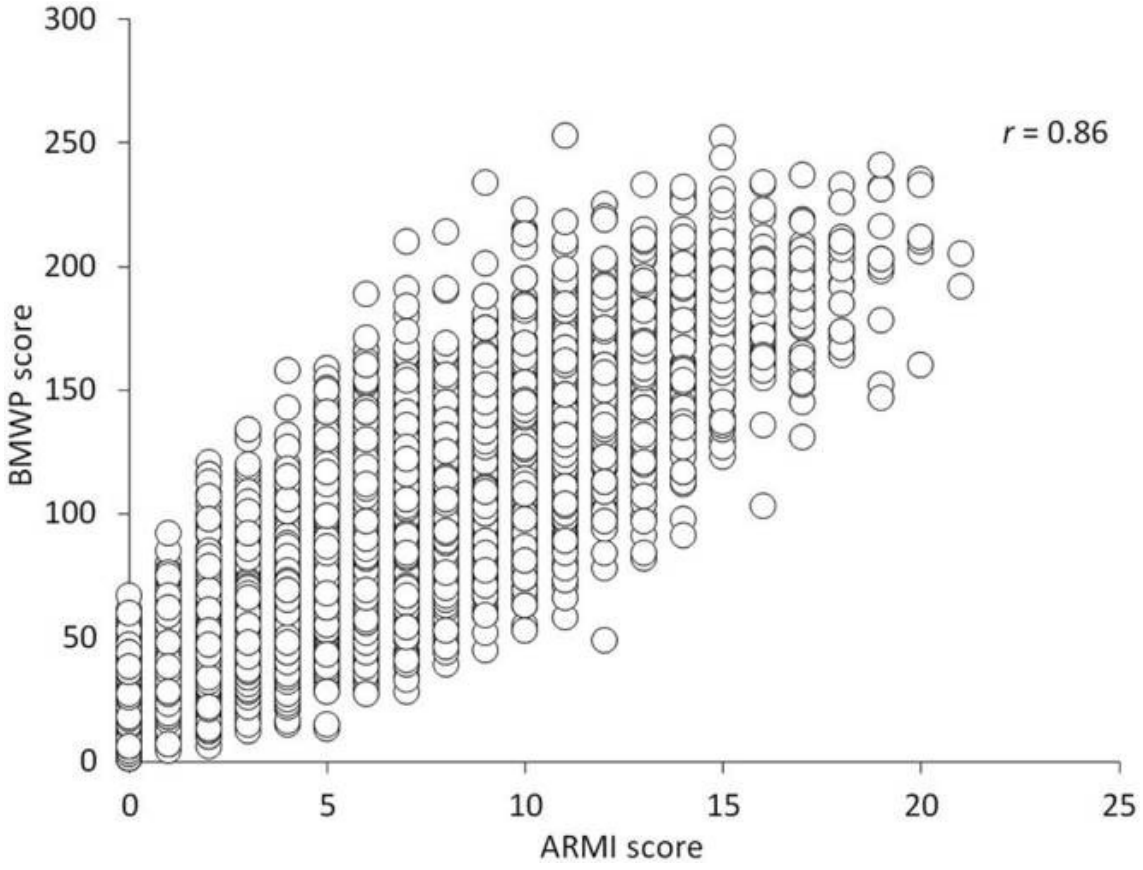
Anglers' Riverfly Monitoring Initiative (ARMI): A UK-wide citizen science project for water quality assessment

Stephen J. Brooks[1,5], Ben Fitch[2,6], John Davy-Bowker[3,7], and Soraya Alvarez Codesal[4,8]



- Producing reliable and replicable data
- In-kind value:
  approx. 500,000 Euro p.a.

With wide benefits to biodiversity

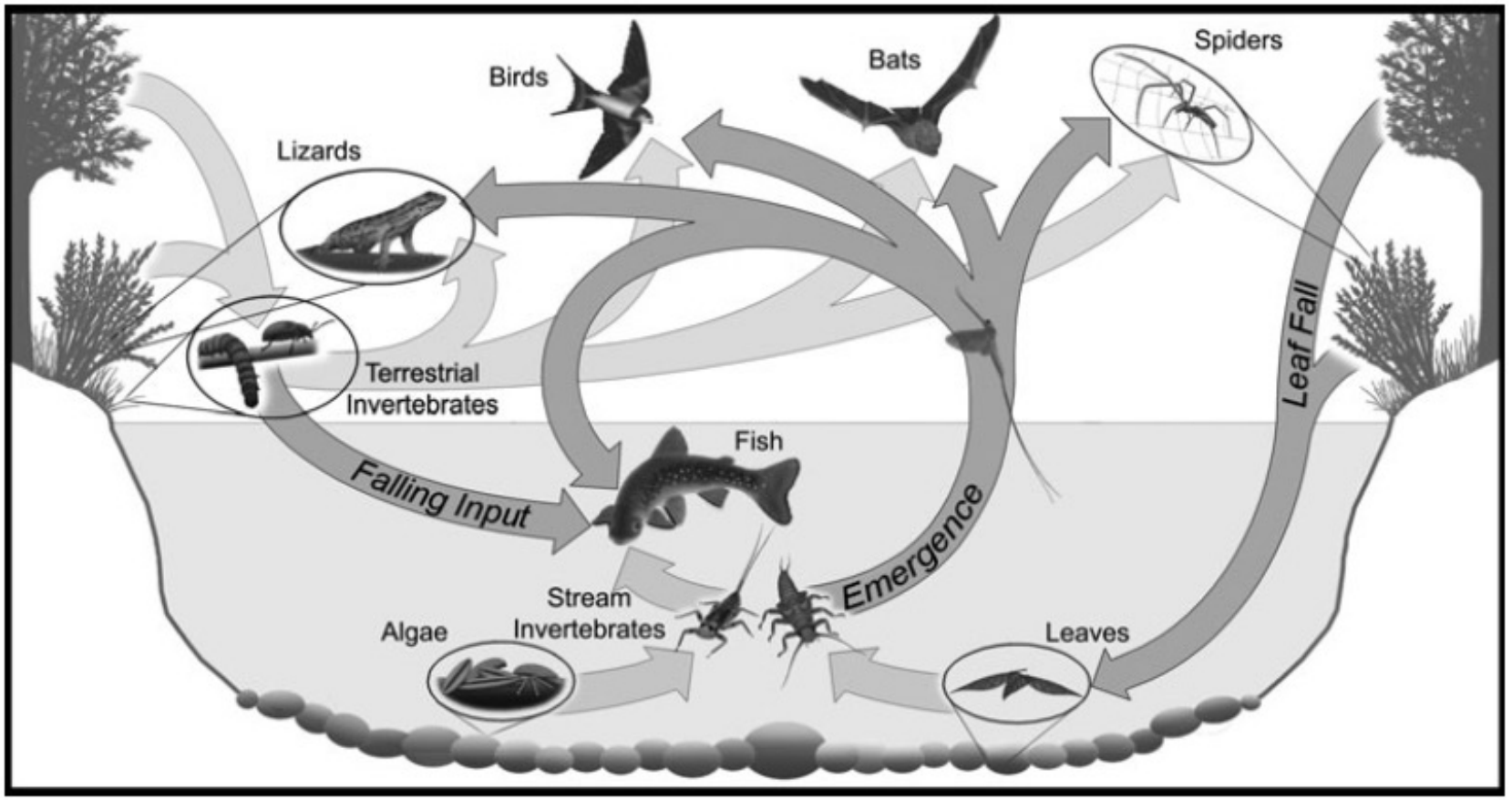


Fig. 1 A generalised diagram showing reciprocal flows of invertebrate prey and inputs of plant material (dark arrows) that have direct and indirect effects in stream and riparian food webs.

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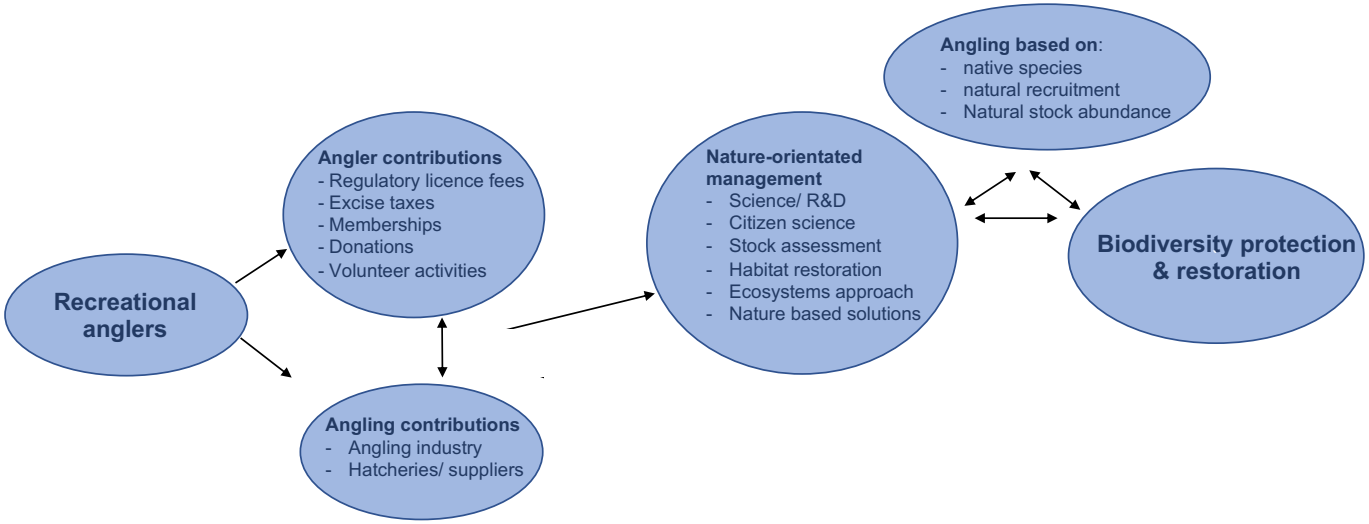
Recreational anglers as drivers of biodiversity protection & restoration

4. Conclusions

4. Conclusions



- Angling/ anglers play fundamental roles in protecting & restoring biodiversity
- C&R, data provision, citizen science (+ funding R&D, habitat restoration etc. etc.)
- Direct contributions to meeting/ implementing WFD, IAS Regulations, CFP reforms
- While also promoting human well-being/ mental health: connecting people with nature