

# Freshwater alien fish species in Croatia: problems and current situation in aquaculture

Slatkovodne strane vrste riba Hrvatskoj:  
problemi i trenutna situacija u akvakulturi

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# Introduction

- Freshwater fishes are the major group introduced for aquaculture in Europe, including Croatia.
- It is known that the great bulk of global fish introductions and translocations have been carried out for aquaculture purposes.
- Introduction of alien (exotic) fish species is considered to be one of the biggest threats to finfish biodiversity.
- Global aquaculture activities tend to be highly dependent on culturing non-native species, with their intentional and/or accidental introduction into the wider environment being an increasing ecological concern.
- There is still no adequate control of the escapees - from fish farms in Croatia.
- Purpose – to present current situation, consequences and to give recommendations

## In Balkan Peninsula 30 freshwater fish species

- were introduced **intentionally** for aquaculture
- 20 of which are now **naturalised** in inland waters.

In Croatian inland waters 19 fish – introduced by aquaculture

- 15 freshwater alien fish species - **intentionally** for aquaculture.
- 4 alien fish species -due to aquaculture activities of neighboring countries.
- some species have ceased to be interesting for domestic aquaculture, they are released out of the facilities and
- some of them today pose a **major threat** to the native freshwater ichthyofauna in Croatia (eg North American catfish).

### Alien freshwater fish species in the Balkans—Vectors and pathways of introduction

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2. Hrvatski simpozij o invazivnim vrstama / 2<sup>nd</sup> Croatian Symposium on invasive species Zagreb, Croatia, 21-22. XI 2016.

### FRESHWATER ALIEN FISH SPECIES INTRODUCED INTO CROATIA FOR AQUACULTURE AND CONSEQUENCES OF THEIR ESCAPES AND RELEASES IN INLAND WATERS

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#### Fisheries Management and Ecology

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### Risk screening of non-native freshwater fishes in Croatia and Slovenia using the Fish Invasiveness Screening Kit

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Yellow color denotes introduction in Croatia due aquaculture activities of nearby countries

Species name	Common Name	Origin	Date	Pathway: Introduction /spreading	Status	Place of first introduction	Prevalence	Risk	Current distribution
<i>Acipenser baeri</i> Brandt, 1869	 Siberian sturgeon	AS/EE	2010	AQ/ <b>AN</b>	A	Kupa fish farm, Draganići	M	N	Sava and Danube River
<i>Ameiurus melas</i> (Rafinesque, 1840)	 black bullhead	NA	1905	AQ/ <b>UN</b>	N	Končanica, Crna mlaka, Našice fish farms	W	H	Danube and Adriatic basin
<i>Ameiurus nebulosus</i> (LeSueur, 1819)	 brown bullhead	NA	1905	AQ/ <b>UN</b>	N	Končanica, Crna mlaka, Našice fish farms	R	H	Neretva basin
<i>Carassius gibelio</i> (Bloch, 1782)	 Gibel carp	AS	1950	<b>UN/AQ/UN</b>	N	From Russia: Danube river, Orašje fish farm	W	H	Danube and Adriatic basin
<i>Clarias gariepinus</i> (Burchell, 1829)	 North African catfish	AFR	2010	AQ/ <b>AN</b>	U	Kupa fish farm, Draganići	U	VH	Unknown
<i>Coregonus lavaretus</i> (Linnaeus, 1758)	 European whitefish	NE	1937	AQ/ <b>AN</b>	N	Plitvice lake	R	M	Plitvice lake; Accumulation Peruća, Cetina river
<i>Coregonus peled</i> (Gmelin, 1789)	 peled	NE	1937	AQ/ <b>AN</b>	N	Plitvice lake	R	MH	Plitvice lake; Accumulation Peruća, Cetina river
<i>Ctenopharyngodon idella</i> (Valenciennes, 1841)	 grass carp	AS	1966	AQ/BC/ <b>AN</b>	N	Končanica fish farm	W	MH	Adriatic and Danube Basin
<i>Hypophthalmichthys molitrix</i> Valenciennes, 1840	 silver carp	AS	1966	AQ/BC/ <b>AN</b>	A	Končanica fish farm	M	MH	Adriatic and Danube Basin
<i>Hypophthalmichthys nobilis</i> (Richardson, 1846)	 bighead carp	AS	1966	AQ/BC/ <b>AN</b>	N	Končanica fish farm	M	MH	Adriatic and Danube Basin
<i>Micropterus salmoides</i> (Lacepède, 1806)	 largemouth (black) bass	NA	1980s	AQ/ <b>AN</b>	N	Several fish farms	M	H	Adriatic and Danube Basin
<i>Morone chrysops</i> × <i>Morone saxatilis</i>	 wiper/sunshine bass hybrid	NA	2010	AQ/ <b>UN/AN</b>	U	Hungary, escapee to the Danube River	U	M	Danube River
<i>Oncorhynchus mykiss</i> (Walbaum, 1792)	 rainbow trout	NA	1883	AQ/ <b>AN</b>	N	Medvednica fish farm	W	MH	Danube and Adriatic basin
<i>Polyodon spathula</i> (Walbaum, 1792)	 Mississippi paddlefish	NA	2011	AQ/ <b>UN/AN</b>	U	Hungary, escapee to the Danube River	U	M	Danube River
<i>Pseudorasbora parva</i> (Temminck & Schlegel, 1846)	 Topmouth gudgeon	AS	1985	<b>UN/UN/AQ</b>	N	From Albanian and Romanian fish farms to the Danube	W	MH	Danube and Adriatic basin
<i>Salvelinus alpinus</i> (Linnaeus, 1758)	 Arctic char	NE	1963	AQ/ <b>AN</b>	N	Plitvice lake (from Bohinj lake to the Kozjak lake)	R	MH	Plitvice Lake; Neretva River, Peruća accumulation
<i>Salvelinus fontinalis</i> (Mitchill, 1815)	 brook trout	NA	1960-1970	AQ/ <b>AN</b>	N	Plitvice lake	R	MH	Plitvice Lake; Neretva River, Peruća accumulation
<i>Salmo trutta</i> Linnaeus, 1758 (Atlantic lineage)	 brown trout	WE	1970?	AQ/ <b>AN</b>	N	Unknown	W	H	Danube and Adriatic basin
<i>Salmo salar</i> Linnaeus, 1757	 Atlantic salmon	NE	1980	AQ/ <b>AN</b>	U	Krka estuary	U	N	Drava and Sava River

# Consequences– impact on fisheries

Croatian Journal of Fisheries, 2017, 75, 89-94  
T. Treer and I. Kubatov: Recreational and artisanal fisheries in rivers

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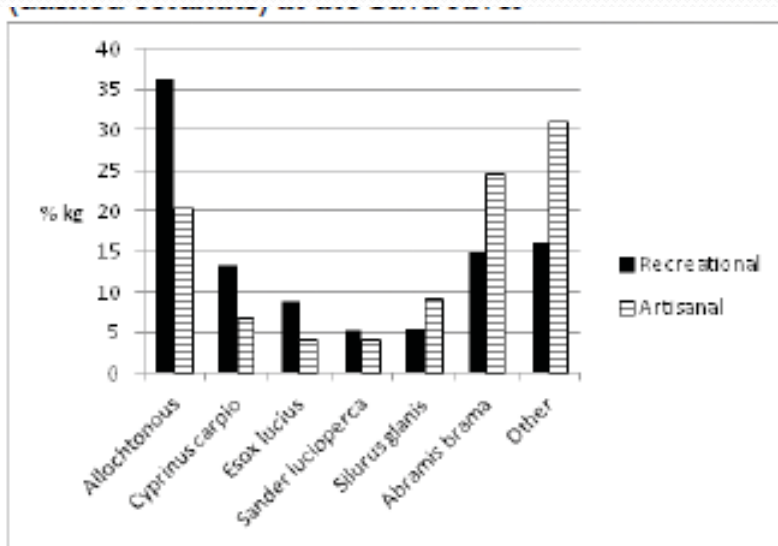
CODEN RIBAEG ISSN 1330-061X (print),  
1848-0586 (online)



## THE CO-EXISTENCE OF RECREATIONAL AND ARTISANAL FISHERIES IN THE CENTRAL PARTS OF THE DANUBE AND SAVA RIVERS

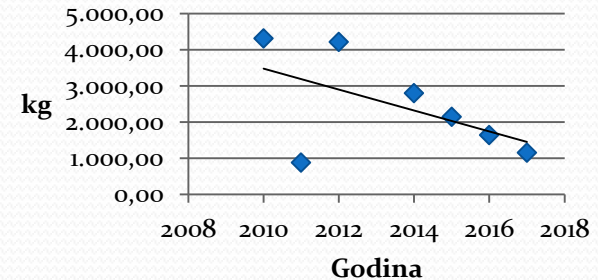
Tomislav Treer<sup>1\*</sup>, István Kubatov<sup>2</sup>

from 2004 to 2011

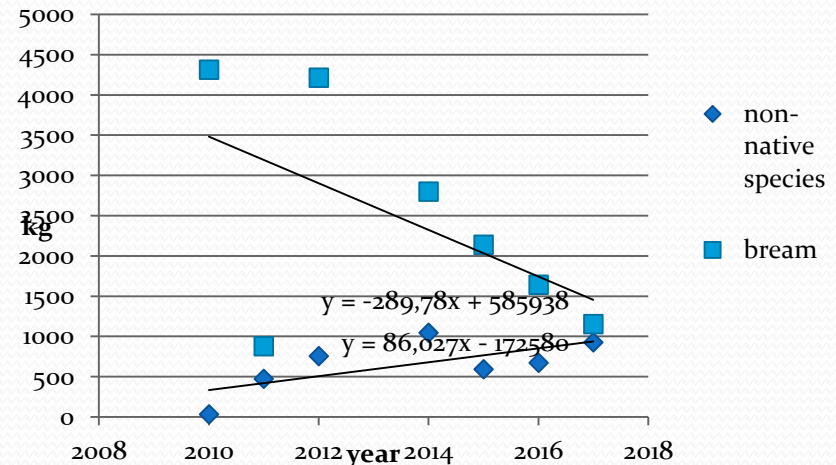
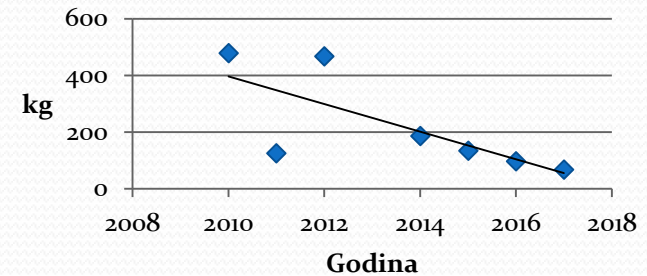


**Fig 4.** Average annual share of species in total catch (% kg) by recreational (full columns) and artisanal fishermen (dashed columns) in the Croatian section of the Danube

## Bream kg



## bream /per fisherman



- Total catch (kg) bream and non-native species

# Facts

- Under the EC regulation on the use of alien species in aquaculture (EU Regulation 708/2007) (adopted by the new Act on Aquaculture in Croatia from 2017) important alien species in aquaculture are regulated

## List of species foreseen by Article 2(5)

Rainbow trout, *Oncorhynchus mykiss*

Brook trout, *Salvelinus fontinalis*

Common carp, *Cyprinus carpio*

Grass carp, *Ctenopharyngodon idella*

Silver carp, *Hypophthalmichthys molitrix*

Big head carp, *Aristichthys nobilis*

Pacific cupped oyster, *Crassostrea gigas*

Japanese or Manila clam, *Ruditapes philippinarum*

Large-mouth bass, *Micropterus salmoides*

Arctic char, *Salvelinus alpinus*

(1) Pravnim ili fizičkim osobama iz članka 9. stavka 1. ovoga Zakona odobrit će se unos strane vrste ili prijenos lokalno neprisutne vrste koja nije obuhvaćena Prilogom IV. Uredbe Vijeća (EZ) br. 708/2007 radi njezina korištenja u akvakulturi izdavanjem dozvole za korištenje stranih i lokalno neprisutnih vrsta u akvakulturi.

- in Croatia has not been developed clear strategy for alien species farming and there is no clear definition of diversification of aquaculture production.
  - Eg. market needs? Tilapia? Paddlefish? Why?
- standardized risk assessment tool for alien fish species assessment in Croatia – should be developed by legislation but...
  - AS-ISK
  - <http://www.cefas.co.uk/nns/tools/> (free to use)



# Recommendations

- In order to successfully implement the legislation in Croatia, it is necessary to make:
  1. a list of alien freshwater fish species - important for farming;
  2. a list of alien freshwater fish species present in farm ponds which are not being commercially grown but have accidentally entered at production facilities;
  3. a list of alien fish species in supply waters, located nearby the fish farms.

# Recommendations

- closed recirculating systems (RAS) represent the future technology for the potential diversification, particularly for the future introduction of alien fish species in aquaculture - *number of farms which possess such system? Lack of RAS funding?*
- lack of farming native fish species (e.g. pikeperch)
  - Except for food - could be intended for inland waters restocking

# Summary

- To establish a alien fish species database,
- to standardize methodology,
- to use appropriate fish farming technology
- to develop a clear strategy

# Thank you for your attention

