

Invasive freshwater fish in the Mediterranean region of Catalonia. Updated impact review.

Ferran Fitó Gasol. Grau de Biologia. Universitat Autònoma de Barcelona. 2015

1. Introduction

Human activities have attenuated the biogeographical barriers that used to keep species in their former distributions, with the result of biotic homogenization throughout the earth.

Some of them have become invasive, entering new ecosystems aggressively and causing severe impacts to the endemic species and ecosystem processes and services.

Biological invasions are a major threat to biodiversity and a major driver of the global change.

An up-to-date impact knowledge-based framework is needed to prevent invasions, prioritize actions and restore ecosystems.

2. Objectives

- Obtain an updated overview of the impacts produced by the exotic and invasive freshwater fish in the region of Catalonia, Spain.
- Describe which biologic and ecologic species traits are associated with the impacts produced.
- Know which organisms are affected by this impacts.

3. Methods

The review consisted in gathering species-specific information from local and international on-line databases (*Non-indigenous Aquatic Species, Global Invasive Species Database, ExoAqua, Delivering Alien Invasive Species Inventories for Europe*) plus the national catalogue of invasive species in Spain (*Catálogo Español de Especies Exóticas Invasoras – Peces*). The information was complemented with on-line literature search and minor databases such as *Invasiber*.

ANOVA and PostHoc tests were used for numeric data.

4. Results

I. Predators



Micropterus salmoides

They can severely alter the ecosystem by predatory top down effects.



Esox lucius

- Less variable group, excepting common length
- Largest fish
- Hunters of big animals
- Highest trophic levels
- Native from Europe and America



Sander lucioperca



Silurus glanis

III. Micropredators



Fundulus heteroclitus

They can alter the ecosystem by intense interactions with other small species, usually competition or predation on invertebrates.



Gambusia holbrooki

- Taxonomically heterogeneous
- Most variable in risk assessment
- Smallest fish
- Hunters of invertebrates or small fish
- Intermediate trophic levels
- Mostly native from America



Lepomis gibbosus



Oncorhynchus mykiss



Pseudorasbora parva

II. Habitat engineers



Alburnus alburnus

They can severely alter the ecosystem by both herbivory bottom up effects or changes in the water quality and conditions.



Amelurus melas

- Mostly cypriniformes
- Most variable group, especially in thermic amplitude
- Medium sized
- Generally omnivorous
- Most feed near the bottom
- Lowest trophic levels
- Some of them produce bioturbation.
- Mostly native from Europe and Asia



Carassius auratus



Cyprinus carpio



Misgurnus anguillicaudatus



Rutilus rutilus

IV. Interactors



Scardinius erithrophthalmus

They can exert negative effects on other species but they are not known capable of causing major ecosystem impacts.

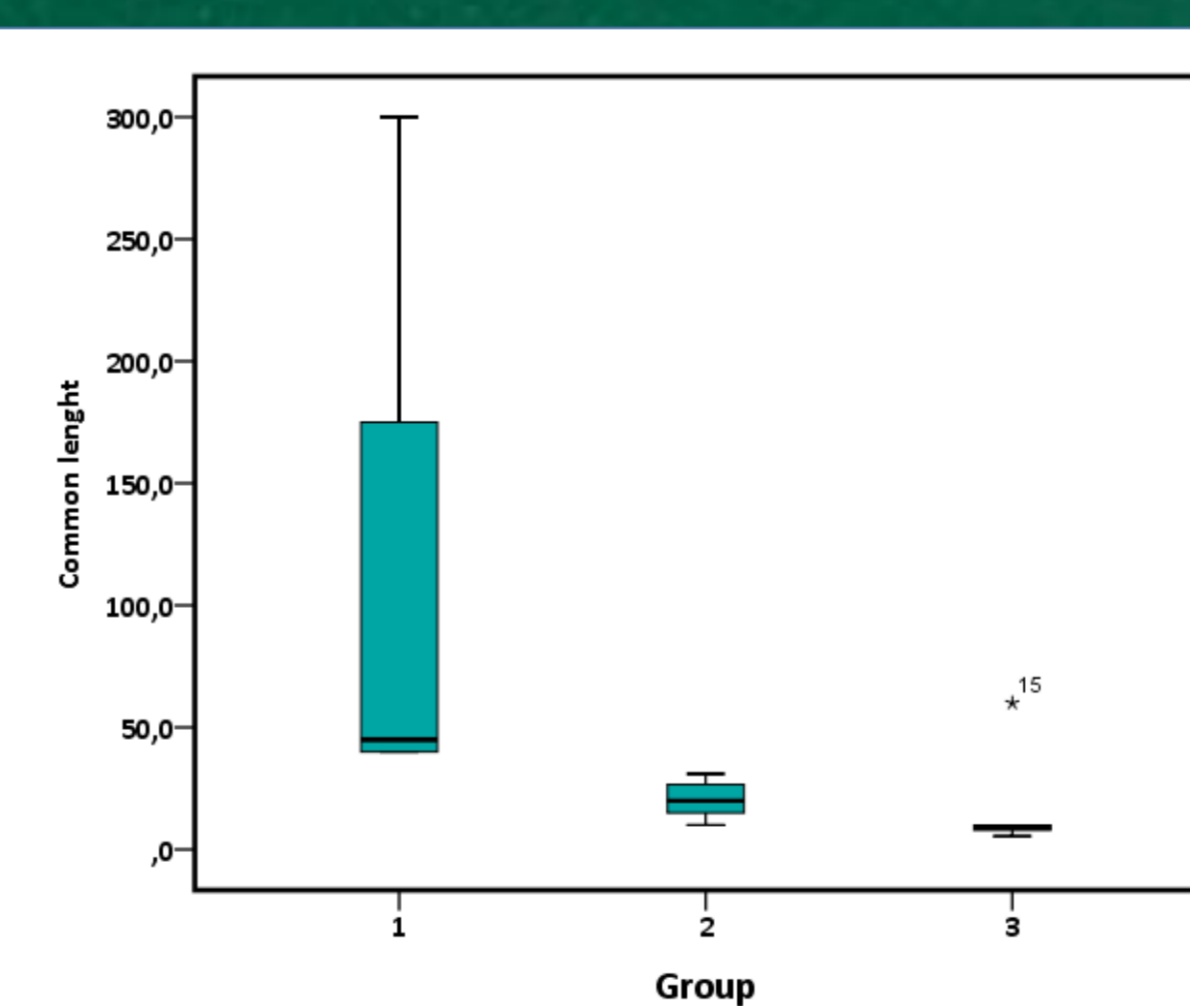


Figure 1. Common length distribution per impact group. The whiskers indicate the range, the box comprises 50% of the values and the line shows the median value.

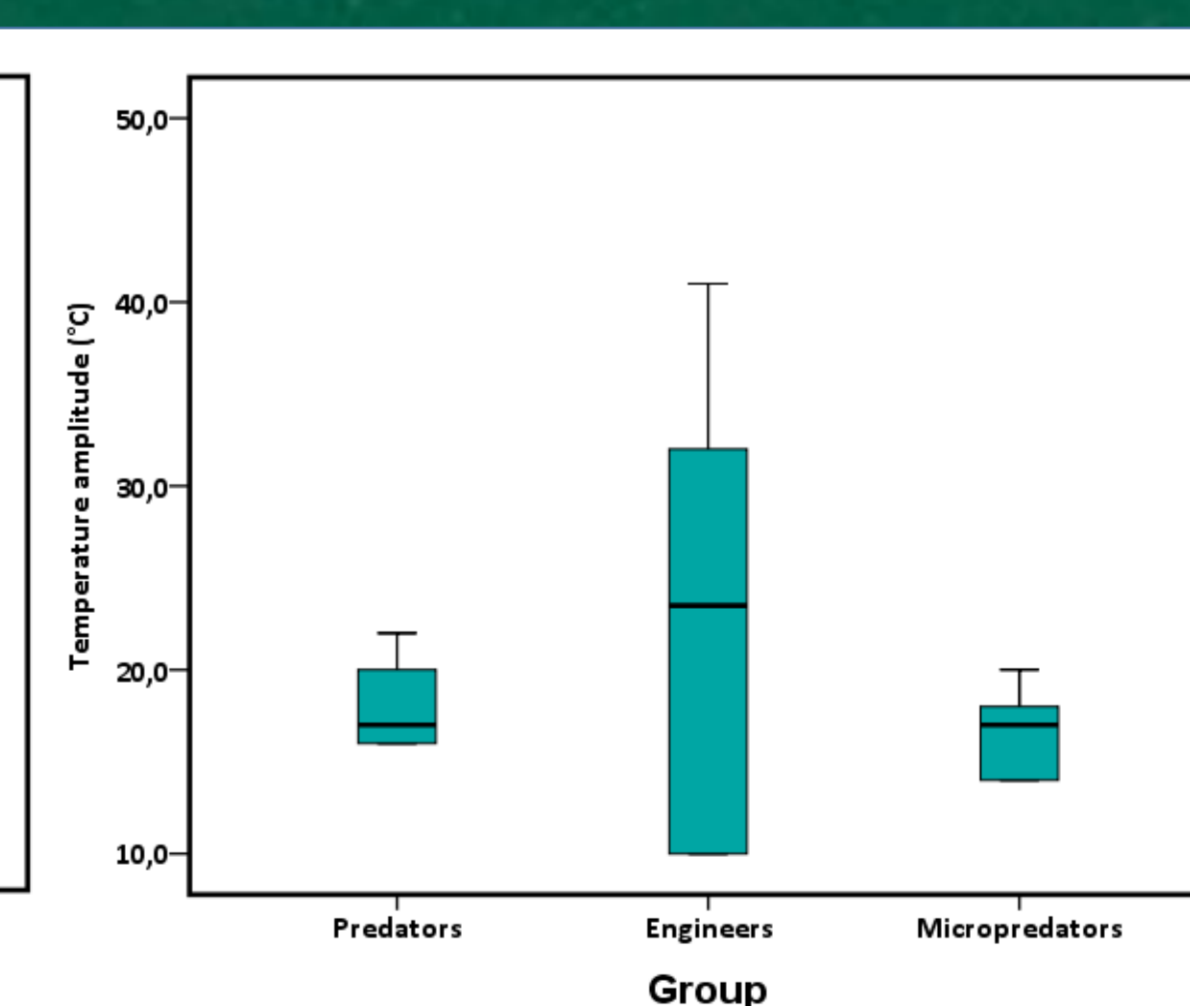


Figure 2. Temperature amplitude distribution per impact group. The whiskers indicate the range, the box comprises 50% of the values and the line shows the median value. Engineers were 4 times more variable than the other groups.

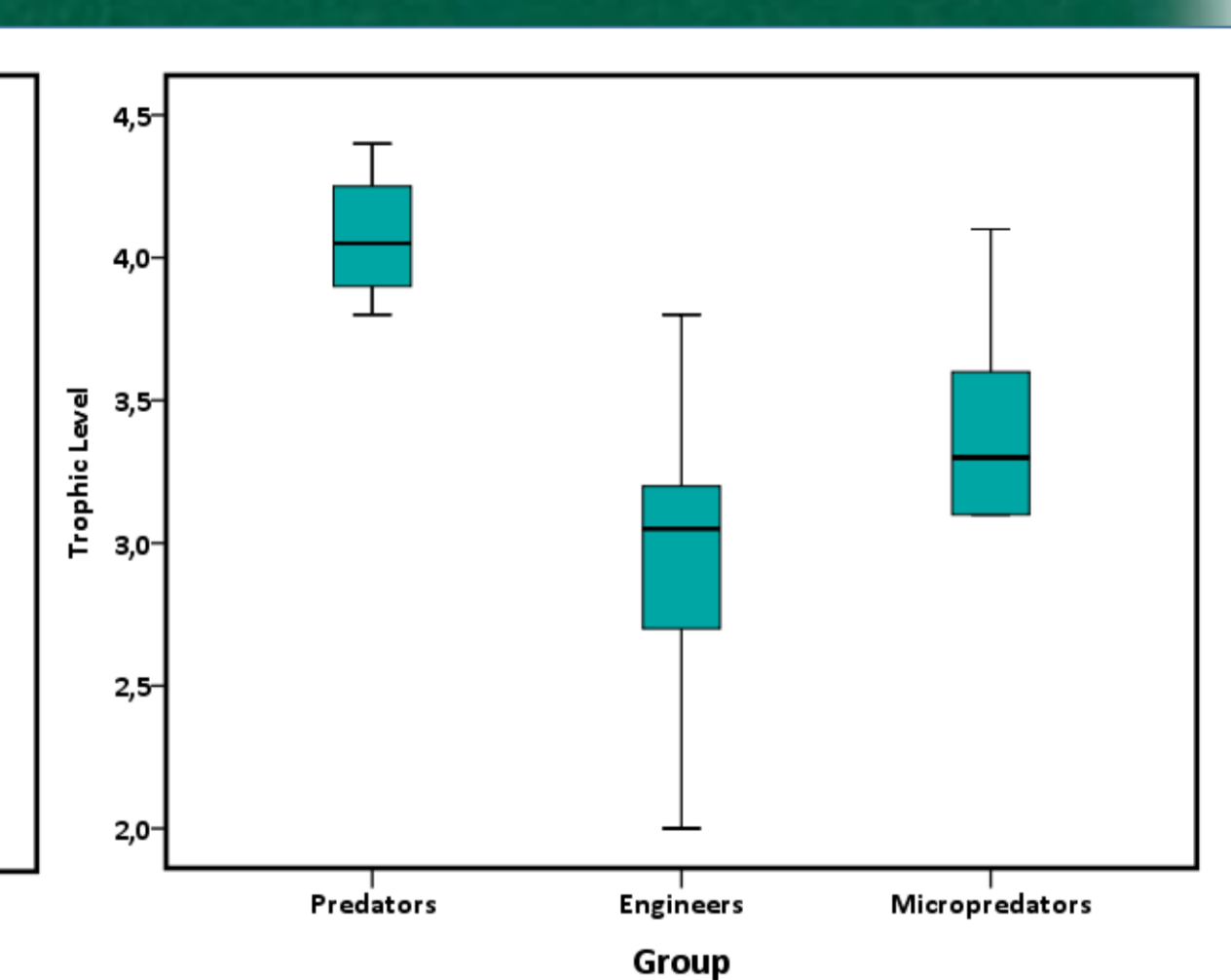


Figure 3. Trophic level distribution per impact group. The whiskers indicate the range, the box comprises 50% of the values and the line shows the median value. Predators were significantly different from engineers.

5. Conclusions

- The Catalan freshwater ecosystems are facing the invasion impacts of 16 fish species.
- This species can be splitted in 4 major groups based on the type of environmental impacts produced.
- Engineers produce strong visual and social impacts.
- Predators and disease vectors are a threat to economy.
- 2 species produce beneficial impacts to people.
- The most affected organisms are Cyprinids, Salmonids, amphibians and macroinvertebrates.
- Threatened native and endemic species suffer the impacts of several invasive fish.