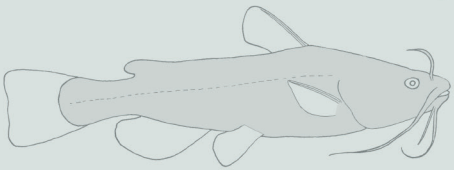
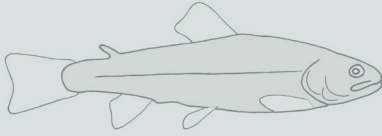
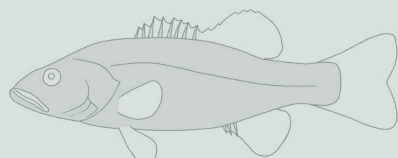


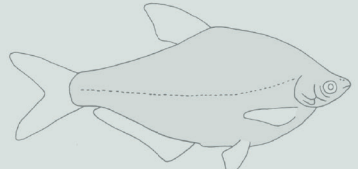
**HELLENIC CENTRE FOR  
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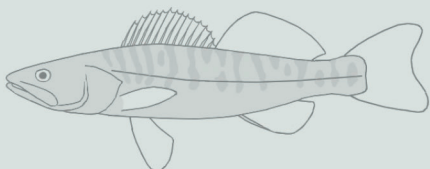
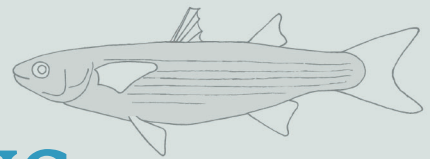
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# FRESHWATER FISHES



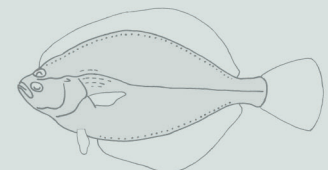
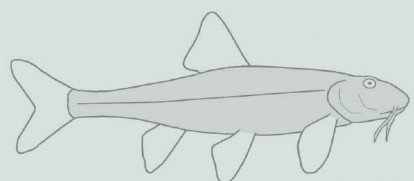
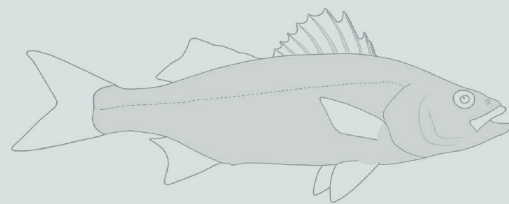
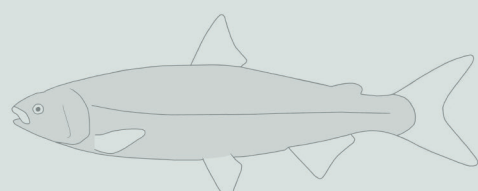
# AND LAMPREYS OF GREECE



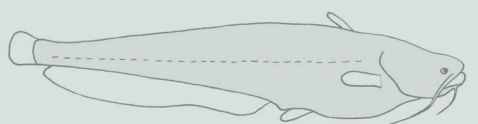
*An Annotated Checklist*



Barbieri R., Zogaris S., Kalogianni E., Stoumboudi M. Th,  
Chatzinikolaou Y., Giakoumi S., Kapakos Y., Kommatas D.,  
Koutsikos N., Tachos, V., Vardakas L. & Economou A.N.



2015





**FRESHWATER FISHES  
AND LAMPREYS OF GREECE**

*An Annotated Checklist*





HELLENIC CENTRE FOR  
MARINE RESEARCH

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**Monographs on Marine Sciences No. 8**

# FRESHWATER FISHES AND LAMPREYS OF GREECE

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*An Annotated Checklist*

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Any mistakes and omissions are solely the responsibility of the authors. Please contact the ichthyological team of IMBRIW at [imbriw-webmaster@hcmr.gr](mailto:imbriw-webmaster@hcmr.gr) and/or [info@fishlist.gr](mailto:info@fishlist.gr) for queries, comments, corrections or new contributions relevant to freshwater fishes in Greece.

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*Dedicated to  
Professor P.S. Economidis,  
and to  
the memory of the late A. Stephanidis*





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## Foreword

Writing the foreword of a book is always a challenge and totally different than writing a scientific essay. Although the foreword of a book might follow certain technical ‘guidelines’, as anyone can realize by googling ‘foreword’, the main difference is that in a foreword one can freely express his/her ideas that are published without the burden of peer-review. And I will use this ‘privilege’ here.

It is really an honor and pleasure to present ‘Freshwater Fishes and Lampreys of Greece: An annotated checklist’, which constitutes the 8th volume of the series ‘Monographs on Marine Sciences’ (published by the Hellenic Centre for Marine Research, HCMR). It is an honor because this book is written by some of the most renowned Greek scientists in the field. It is also a pleasure because with some of them our scientific careers have followed a common path, i.e., we scientifically age together. The authors of the book include my long-time friends Alkis Economou, Maria Stoumboudi and Roberta Barbieri<sup>1</sup>. Among the authors are also Vassilis Tachos<sup>2</sup>, Yiorgos Chatzinikolaou<sup>3</sup>, Stamatis Zogaris, Eleni Kalogianni, Sofia Giakoumi, Yiannis Kapakos, Dimitris Kommatas, Nicholas Koutsikos and Leonidas Vardakas with whom I have a close interaction and thus had the opportunity to realize their dedication during the last 15 months that I serve as the director of the Institute of Marine Biological Resources and Inland Waters (IMBRIW). All of the above mentioned scientists have spent thousands of hours to explore, observe, sample and analyze the data that have been collected from almost all Greek river basin areas.

The knowledge appearing in this book is the product of research and careful coding of the information collected through a plethora of scientific projects, mostly undertaken by the former Institute of Inland Waters and now IMBRIW, during the last 30 years. Among these projects special reference should be made to the river component of the national ecological water quality monitoring project implementing the EU Water Framework Directive, which is led by IMBRIW and supported by the Special Secretariat for Water, Ministry of Environment, Energy and Climate Change (2012-2015). Naturally, this is a book that is based on group effort, given that more than 30 national and international scientists and naturalists have contributed to it at various stages with information and advice (see Acknowledgements). Furthermore, the book was reviewed by Dr Jörg Freyhof (German Centre for Integrative Biodiversity Research), a world-renowned authority on freshwater fish taxonomy, and Assistant Professor Dimitra Bobori, a dedicated ichthyologist (Department of Biology, Aristotle University of Thessaloniki). I have written elsewhere (Stergiou 2005, *Conservation Biology* 19, 983-985) that ecology (as fine arts) must not reflect like a mirror but must magnify as a lens<sup>4</sup>. Indeed, this book undoubtedly magnifies on, rather than reflecting, the fish fauna of Greek inland waters.

The book is very well written and presented. It includes a Greek summary and several pertinent introductory essays (taxonomy and nomenclature, geography of inland waters, biogeographical setting,

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1 Whom I know since the late 1980s, when we all started our career in HCMR.

2 A student of mine.

3 I was an external examiner of his PhD thesis.

4 Paraphrasing the well-known lyrics of Vladimir Maiakovski.

conservation) in which the authors set the theoretical (and technical) framework of their work and point out some of the most intriguing aspects of the Greek ichthyofauna, notably its endemism, as well as the conservational value of their book (i.e., freshwater fishes are among the most highly threatened species groups in Europe). Consequently, there is a chapter on how to use the Annotated Checklist followed by the backbone of the book, i.e., species accounts for every freshwater fish and lamprey species documented in Greek inland waters. Each species is accompanied by its common Greek and English name, its maximum length and other information in a standardized format. Finally, there are excellent drawings of all genera by Roberta Barbieri.

Naturally, apart from the introductory chapters, this is not a book that you can read in one pass. This is rather a book that students, teachers, professors, scientists, naturalists, journalists, laymen and managers related to life sciences, ecology, biodiversity and conservation, hydrobiology, potamology and management must always keep on their desk for quick and immediate consultation. It is undoubtedly an invaluable source on the biodiversity and conservation of Greek inland waters.

What is also very important and should be stressed here is that the authors will regularly provide updated versions of their checklist on the website of IMBRIW (<http://imbriw.hcmr.gr/en/>), i.e., this is a dynamic checklist.

This book is the second annotated list of Greek fishes, the first one being 'Fauna Graecia: An updated checklist of the fishes in the Hellenic Seas' written by Costas Papaconstantinou (Monographs in Mediterranean Science No 7). Both books will be immediately incorporated into FishBase ([www.fishbase.org](http://www.fishbase.org)), the largest electronic encyclopedia on fishes, a fact that will render Greece as the 'FishBase' country with one of the most complete and updated inventories of its ichthyofauna. Both books are also really open access (i.e. available at no cost) to the public as scientific publications should be (see Tsikliras & Stergiou 2013, *Mediterranean Marine Science* 14:363-364). This is an important contribution of IMBRIW to science and society.

Finally, I would like to close this foreword with the hope and wish that these two books will serve as paradigms being followed by similar books on other aquatic taxa.

***Konstantinos I. Stergiou***

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## Summary in the Greek language / Περίληψη

**Ψάρια και πετρόμυζα της Ελλάδας: κατάλογος ειδών**

Αυτό το βιβλίο προσφέρει έναν εμπλουτισμένο κατάλογο της ιχθυοπανίδας των εσωτερικών υδάτων της Ελλάδας (ποταμών, λιμνών, υδροτόπων). Ο κατάλογος περιλαμβάνει όλα τα είδη ψαριών που έχουν μέχρι σήμερα επίσημα τεκμηριωθεί σε υδάτινα συστήματα της ελληνικής επικράτειας (Πετρομυζωντίδες και Ακτινοπτερύγιοι, περιλαμβανομένων και των εισαχθέντων ξενικών ειδών). Μέχρι σήμερα έχουν καταγραφεί 160 είδη ψαριών που ζουν σε γλυκά νερά στην Ελλάδα (137 ιθαγενή είδη). Από αυτά, 47 είναι αποκλειστικά ενδημικά της Ελλάδας – δεν υπάρχουν πουθενά αλλού στη Γη - ενώ άλλα 14 απαντούν και σε ορισμένα διασυννοριακά ύδατα με τις γειτονικές βαλκανικές χώρες (Λεκάνες Butrint, Δοϊράνης και Πρεσπών). Αυτό σημαίνει ότι το 38% των ειδών είναι ενδημικά ή σχεδόν ενδημικά της χώρας μας ή, αν αφαιρέσουμε τα ξενικά είδη και τα είδη θαλάσσιας προέλευσης, προκύπτει ότι το 50% της αυτόχθονης ιχθυοπανίδας των γλυκών νερών της χώρας αποτελείται από ενδημικά και σχεδόν ενδημικά είδη.

Καμία άλλη ομάδα ζώων δεν έχει τόσο υψηλό ποσοστό ενδημισμού στην Ελλάδα, ενώ παράλληλα αυτό είναι από τα υψηλότερα ποσοστά ενδημισμού ψαριών στην Ευρώπη. Οι ακριβείς αιτίες για αυτόν τον ενδημικό πλούτο κρύβονται στην ιδιόμορφη γεωλογική και κλιματική ιστορία της Ελλάδας που δημιούργησε αρχαίους εποικισμούς, γεωγραφική απομόνωση, παγετωνικά καταφύγια και συνθήκες που ευνοούν την ειδογένεση. Η μελέτη της κατανομής των ενδημικών ειδών και των πολύπλοκων φυλογενετικών σχέσεων και οικολογικών τους αλληλοεξαρτήσεων μας βοηθούν να κατανοήσουμε τη βασική φυσική ιστορία των εσωτερικών υδάτων της χώρας. Παράλληλα, η μοναδικότητα των ψαριών γλυκού νερού της Ελλάδας έχει προσελκύσει διεθνές ερευνητικό ενδιαφέρον, καθώς η μελέτη της γεωγραφικής κατανομής και της γενετικής δομής των πληθυσμών τους βοηθούν να διασαφηνίσουμε την προέλευση και τη βιογεωγραφική εξέλιξη της ευρωπαϊκής ιχθυοπανίδας.

Πολλά από τα 137 είδη της ελληνικής αυτόχθονης ιχθυοπανίδας είναι εξαιρετικά ευάλωτα σε ανθρωπογενείς πιέσεις γιατί έχουν γεωγραφικά περιορισμένες κατανομές και στενές οικολογικές απαιτήσεις. Τα εσωτερικά νερά στην Ελλάδα αποτελούν σημαντικό πόρο προς εκμετάλλευση από τον άνθρωπο, και πολλά οικοσυστήματα έχουν υποβαθμιστεί εξαιτίας της εκμετάλλευσης αυτής. Επακόλουθο είναι ότι πολλά αυτόχθονα είδη δέχονται σοβαρές απειλές από δραστηριότητες που επηρεάζουν τους πληθυσμούς και τα ενδιαιτήματά τους. Η Ελλάδα έχει μεγάλη ευθύνη – και χρέος απέναντι στις επόμενες γενιές– για τη διατήρηση της βιοποικιλότητας των εσωτερικών υδάτων. Απαραίτητη προϋπόθεση για την ανάληψη δράσεων προστασίας και διατήρησης είναι να γνωρίζουμε τα είδη, τη γεωγραφική εξάπλωση και τις πληθυσμιακές τους τάσεις, καθώς και βασικές παραμέτρους της βιολογίας, της οικολογίας και του κύκλου ζωής τους.

Το πρώτο ερώτημα επομένως που τίθεται είναι πόσα είδη, και ποια, ζουν στα εσωτερικά νερά της Ελλάδας. Αν και φαινομενικά απλό, το ερώτημα δεν είναι εύκολο να απαντηθεί. Από τη μία πλευρά, η συστηματική κατάταξη των ψαριών είναι μία δυναμική επιστήμη που εξελίσσεται συνεχώς κάτω από το πρίσμα νέων πορισμάτων της έρευνας στη μορφολογία και τη γενετική των ειδών. Τα

τελευταία χρόνια έχουν γίνει πολλές φυλογενετικές και γενετικές έρευνες και αρκετά νέα είδη έχουν προστεθεί στην αυτόχθονη ελληνική ιχθυοπανίδα, ενώ τα ονόματα κάποιων ειδών έχουν αλλάξει ώστε να αντανακλούν την εξελικτική τους ιστορία και τις φυλογενετικές τους σχέσεις με άλλα είδη. Από την άλλη πλευρά, δεν είναι τόσο εύκολο να αποτιμήσει κανείς το σύνολο της ιχθυοπανίδας των γλυκών νερών επειδή σε αυτήν περιλαμβάνονται κρυπτικά και μη μελετημένα ή περιγραφέντα είδη, ξενικά είδη που εισήλθαν ή συνεχώς εισέρχονται με ανθρώπινη παρέμβαση, καθώς και ευρύαλα είδη (είδη που απαντώνται σε ένα μεγάλο εύρος αλατότητας νερών), των οποίων ο βαθμός παρουσίας και τα όρια εξάπλωσης σε γλυκά νερά είναι ενίοτε δύσκολο να εκτιμηθεί.

Στο παρελθόν έχουν γίνει σημαντικές προσπάθειες συνολικής παρουσίασης και συστηματικής περιγραφής των ψαριών της Ελλάδας ή μέρους αυτής, με προεξέχουσες τις δημοσιεύσεις των Στεφανίδη (1939) και Οικονομίδη (1973, 1991). Ωστόσο, η ταξινομική είναι ένα πολύ δυναμικό επιστημονικό πεδίο, καθώς ανακαλύψεις νέων ειδών, νέες πληροφορίες για την κατανομή των ειδών, νέες διαγνωστικές μέθοδοι στην αναγνώριση ειδών, αλλά και αλλαγές στην αντίληψη του ορισμού του «είδους», οδηγούν στην ανάγκη για συνεχείς τροποποιήσεις στην ονοματολογία και στη συστηματική κατάταξη των ειδών (βλ. Economidou *et al.*, 2007a). Μεταξύ άλλων, αυτές οι τροποποιήσεις δημιουργούν ονοματολογική σύγχυση στους χρήστες των ιχθυολογικών δεδομένων, καθώς το ίδιο είδος μπορεί να αναφέρεται με διαφορετικά ονόματα σε νεότερες και παλαιότερες δημοσιεύσεις. Παράλληλα, υπάρχει ακόμα αρκετή ασάφεια σε ό,τι αφορά τα όρια της γεωγραφικής κατανομής των ειδών, η οποία οφείλεται στο γεγονός ότι η ιχθυοπανίδα ορισμένων υδάτινων συστημάτων δεν έχει ακόμα μελετηθεί επαρκώς. Οι συνθήκες αυτές δημιουργούν την ανάγκη για περιοδική επικαιροποίηση των καταλόγων ώστε να ενσωματώνεται η νέα γνώση και εμπειρία που αποκτάται.

Η σύνταξη του παρόντος καταλόγου μπορεί λοιπόν να θεωρηθεί ως συνέχεια και συμπλήρωση προηγούμενων προσπαθειών ταξινομικής κατηγοριοποίησης και γεωγραφικής απεικόνισης της κατανομής των ψαριών της Ελλάδας. Καταβλήθηκε προσπάθεια να συλλεχθεί και να περιληφθεί κάθε νεώτερη πληροφορία σχετικά με τη συστηματική, τη γεωγραφική εξάπλωση, τη φυλογένεση και την πληθυσμιακή κατάσταση των ειδών, κάνοντας χρήση αφενός της σχετικής επιστημονικής βιβλιογραφίας, και αφετέρου των αποτελεσμάτων των εκτεταμένων ιχθυολογικών ερευνών του τομέα Εσωτερικών Υδάτων του Ινστιτούτου Θαλάσσιων Βιολογικών Πόρων και Εσωτερικών Υδάτων (ΙΘΑΒΙΠΕΥ) και των συνεργατών του. Σκοπός μας είναι η δημιουργία μίας ολοκληρωμένης πληροφοριακής βάσης για τα ψάρια γλυκού νερού της Ελλάδας που θα παρέχει την πιο έγκυρη ονοματολογία και τα πιο πρόσφατα στοιχεία για την κατανομή και το καθεστώς διατήρησης των ειδών, συμβάλλοντας έτσι στην υποστήριξη μελετών, ερευνητικών και πολιτικών έργων για την προστασία των υδατικών πόρων και της βιοποικιλότητας.

Εκ πρώτης όψεως, η δημιουργία ενός καταλόγου ειδών μπορεί να εκληφθεί ως ένα θεωρητικού ενδιαφέροντος ζήτημα που απασχολεί μία μικρή μερίδα επιστημόνων και στερείται πρακτικής σημασίας. Τα περισσότερα ψάρια του γλυκού νερού έχουν χαμηλή οικονομική αξία – προς τι λοιπόν η προσπάθεια διασαφήνισης του αριθμού, της συστηματικής και της κατανομής τους; Μία πρώτη απάντηση στο ερώτημα είναι ότι ένας επικαιροποιημένος κατάλογος παρέχει αξιόπιστη πληροφορία στην οποία μπορούν να στηριχθούν δράσεις προστασίας των ειδών, των οικοσυστημάτων, και της

φύσης γενικότερα. Δεν είναι δυνατόν να προστατεύσουμε τη βιοποικιλότητα αν δεν γνωρίζουμε τα είδη και τη γεωγραφική τους εξάπλωση, αλλά και βασικές παραμέτρους της οικολογίας και πληθυσμιακής τους κατάστασης, από τις οποίες θα συνάγουμε ποια είδη ή οικοτόποι διακρίνονται ως πραγματικά απειλούμενοι ή είναι υπό δυσμενές καθεστώς διατήρησης. Δυστυχώς, η σημασία της έγκυρης συστηματικής και γεωγραφικής πληροφορίας για τα είδη και τους τοπικούς πληθυσμούς τους δεν είναι πάντα προφανής. Αυτό απεικονίζεται με αρνητικό τρόπο στη σύνταξη του καταλόγου των ειδών ψαριών Κοινοτικού ενδιαφέροντος που περιέχεται στην Οδηγία για τους Οικοτόπους (92/43/ΕΟΚ). Αν και η Ελλάδα είναι η πλουσιότερη ίσως χώρα της ΕΕ από πλευράς αριθμού και σημασίας ενδημικών ψαριών γλυκού νερού, η θεσμοθετημένη λίστα της Οδηγίας δεν περιλαμβάνει πολλά σημαντικά και κινδυνεύοντα είδη της ελληνικής ιχθυοπανίδας, ενώ άλλα είδη εμφανίζονται με λανθασμένες ή αδόκιμες ονομασίες. Εξαιτίας αυτών των παραλείψεων, τα ψάρια του γλυκού νερού δεν αποτέλεσαν αντικείμενο πολλών χρηματοδοτούμενων προγραμμάτων προστασίας και αποκατάστασης του φυσικού περιβάλλοντος στην Ελλάδα.

Αν και η προσπάθεια προστασίας της ιχθυοπανίδας είναι το κύριο κίνητρο για την οργάνωση του παρόντος καταλόγου, η πληροφορία που περιέχεται μπορεί να αξιοποιηθεί και σε διάφορες άλλες χρήσεις ιχθυολογικών δεδομένων, όπως για παράδειγμα σε προγράμματα παρακολούθησης της οικολογικής κατάστασης των υδάτων, σύμφωνα με τις απαιτήσεις της Οδηγίας Πλαίσιο για τα Ύδατα, ΟΠΥ- 2000/60/ΕΚ (π.χ. Economidou *et al.*, 2007b; 2009). Τα ψάρια, όπως και άλλα βιολογικά στοιχεία ποιότητας που απαιτεί η Οδηγία είναι απαραίτητα στην αξιολόγηση της οικολογικής κατάστασης των ποταμών, λιμνών και μεταβατικών υδάτων. Στα μέτρα αποκατάστασης των υδάτινων σωμάτων αλλά και διαχείρισης του νερού θα υπάρξουν θεσμοθετημένοι όροι που θα αναφέρονται στη διαβίωση των ψαριών.

Στην παρούσα έκδοση, περιοριζόμαστε στην ταξινομική των ψαριών των εσωτερικών υδάτων της Ελλάδας και στην παροχή συνοπτικής πληροφορίας σχετικής με την κατανομή, τις οικολογικές απαιτήσεις και τα ενδιαιτήματά τους, αλλά και στοιχείων για την κατάσταση διατήρησής τους. Η σειρά παρουσίασης των οικογενειών γίνεται σύμφωνα με τους Eschmeyer & Fong (2014), με μία σύντομη μορφολογική περιγραφή κάθε οικογένειας. Η ονοματολογία και η συστηματική των ειδών ακολουθούν κατά βάση τους Kottelat & Freyhof (2007) αποδεχόμενοι τις τροποποιήσεις και προσθήκες που προτάθηκαν από τους Economidou *et al.* (2007a) και Koutsikos *et al.* (2012). Για να αποφευχθεί η ονοματολογική σύγχυση με παλαιότερα ονόματα των ειδών, γίνεται αντιστοίχιση των σημερινών ονομασιών με τις ονομασίες που αναφέρονται στο Economidis (1991) (βλ. Παράρτημα σελ. 121). Το καθεστώς διατήρησης των ειδών δίνεται σύμφωνα με τη Διεθνή Ένωση για τη Διατήρηση της Φύσης (International Union for the Conservation of Nature, IUCN), το Κόκκινο Βιβλίο Απειλούμενων Ζώων της Ελλάδας (2009) και τα Παραρτήματα της Οδηγίας για τους Οικοτόπους (92/43/ΕΟΚ). Επειδή πολλά απειλούμενα είδη της ελληνικής ιχθυοπανίδας δεν περιλαμβάνονται στο παράρτημα της παραπάνω Οδηγίας, γίνεται αντιστοίχιση αυτών των ειδών με είδη του παραρτήματος, μία προσπάθεια προσαρμογής που ξεκίνησε από τους Οικονομίδη κ.ά. (1996). Τέλος, για τη γεωγραφική εξάπλωση των ειδών υιοθετείται η βιογεωγραφική υποδιαίρεση της Ελλάδας σε οικοπεριφέρειες εσωτερικών υδάτων, που παρατίθεται στο Zogaris *et al.* (2009b).

Ο κατάλογος περιλαμβάνει και είδη τα οποία περιγράφηκαν πρόσφατα, ωστόσο, όπου υπάρχουν

διαφοροποιήσεις από τις ταξινομικές περιγραφές των Kottelat & Freyhof (2007), παρέχεται πάντα η σχετική βιβλιογραφική τεκμηρίωση. Πληθυσμοί για τους οποίους υπάρχουν γενετικές ή μορφολογικές ενδείξεις ότι αποτελούν διακριτές ταξινομικές οντότητες χωρίς όμως να έχει γίνει επίσημη συστηματική περιγραφή, δεν θεωρούνται έγκυρα είδη και δεν περιλαμβάνονται στον κατάλογο, εν αναμονή πιο ολοκληρωμένων επιστημονικών συμπερασμάτων. Από διαχειριστική άποψη όμως, οι πληθυσμοί αυτοί θα πρέπει να θεωρούνται ως εν δυνάμει διαφορετικές ταξινομικές μονάδες και επομένως θα πρέπει να υπαχθούν σε κάποιο καθεστώς προστασίας. Στις παραπάνω περιπτώσεις, καθώς και στις περιπτώσεις ταξινομικής αβεβαιότητας ή όπου πρόσφατα γενετικά δεδομένα υποδηλώνουν μεταβολές σε σχέση με προηγούμενες κατηγοριοποιήσεις, οι παρουσιάσεις των ειδών συνοδεύονται από συστηματικές διευκρινίσεις και παρατίθεται η σχετική βιβλιογραφία. Όπου κρίνεται απαραίτητο, επισημαίνονται γεωγραφικές περιοχές και υδάτινα συστήματα με πληθυσμούς αδιευκρίνιστης συστηματικής θέσης για τους οποίους απαιτείται περαιτέρω έρευνα.

Το τεύχος αυτό παρουσιάζεται στην Αγγλική γλώσσα και στη συνέχεια θα μεταφραστεί στα ελληνικά και θα παρουσιαστεί σε ειδική ιστοσελίδα του ΠΘΑΒΙΠΕΥ. Σε μελλοντικές ηλεκτρονικές εκδόσεις θα περιληφθεί λεπτομερέστερη πληροφορία σχετικά με τη γεωγραφική εξάπλωση, οικολογία, βιολογία, πληθυσμιακές παραμέτρους, φυλογενετικές σχέσεις, απειλές και πρακτικές διατήρησης αυτών των ειδών.

## Introduction

This publication provides a complete list of fish species inhabiting freshwaters in Greece as of December 2014. Our initiative aims to produce an official annotated list that will be regularly updated and reviewed by a committee of experts. An annotated species list is critically important for biodiversity conservation, especially since fish names and taxonomic validation have undergone remarkable changes during the last decade. This checklist contains standardized information on species' taxonomy, distribution, habitat, and conservation status, while it also helps interpret nomenclature and taxonomic problems. Furthermore, it may serve as a scientific basis for developing a wider public interest in Greece's freshwater fish fauna.

The checklist is based on the approach developed by researchers at the Hellenic Centre for Marine Research (HMCR), who have been following fish taxonomy and biogeographical patterns throughout the last two decades. Recent reviews of the regional and national fish lists and ichthyogeography document this progress (e.g. Economou *et al.*, 1999; Economou *et al.*, 2007a; Zogaris *et al.*, 2009a; Koutsikos *et al.*, 2012). Many taxonomic experts who work closely with our institute have also contributed to this list by providing their professional advice on species taxonomy, systematics and distribution records. We gratefully acknowledge the assistance of our many scientific collaborators; their names appear in our recent scientific publications and reports.

Updated versions of this checklist will be available on the IMBRIW websites (<http://imbriw.hcmr.gr/en/>). The checklist and its future web-based derivatives will be regularly updated, as taxonomic changes take place and new information becomes available.



## **The freshwater fishes of Greece**

The freshwater fish fauna of Greece is of particular importance as a national heritage, especially due to its diversity and high degree of endemism. This is mainly the result of the complex geological and climatic history of the Balkan Peninsula, which has allowed multiple colonisations from outside the area and long periods of isolation of fish populations leading to speciation. In addition, Greece is at the crossroads among the major biogeographical realms of southeastern Europe, western Asia and the Mediterranean Basin.

Hydrographic isolation is the main factor responsible for Greece's ichthyofaunal diversity, since freshwater fishes are by nature confined to freshwater island-like basins (Economidis & Bănărescu, 1991). As of December 2014, the freshwater ichthyofauna of Greece is known to consist of 160 species belonging to 26 families. The actual number of inland water fish species is not easily determined, as various marine species are often encountered in the lower sections of inland waters, especially in transitional waters, while new alien species are becoming established in the wild. Moreover, taxonomic changes are taking place at a rapid pace, with new species being described, former synonyms being reinstated and former "subspecies" validated to species rank. This dynamic state of seemingly perpetual change in the "official checklist" is not that problematic, if one studies and describes each species entity in detail and maintains a proper synonymy list.

The most intriguing aspect of Greek ichthyofauna is the high number of its endemics. Out of 160 fish species listed here, 137 are native to Greece and 23 are introduced; 47 are endemic to Greece, i.e., they are found only in Greece and nowhere else on Earth. A further 14 species are near-endemic, i.e., they are almost completely restricted to Greece, since they occur in transboundary freshwater bodies shared with neighboring countries (these being specifically: the Butrint basin, Prespa Lakes, and Lake Doirani). Furthermore, another group of species found in Greece are endemic to the southern Balkan peninsula (29 species). Finally, five Western Anatolia endemic species also inhabit certain Greek islands of the eastern Aegean Sea.

## Freshwater fishes, their environment and their distributions

Freshwater fishes inhabit a variety of inland waters. Traditionally “inland waters” include both purely freshwater environments such as rivers and lakes, as well as transitional waters – brackish waters – in contact with the sea, inland of the coastline. Transitional waters are not freshwaters nor are they typically marine, and are usually located in the vicinity of river mouths, which are partly saline. Transitional waters thus include most saline and brackish coastal lagoons, coastal saltmarshes and parts of the outermost river-mouth sections that are predominately brackish for most of the year. Precise delineations are not clear-cut (see figure 1); in the current list, for example, springs or spring-fed lakes that are slightly brackish are included in the freshwater realm, since they delimit inland hydrographic units. Furthermore, some species that live in freshwaters will frequently move into transitional waters and many marine species also enter transitional waters. Although our focus here is on the fishes of inland freshwaters, we restrict our checklist to the species regularly inhabiting freshwaters. Thus, we include only those marine euryhaline transients and migrants that are frequently found in freshwaters, but not the plethora of marine species that occur in transitional waters. A precise separation of freshwater and transitional water fishes is therefore subjective, since the distribution of some euryhaline species is insufficiently known. In the current checklist, we include 14 marine euryhaline species because we have evidence of their frequent occurrence and/or residence in freshwaters.

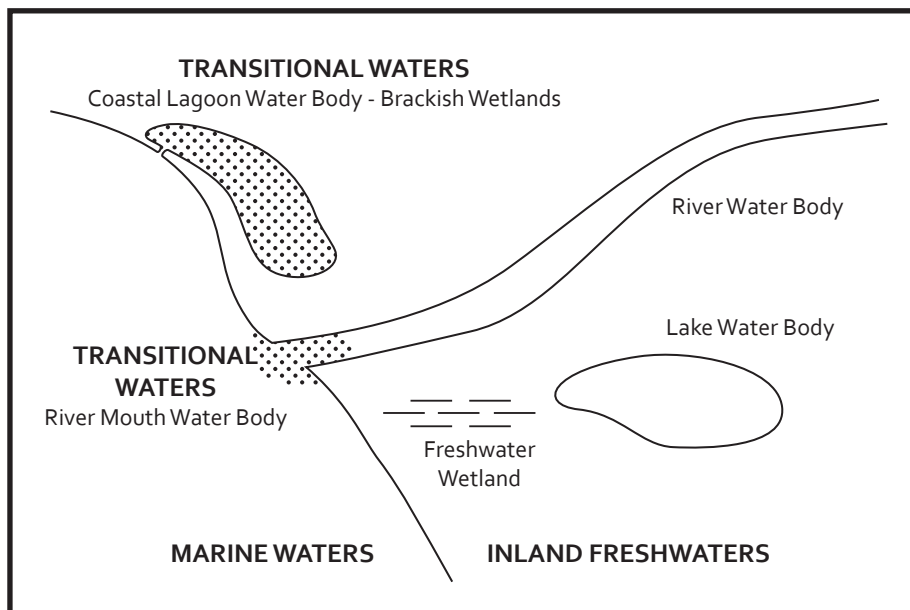


Fig. 1. Schematic view of the nebulous boundaries among the marine, transitional and inland freshwater environments. In this checklist only freshwater systems (rivers, lakes, and wetlands) are considered.

## Taxonomy and nomenclature

Humans have named fishes throughout recorded history. The formal biological classification of fishes is called fish systematics, a specialized taxonomy, by which species are classified according to estimates of the closeness of their ancestral relationships. Estimates of closeness are usually based mainly on morphology and biochemistry, though fossil data and aspects of embryology are sometimes considered. Fishes within a single species will generally look similar and be genetically similar. However, in some cases, fish that look similar may be genetically different, which constitutes the ground for taxonomic re-evaluations and name changes. Therefore, systematics is critical to understanding both the phylogenetic relations among the different species and their evolutionary history, as well as rationally organizing the biological and ecological knowledge about species.

One of the main reasons for publishing this checklist is that sweeping taxonomic and name changes of Greek freshwater fishes have taken place in the last two decades. These changes have resulted from the development of new taxonomic concepts and methods, especially the adoption of the Phylogenetic Species Concept (PSC), which has largely replaced the Biological Species Concept (BSC) (for a review see Economou *et al.*, 2007a). Under the BSC, “species” is a group of actually or potentially interbreeding populations that can produce fertile offspring of both genders. The PSC, by contrast, considers “species” as the smallest diagnosable cluster of individuals within which there is a parental pattern of ancestry and descent. In this context, the PSC accepts the evolutionary potential of a lineage that has just started to separate from other lineages as the main criterion for defining species. Thus, under the PSC, there are no subspecies. As a result, many taxa recognised as subspecies under the BSC and regarded as local races, have been raised to the species rank. The elimination of the subspecies taxonomic rank makes taxonomy and nomenclature clearer. As taxonomic research continues, former species and subspecies will either tend to be “split” into distinct species or “lumped” within already valid species. Ongoing research on fish populations’ systematics will continue to guide our interpretations and an evolving and clearer picture of fish biodiversity will emerge.

Unfortunately, the resulting name changes are confusing to many conservation practitioners and to the public. Names are very important however – they are recognizable mental tags we officially give each species entity. To really know the fishes, we must know their names. So today it is important to understand the basics of their taxonomy and to follow the designated and updated checklists.

## A brief geography of the inland waters of Greece

Greece’s inland waters are extremely diverse. Greece is a hydrographically fragmented country composed of hundreds of autonomous river basins, each of which has a history of geological isolation and connections to other basins. Moreover, Greece has over 40 natural lakes and 15 large artificial lakes and reservoirs, as well as numerous lagoons and wetlands. During the last 100 years, a substantial number of lakes and wetlands have been drained and several previously perennial rivers now have artificially intermittent flow regimes, due to increased anthropogenic pressures.

The current checklist presents distribution data on the fishes of the territory of the Hellenic Republic based on published information and results of fish surveys undertaken primarily by the Institute of

Marine Biological Resources and Inland Waters (IMBRIW), HCMR. Specific hydrographic basin distributions are already published in Economou *et al.* (2007a) and Koutsikos *et al.* (2012). Key place names are given in the map and list below (Figure 2, Table 1).

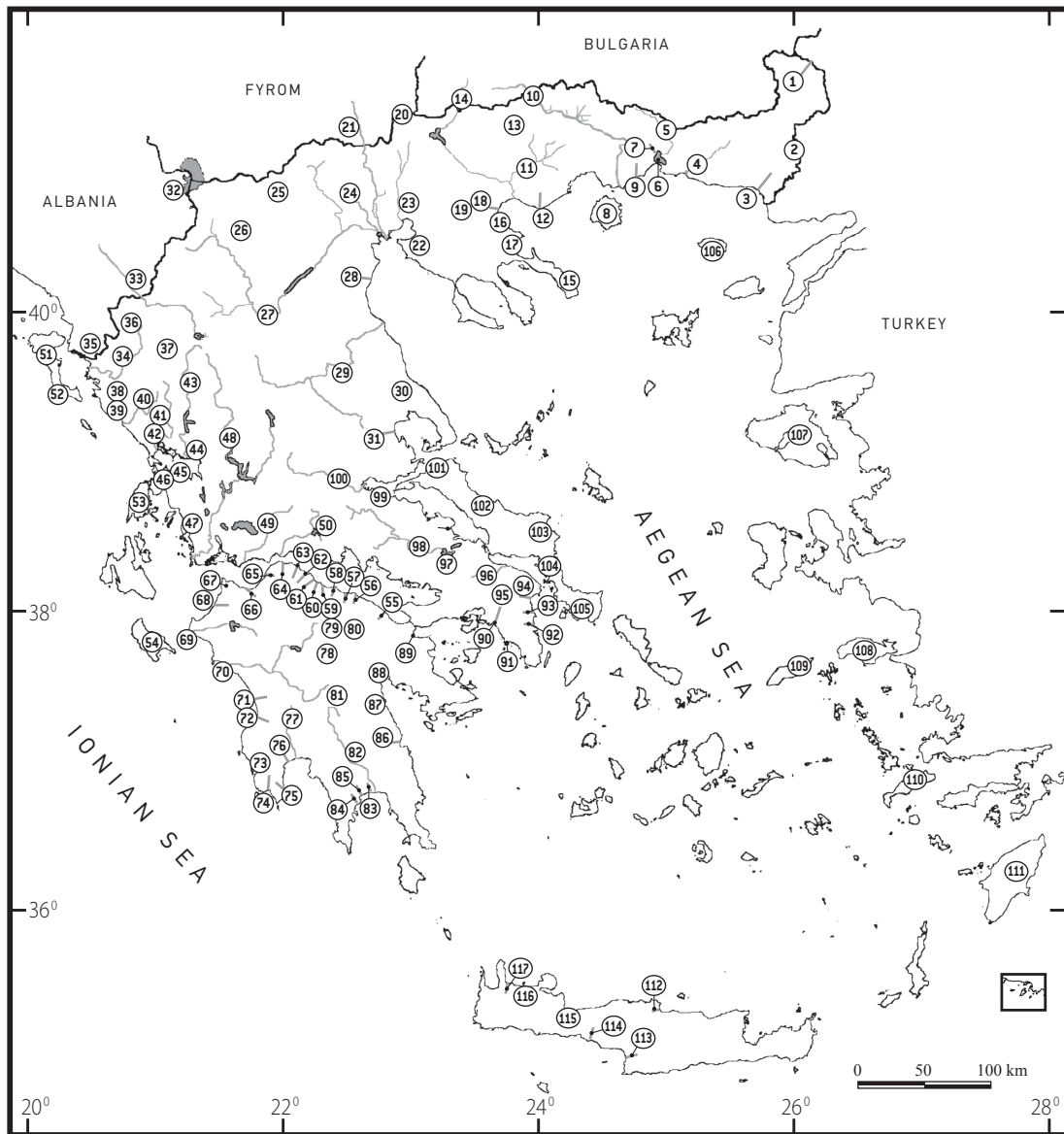


Fig. 2. Map of hydrographic basin units and selected water body systems (for number abbreviations see Table 1).

Table 1. Defined hydrographic river basin areas.

No	Name Given	Freshwater Ecoregion	Included water bodies
1	<b>Ardas</b>	THRAKI	Ardas R. (major tributary of Evros R.),
2	<b>Evros</b>	THRAKI	Evros R. (Maritsa, Meriç), Loutros R.
3	<b>Avas</b>	THRAKI	Avas R.
4	<b>Filiouri</b>	THRAKI	Filiouris R., Bospos R., Mitrikou L., adjacent coastal lagoons, Maronia R.
5	<b>Kompsatos</b>	THRAKI	Kompsatos R.
6	<b>Vistonis</b>	THRAKI	Vistonis L., Porto Lagos Lagoons
7	<b>Kossinthos</b>	THRAKI	Kossinthos R.
8	<b>Laspias</b>	THRAKI	Laspias R., Avdira wetlands and surrounding lagoons

No	Name Given	Freshwater Ecoregion	Included water bodies
9	<b>Thassos</b>	THRAKI	Thassos Island water features
10	<b>Nestos</b>	THRAKI	Nestos, Nestos delta wetlands and lagoons
11	<b>Aggitis</b>	THRAKI	Major tributary of the Strymon R.
12	<b>Marmaras</b>	THRAKI	Marmaras R.
13	<b>Nevrokopi</b>	THRAKI	Streams in Nevrokopi basin
14	<b>Strymon</b>	THRAKI	Strymon (Struma) R.
15	<b>Ladopotamos</b>	THRAKI	Water features of Agion Oros peninsula
16	<b>Mavrolakas</b>	THRAKI	Mavrolakas R.
17	<b>Asprolakas</b>	THRAKI	Asprolakas R.
18	<b>Rihios</b>	THRAKI	Rihios R.
19	<b>Volvi</b>	THRAKI	Volvi L., Koronia L., tributary streams
20	<b>Doiran</b>	MAKEDONIA-THESSALY	Doriani (Dorjan) L., tributary streams, Megalo R.
21	<b>Axios</b>	MAKEDONIA-THESSALY	Axios (Vardar) R.
22	<b>Anthemountas</b>	MAKEDONIA-THESSALY	Anthemountas R.
23	<b>Gallikos</b>	MAKEDONIA-THESSALY	Gallikos (Echedros) R.
24	<b>Loudias</b>	MAKEDONIA-THESSALY	Loudias R.
25	<b>Vegoritis</b>	MAKEDONIA-THESSALY	Vegoritis L., Cheimaditis L., Petron L., Zazari L., tributary streams
26	<b>Kastoria</b>	MAKEDONIA-THESSALY	Kastoria Lake and tributary streams
27	<b>Aliakmon</b>	MAKEDONIA-THESSALY	Alkiakmon R., Almopeos R., Tripotamos R., delta wetlands
28	<b>Mavroneri</b>	MAKEDONIA-THESSALY	Mavroneri R.
29	<b>Pinios The</b>	MAKEDONIA-THESSALY	Thessalian Pinios R.
30	<b>Karla</b>	MAKEDONIA-THESSALY	Karla L. (sub-basin of Thessalian Pinios R.)
31	<b>Cholorema</b>	WESTERN AEGEAN	Cholorema R. (Pagasitikos Gulf)
32	<b>Prespa</b>	SE ADRIATIC	Mikri and Megali Prespa L., Ag. Germanos R.
33	<b>Aoos</b>	SE ADRIATIC	Aoos R.
34	<b>Kalamas</b>	IONIAN	Kalamas R.
35	<b>Butrint</b>	IONIAN	Butrint Lagoon (Albania) and basin
36	<b>Zaravina</b>	IONIAN	Zaravina L.
37	<b>Pamvotis</b>	IONIAN	Pamvotis L.
38	<b>Paramythia</b>	IONIAN	Small lakes and water features of Paramythia
39	<b>Kalodiki</b>	IONIAN	Kalodiki L.
40	<b>Acheron</b>	IONIAN	Acheron R. and coastal wetlands
41	<b>Ziros</b>	IONIAN	Ziros L.
42	<b>Louros</b>	IONIAN	Louros R.
43	<b>Arachthos</b>	IONIAN	Arachthos R. and delta
44	<b>Vouvos</b>	IONIAN	Vouvos R. (Amvrakikos)
45	<b>Vlychos</b>	IONIAN	Vlychos spring and Myrtari Lagoon
46	<b>Voukaria</b>	IONIAN	Voukaria L.
47	<b>Astakos</b>	IONIAN	Astakos streams
48	<b>Acheloos</b>	IONIAN	Acheloos R., Agios Dimitrios (Lesini) R. and lagoons
49	<b>Evinos</b>	IONIAN	Evinos R.
50	<b>Mornos</b>	IONIAN	Mornos R., Mornos delta wetlands and Gouvos Spring
51	<b>Kerkyra</b>	IONIAN	Kerkyra (Corfu) freshwater features
52	<b>Korission</b>	IONIAN	Korission lagoon catchment
53	<b>Lefkas</b>	IONIAN	Lefkas water features
54	<b>Zakynthos</b>	IONIAN	Zakynthos water features
55	<b>Assopos Pel</b>	IONIAN	Assopos (Peloponnese) R.
56	<b>Dervenios</b>	IONIAN	Dervenios R.
57	<b>Krios</b>	IONIAN	Krios R.
58	<b>Krathis</b>	IONIAN	Krathis R. including Tsivlos L.
59	<b>Vouraikos</b>	IONIAN	Vouraikos R.
60	<b>Keronitis</b>	IONIAN	Keronitis R.
61	<b>Selinous</b>	IONIAN	Selinous R.
62	<b>Meganitis</b>	IONIAN	Meganitis R.
63	<b>Phoenix</b>	IONIAN	Phoenix R.
64	<b>Volinaios</b>	IONIAN	Volinaios R.
65	<b>Glafkos</b>	IONIAN	Glafkos R.
66	<b>Piros</b>	IONIAN	Piros R.

No	Name Given	Freshwater Ecoregion	Included water bodies
67	<b>Prokopos</b>	IONIAN	Prokopos Lagoon, Lamia swamp and adjacent springs and streams
68	<b>Kotychi</b>	IONIAN	Kotychi Lagoon and Vergas R.
69	<b>Pinios Pel</b>	IONIAN	Peloponnesian Pinios R.
70	<b>Alfios</b>	IONIAN	Alfios R.
71	<b>Neda</b>	IONIAN	Neda R.
72	<b>Peristeras</b>	IONIAN	Peristeras R.
73	<b>Yiannousagas</b>	IONIAN	Yiannousagas R. and adjacent Yalova Lagoon
74	<b>Minagiotiko</b>	IONIAN	Stream basin near Finikoundas
75	<b>Kleissoureiko</b>	IONIAN	Stream basin near Nea Koroni
76	<b>Valika</b>	IONIAN	Stream basin near Messini
77	<b>Pamissos</b>	IONIAN	Pamissos R. and Aris R.
78	<b>Kandila</b>	IONIAN	Kandila spring and wetlands of drained lake basin
79	<b>Feneos</b>	IONIAN	Doxa Reservoir in Feneos Plateau
80	<b>Stymphalia</b>	IONIAN	Stymphalia L.
81	<b>Taka</b>	IONIAN	Taka L.
82	<b>Evrotas</b>	IONIAN	Evrotas R.
83	<b>Vassilopotamos</b>	IONIAN	Vassilopotamos canals of the Evrotas delta
84	<b>Smynous</b>	IONIAN	Smynous R.
85	<b>Ardeli</b>	IONIAN	Ardeli (Ardelolaggado) R.
86	<b>Dafnonas</b>	WESTERN AEGEAN	Dafnonas R.
87	<b>Moustos</b>	WESTERN AEGEAN	Moustos lagoon and surrounding stream basins
88	<b>Erassinos Arg</b>	WESTERN AEGEAN	Argolid Erassinos R. including Lerni and Kefalari Springs
89	<b>Kato Almyri</b>	WESTERN AEGEAN	Kato Almyri Spring
90	<b>Kifissos Att</b>	WESTERN AEGEAN	Attica Kifissos R.
91	<b>Vouliagmeni</b>	WESTERN AEGEAN	Vouliagmeni Karstic Lake (Attiki)
92	<b>Erassinos Vra</b>	WESTERN AEGEAN	Erassinos R. of Vravrone (Attika)
93	<b>Rafina</b>	WESTERN AEGEAN	Rafina (Megalo Rema) R.
94	<b>Marathon</b>	WESTERN AEGEAN	Marathon Reservoir and tributaries and Schinias Marathon Marshes
95	<b>Beletsi</b>	WESTERN AEGEAN	Beletsi ponds Mt Parnitha
96	<b>Assopos Beo</b>	WESTERN AEGEAN	Beotian Assopos R.
97	<b>Yliki</b>	WESTERN AEGEAN	Yliki L. and Paralimni L.
98	<b>Kifissos Beo</b>	WESTERN AEGEAN	Beotian Kifissos R.
99	<b>Thermopyles</b>	WESTERN AEGEAN	Thermopyles (Thermopylae) hot springs and surrounding wetland
100	<b>Sperchios</b>	WESTERN AEGEAN	Sperchios R. and delta wetlands
101	<b>N Evia Streams</b>	WESTERN AEGEAN	N. Evia streams
102	<b>Kireas</b>	WESTERN AEGEAN	Kireas-Nileas R. (Kirinthos)
103	<b>Manikiotiko</b>	WESTERN AEGEAN	Manikiotiko (or Monodrotiko) R.
104	<b>Dystos</b>	WESTERN AEGEAN	Dystos L.
105	<b>Rigia</b>	WESTERN AEGEAN	Rigia (Karystos Wetland and tributary streams)
106	<b>Samothraki</b>	THRAKI	Samothraki water features
107	<b>Lesvos</b>	EASTERN AEGEAN	Lesvos water features
108	<b>Samos</b>	EASTERN AEGEAN	Samos water features
109	<b>Ikaria</b>	EASTERN AEGEAN	Ikaria water features
110	<b>Kos</b>	EASTERN AEGEAN	Kos water features
111	<b>Rhodos</b>	EASTERN AEGEAN	Rhodos water features
112	<b>Almyros</b>	CRETE	Heraklion Almyros Spring
113	<b>Koutsoulidis</b>	CRETE	Koutsoulidis R. (Yeropotamos Basin) and Zaros reservoir
114	<b>Kourtaliotis</b>	CRETE	Kourtaliotis R.
115	<b>Kourna</b>	CRETE	Kourna L. and adjacent water features
116	<b>Agia</b>	CRETE	Agia reservoir and surrounding river features
117	<b>Tavronitis</b>	CRETE	Tavronitis river basin

## The biogeographical setting

Biogeographic classifications based on spatial analyses of species distributions provide a fundamental framework for conservation planning and monitoring programs (Higgins *et al.*, 2005; Kreft & Jetz, 2010). Freshwater fishes are excellent indicators of biogeographic history, thus river basins can be classified relative to how closely fishes are related on a biological and hence regional ecosystemic scale. River basin areas that have similar geological history and climatic regimes have more similarities in their natural synthesis of aquatic biota, and this allows us to delineate regional units based on biogeographical knowledge (i.e. ichthyoregions and freshwater ecoregions).

In the Balkans, ichthyogeographic regionalisations have been pursued since the beginning of the 20th century (Petit, 1930; Stephanidis, 1939; Berg, 1949; Bianco, 1990a; Economidis & Bănărescu, 1991; Bănărescu, 2004; Abell *et al.*, 2008; Zogaris *et al.*, 2009b; Bobori, 2012). All regionalisation schemes recognise the importance of the Dinaric-Pindus mountain range in separating Greece into two major ichthyogeographic divisions along the east-west axis, but differ over the number and boundaries of finer divisions within the two broader ones.

A main point of controversy and ongoing research concerns the geographic origins and arrival pathways of the species now inhabiting Greece. The classic and still widely accepted hypothesis (Economidis & Bănărescu, 1991) holds that Euro-Siberian taxa of east-Asian origin spread southward to Europe and west Asia via temporary river connections in Oligocene and Miocene times and subsequently invaded the southern Balkans via two major colonisation pathways. The first colonisation would have occurred in the Oligocene or the Miocene and brought to the Balkans “old” Siberian lineages, possibly originating from southwestern Asia, across the Iranian-Anatolian-Balkan landmass that existed until the Pliocene. This is often referred to as the “southern” (Iranian) dispersal route. A second colonisation wave would have occurred at the Pliocene/Pleistocene boundary through the so-called “northern” dispersal route involving a river capture between the Danube and the Axios rivers and a paleo-river system connecting the Black Sea (then a freshwater lake) with the Aegean Sea. This colonisation wave would have brought to northeastern Greece “modern” European lineages of Danubian ancestry and caused the elimination of most former colonisers. The geological plausibility and significance of these ancient dispersal pathways have been extensively investigated in the context of distributional, phylogenetic and paleogeographical data (Doadrio & Carmona, 1998; Durand *et al.*, 2000; Perea *et al.*, 2010; Gante, 2011). An alternative colonisation scenario (Bianco, 1990a; 1998) proposes that freshwater fishes of Paratethyan origin colonised the Balkan area during the Messinian “Lago-Mare” event of the Mediterranean, when the basin was almost completely dried-out and subsequently was briefly refilled with fresh water from the Paratethys (Messinian Salinity Crisis, 5.3 million years ago). In addition to these long-distance dispersal routes, short-range dispersal would have been enabled at Pleistocene times of sea level lowering and low salinity conditions (Bianco, 1990a; Economidis & Bănărescu, 1991).

Our interpretation of the natural history of fishes in Greece has made significant strides during the last decade. Progress in ichthyogeographic research in Greece has been hindered however by incomplete distributional datasets, taxonomic incompatibilities among datasets and insufficient knowledge of the genetic composition of many populations. Recent results from a nationwide

monitoring programme and significant developments in genetic data analysis permit a reasonable re-interpretation and synthesis of the available phylogenetic and distributional data. We have arrived at a regionalization scheme that broadly supports some of the previously proposed ichthyogeographic classifications (Abell *et al.*, 2008; Zogaris *et al.*, 2009a, 2009b) and that divides Greece into eight freshwater ecoregions (see Figure 3). Within each ecoregion there is a distinctive assemblage of fishes and other wholly aquatic life forms (e.g. aquatic snails, bivalves), as well as distinctive semi-aquatic communities (e.g. aquatic insects, amphibians). The boundary limits of these ecoregions are indicative of important biogeographical and geological barriers. For conservation and management purposes they are more important than any kind of political lines on the map.

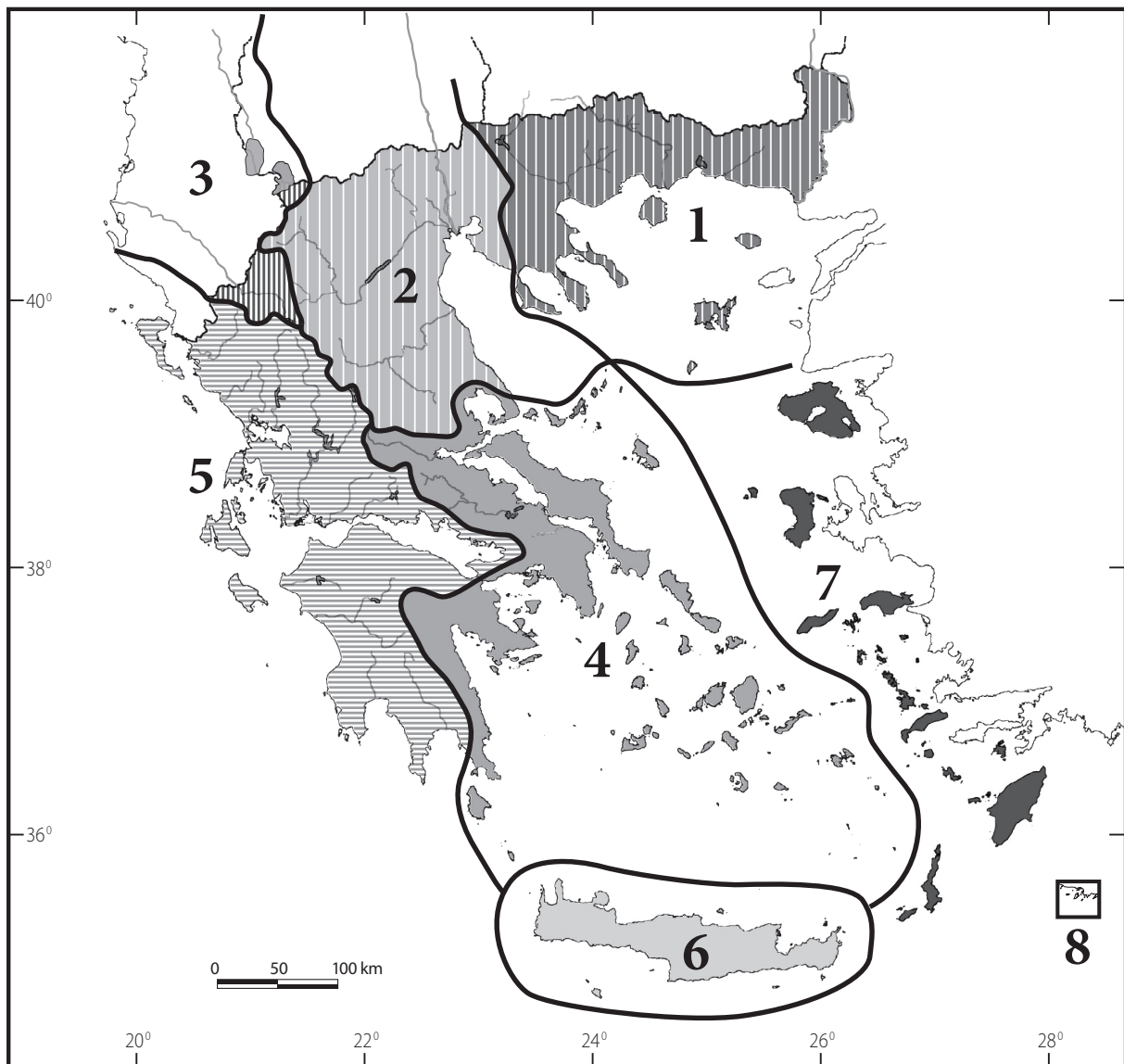


Fig. 3. Freshwater ecoregions of Greece, as adapted from Abell *et al.* (2008) and revised by Zogaris *et al.* (2009a, b). These are numbered as: (1) Thraki, (2) Makedonia-Thessaly, (3) Southeast Adriatic, (4) Western Aegean, (5) Ionian, (6) Crete, (7) Eastern Aegean, and (8) Southern Anatolia. The South Anatolia ecoregion (in inset) encompasses only the islands of the Kastellorizo cluster east of Rhodes.



## The conservation value of Greece's inland water ichthyofauna

Freshwater fishes are one of the most highly threatened species groups in Europe (Smith & Darwall, 2006; Freyhof & Brooks, 2011). Greece, a small Balkan country, with a territory of only 131,957 km<sup>2</sup>, has one of the most diverse ichthyofaunas in Europe and the highest degree of fish endemism in the Mediterranean region (Crivelli, 1996). No other vertebrate group even approaches the high percentage of local endemism that freshwater fishes have in Greece (Legakis & Maragou, 2009). A large number of these unique fish species have been impacted by anthropogenic pressures and are classified as imperiled by scientific evaluations. Table 2 presents both national and international species threat status. The threat status assessment initiatives are dynamic procedures that are scientifically revised at frequent time intervals to take into account the increasing knowledge about species at local and global scales. Currently, 53 species are considered threatened at a global scale (i.e., CR, EN, VU) corresponding to 39% of all native inland water fish species in Greece.

Table 2. Imperiled fishes of Greece, according to two official assessments.

Threat status	IUCN Red List <sup>1</sup>	Greek Red Data Book <sup>2</sup>
Critically Endangered (CR)	22	14
Endangered (EN)	15	12
Vulnerable (VU)	16	24
Near Threatened (NT)	6	3
Least Concern (LC)	76	59
Data Deficient (DD)	10	13
Not Evaluated (NE)	21	24

1 The IUCN Red List of Threatened Species. Version 2014.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>

2 Economidis P., 2009. In: Legakis A. & Maragou P. (2009). *The red data book of threatened animals of Greece*. Hellenic Zoological Society, Athens, 528 pp.

Most of the threats to freshwater fishes arise from anthropogenic changes of the hydrological and hydromorphological conditions of their habitats, precipitated by water abstraction, habitat loss and degradation, as well as artificial barriers to fish movement often blocking migration and, in the case of dams, transform riverine environments to reservoir lakes (Economidis, 1995; Barbieri *et al.*, 2002). In addition, water stress increases pollution loads in remnant shrinking waters. These anthropogenic stresses are also augmented by localized overfishing and especially by introduced alien fishes (Caiola & de Sostoa, 2005; Kalogianni *et al.*, 2012; Economidis *et al.*, 2000b). In fact whole assemblages of fishes are rapidly changing as the impacts of alien invasives spread in Greece, a country that once had few alien species compared to other European states (Bianco, 1990b). Alien invasives include both exotic fishes from abroad as well as transplanted fishes present in other ecoregions within Greece. We have evidence that in many inland water systems, as a result of the above pressures, many populations of native freshwater fishes and migratory euryhaline species have collapsed and some have become locally extinct or extirpated (Economidis, 1995; 2009).

The breadth of fish diversity in Greece is easily underestimated if one sticks to established taxonomy and number of recognised “species.” The use of molecular techniques has provided evidence that some taxa previously given a subspecies status comprise genetically distinct lineages, supporting their recent elevation to the species rank. However, as will be shown in the following species descriptions, a large and yet poorly explored amount of diversity *below* the species level still exists. Thus, despite the fact that the conservation and management units of biological diversity are usually confined to designated “valid species,” a management policy aiming to prevent the loss of fish genetic diversity must also identify and protect potential *evolutionary significant conservation units* (ESU) defined by geographic boundaries and morphological and/or genetic criteria. It is recommended that these often isolated fish populations should be carefully studied and monitored to resolve their taxonomic status and a precautionary management approach should be developed, aiming to ensure adequate protection of the respective populations and their habitats.

## Using the annotated checklist

This annotated checklist provides the order, family and species name (including standard common Greek and English names) for all species confirmed to inhabit freshwaters in Greece. The taxonomic unit of subspecies is not applied in this list, following modern fish taxonomy practice (see “Summary checklist”, page 121, for a synopsis of current species names *vs.* older scientific names including former subspecies names). Our work broadly supports the taxonomic classification of Kottelat & Freyhof (2007) that attempts to standardize species entities by applying the new Phylogenetic Species Concept approach; the presented systematic order of the species (at the family level) follows Eschmeyer & Fong (2014).

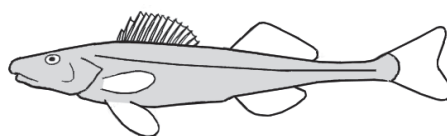
Scientific species names are given following Economou *et al.* (2007a); this includes some distinct forms that are not yet officially valid as species and are given as “*Genus* sp. River-name”, a practice used in Kottelat & Freyhof (2007). Distributional information and species ecological requirements and habitat preferences are derived mostly from Economou *et al.* (2007a), Koutsikos *et al.* (2012), as well as ichthyological monitoring programmes undertaken by HCMR.

### Species deleted from previous checklists

#### Native species

In this statewide ichthyofaunal review we have critically assessed all species included in previously published checklists. As the taxonomy of fishes in Greece is carefully studied in detail, the distributional range of the specific taxa is better defined and evidence of the absence of some fishes in Greece’s territory can be verified. More specifically, recent evidence forces us to exclude two species from the current checklist, namely Dentex trout *Salmo dentex* and West Balkan barbel *Barbus rebeli* (see Koutsikos *et al.*, 2012). We also delete the Adriatic dwarf goby *Knipowitschia panizzae*, which we believe was a misidentification (for details, see *Knipowitschia milleri* in the current checklist). Additionally, we also remove the green goby *Zosterisessor ophiocephalus*, since information on its presence in freshwaters is lacking despite its regular presence in transitional waters.

We have also removed the vretenar *Zingel balcanicus* from Greece’s checklist, as there was never actual evidence of its existence in the country. This elusive benthic fish was speculated to exist in Greek waters because it is endemic in the upper and mid-section of Axios/Vardar River in FYROM, and was thus listed as native to Greece in all previous checklists (as: *Aspro streber balcanicus* in Economidis, 1973; *Zingel streber balcanicus* in Economidis, 1991; *Zingel balcanicus* in Kottelat & Freyhof, 2007 and Economou *et al.*, 2007a). However, though recorded in FYROM only a few kilometers from the Greek border, it has never been recorded in Greek territory, despite numerous recent attempts to locate it.



#### Alien species

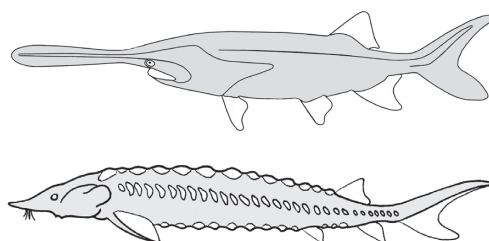
We include in the checklist 23 alien species – these are non-indigenous species introduced by humans from abroad to Greece. In total, 28 freshwater species have been reported as introduced into Greek freshwaters, of which 10 have become established through natural reproduction. Of the remaining 18 species, some are commonly found in the wild, due to frequent stocking and aquaculture escapes (e.g.

*Oncorhynchus mykiss*) and others have a casual, doubtful or questionable occurrence (Zenetos *et al.*, 2009).

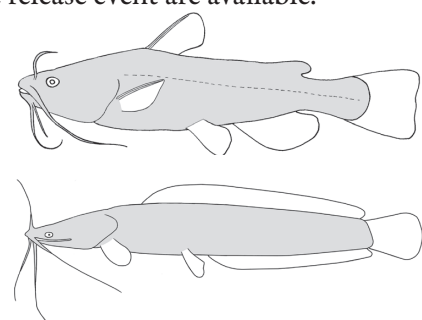
The alien fish species included in the present checklist were selected on the basis of information on reported species introductions or stockings and current distribution or occurrence in the wild. Information on species introductions into inland waters were obtained from various literature sources and reports, as well as assessments of stocking intensity based on compilations of stocking events. Information on alien species occurrence frequencies in the field were obtained from data collected during research and environmental monitoring programmes conducted by the HCMR or found in accessible publications.

Scrutiny of the available evidence from the aforementioned sources raised doubt about the (past or present) occurrence in the wild of certain alien species, presented below, that were identified as having been introduced in the past and were included in previous checklists. We found little or no evidence that these species were ever introduced, and these species have been omitted from the present checklist.

Mississippi paddlefish *Polyodon spathula*, Sterlet sturgeon *Acipenser ruthenus* and Siberian sturgeon *Acipenser baerii* were reared in fish-farm pens near Lake Pamvotis (Ioannina) but we have no evidence that they were ever released (intentionally or accidentally) in the wild, either in this lake or anywhere else in Greece (Paschos, 2002). There is only one account of a release of *Acipenser baerii* in Pamvotis (Leonardos *et al.*, 2008), however no data on the specific release event are available.

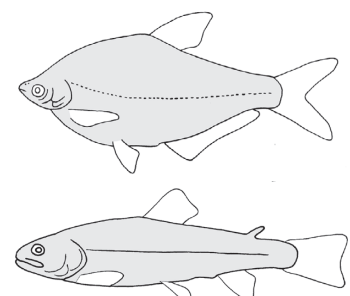


Channel catfish *Ictalurus punctatus* and the African catfish *Clarias gariepinus* were cultivated for a short period in enclosed tanks in at least one fish-farm near Psathotopi village (Arta, Ipeiros) in the Arachthos river delta. Although an anecdotal allegation of escaped catfish does exist, there is no evidence of any release in the wild. It would thus be incorrect to accept, even provisionally, the presence of these species without firm evidence of the long-term existence of released or escaped individuals in the wild.



In addition, another discrepancy concerning a supplementary list of “alien species in Greece” is found in the most recent Greek Red Data Book (Economidis, 2009, pp. 157-158). Two species included in the list have probably been located only in transboundary rivers outside of the Greek territory, namely the Black carp *Mylopharyngodon piceus* and the Weatherfish *Misgurnus fossilis*. Since we do not have specific published evidence proving their presence within Greece we cannot include them here.

We have also deleted from the current list White Amur bream *Parabramis pekinensis* and Atlantic salmon *Salmo salar*. *Parabramis pekinensis* was introduced in the Albanian part of the transboundary Prespa Lakes in the 1970s, where a small but dwindling population was established (Crivelli *et al.*, 1997). The species was last collected in the mid 1980s and now appears to have been extirpated (Krstić, 2012; Koutseri,



2012). *Salmo salar* is cultivated in a few closed fish farms in Greece, and there are some records of its introduction in the wild in Crete (Tingilis, 2005). However, the adverse temperature conditions in Greek freshwaters render the possibility of *S. salar* successfully establishing natural populations very minute (Perdicaris *et al.*, 2010).

We have decided to retain in the list two alien species that, although very rarely reported as introduced or present in the wild (and therefore constituting an insignificant component of the present ichthyofauna of Greece), are known from the literature to be environmentally harmful and to have ecological requirements that are met in the freshwaters of Greece. Namely: the Largemouth bass *Micropterus salmoides*, a serious biohazard, and brown trout *Salmo trutta*, a serious form of biological pollution, since this species may potentially hybridize with native *Salmo* species.

Lastly, incidental occurrences of alien fish species from aquaculture or aquaria do not normally qualify them for inclusion in the current list and such irregularly and very rarely occurring “exotics” should not be included in any faunal list. However, some species (such as sturgeons, salmonids and grass carps) are regularly released, or frequently escape from aquaculture facilities. Although these fishes do not have established self-sustaining populations, their frequent and long-term presence led us to retain them in this checklist.

## Special notations in the species accounts

### Range restricted status

In the current checklist, range restricted species (species that are endemic to a specific region, for example to Greece or to the southern Balkan area) are identified and the level of range-restricted condition and provenance is expressed in the following seven categories:

ENDEMIC Species restricted to the boundaries of Greece.

NEAR ENDEMIC Species almost entirely found within Greek territory. Most of them are found in two lake systems shared with neighboring countries (Lakes Doirani and Prespa). A few other species have their main distribution in the Ionian Ecoregion, with part of their range extending north to Albania's Butrint basin.

ENDEMIC S BALKANS Species restricted to the southern Balkans, specifically, to the Southeast Adriatic, Makedonia-Thessaly and Thraki Ecoregions.

ENDEMIC ASIA MINOR Western Anatolian species that also inhabit certain Eastern Aegean islands.

Further categories based on indigenous status, include:

NATIVE Species that are indigenous to Greece. This category may include extirpated species (e.g. sturgeons).

ALIEN Species not native to any ecoregion of Greece. This category may include species with self-sustained populations through reproduction (established) or species not reproducing in the wild (not established). It does not include translocated species (i.e., native species transferred through human intervention within the country).

**“Marine Euryhaline” notation:** Species that are visitors to freshwaters but essentially live in the sea and/or must reproduce at sea are identified with this notation. These euryhaline marine species are regularly able to adapt to a wide range of salinities, *versus* stenohaline species that are intolerant to changes in salinity. Some marine fishes that have landlocked and established populations in freshwaters (e.g. *Atherina boyeri*) are also noted. Inland water species that are also euryhaline but confined primarily to fresh and transitional waters are not noted.

### Ecoregion distribution

The distribution of native species in the various ecoregions within Greek territory is ascribed in codified form, e.g. ECOREGION: 1, denoting presence in Ecoregion 1 (see Fig. 3). Uncertainty about a species native presence is shown by the region code number in parenthesis, e.g. ECOREGION: 1, (2), denoting presence in Ecoregion 1 but doubtful presence in Ecoregion 2. Alien and translocated species distributions are not accounted for.

### Greek and English common names

It is important to standardize English and Greek formal names as to minimize confusion by users (especially now that scientific names are dynamically changing). The Greek names provided in this list, follow P. S. Economidis's contribution to the latest Greek Red Data Book (2009). We have actively discussed the question of official Greek names with several colleagues to help assist in their upgrading

and standardization. Any newly conceived names in Greek introduced by us for the first time in this list are marked with a cross (+). English names follow Kottelat & Freyhof (2007); in cases, however, of names introduced by Kottelat & Freyhof (2007) that have not gained wider acceptance, we suggest the use of former English names (i.e. Miller & Loates, 1997; Maitland & Linsell, 2006; Froese & Pauly, 2014). The English names that deviate from Kottelat & Freyhof (2007) are also labeled with a (+). We urge the wider adoption of these names, since many erroneous transcriptions from local colloquial Greek have been made in the past (i.e. nicknames from marine fishes used for endemic freshwater species, such as “marida” for *Pelagus stymphalicus*, “bafa” for *Tropidophoxinellus spartiaticus* and “Petropsaro” for *Barbus euboicus*).

Also note that all measurements of species maximum lengths are given as Total Length (TL); they have been cross-checked with the HCMR database. In some cases, exceptional maximum lengths are also recorded.

### Taxonomic clarifications

A brief text in italics, often accompanying the species description highlights taxonomic uncertainties and provides suggestions for nomenclature usage.

### Conservation status

Threatened status and policy conservation are provided, following:

- The IUCN Red List of Threatened Species (2014.3, <http://www.iucnredlist.org/>)
- The Greek Red Data Book (Legakis & Maragou, 2009)
- The Habitats Directive (92/43/EEC) for species of community interest and the corresponding taxa in Greece, following the updated modifications reported in the European Environment Information and Observation Network portal (see below for abbreviations used).

### *Abbreviations*

**Y:** species is listed in the 92/43/EEC in one or more Annexes (and is therefore of European conservation interest);

**N:** species is not listed in the 92/43/EEC Annexes.

As qualifiers<sup>1</sup>:

**HTL:** species implicitly listed in the Annex via a higher taxonomic level (in this case, species were given as a genus category in the original annexes and today include more than one species);

**CTC:** species is covered by the Annexes, a difference in scientific name is due to a change in taxon concept (e.g. because the taxon has been revised and split up in two or more species);

**LR:** the link with the protected species is still debated or unclear.

Abbreviations in **brackets** [ ] denote species included in the corresponding category (IUCN or Habitats Directive), whose Greek populations however are introduced (e.g. *Acipenser gueldenstaedtii* that is indeed included in the Habitats Directive, but introduced to Greece, is marked with [Y]).

1 Source: the European Environment Information and Observation Network portal ([http://bd.eionet.europa.eu/activities/Reporting/Article\\_17/reference\\_portal](http://bd.eionet.europa.eu/activities/Reporting/Article_17/reference_portal)) as of December 2014. In this portal, several changes in taxa names relevant to those provided in the 1992 Habitats Directive have been already incorporated, while others are still debated (see Economidis *et al.*, 1996; ETC-BD 2011).





## **List of species**

## CLASS CEPHALASPIDOMORPHI

## ORDER PETROMYZONTIFORMES

## FAMILY PETROMYZONTIDAE



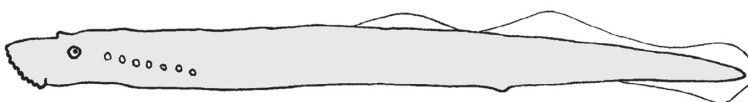
Lampreys are jawless, scaleless, eel-like vertebrates with a cartilaginous skeleton, a single nostril on the top of the head, five to seven gill pores (not supported by gill arches), and a toothed-bearing oral disk that is used by the lamprey as a tool for both feeding and attaching itself to solid substrates and fish. Together with the hagfishes (*Myxiniidae*), they are the only surviving members of the agnathan (jawless) stage in vertebrate evolution. They inhabit both fresh and saltwater environments, and some species are anadromous. They exhibit a complex life cycle, starting life in freshwaters as filter-feeding larvae (ammocoetes) and metamorphose into adults after a relatively long larval stage that lasts several years. They are all semelparous species, spawning once in their life cycle, and then they die. Some species are parasitic, while others are non-parasitic, which can be either predatory, i.e. feeding as adults on other aquatic animals, or non predatory, i.e. not feeding as adults. Non-parasitic lampreys are confined in freshwaters and have a very short adult (reproductive) stage, during which they do not feed. Three non-parasitic species that live entirely in freshwaters and one anadromous parasitic that migrates to the sea after metamorphosis, have so far been reported in Greece.

*Although lampreys are broadly recognised as a sister lineage to all jawed vertebrates, including fishes, they are not fishes in a strict taxonomic sense. They lack jaws and other organs that are typically present in fishes, including paired fins, ribs, true teeth, paired nasal sacs, gill arches, and features of the pharyngeal morphology that support the classical division of vertebrates into agnathans and gnathostomes. However, they possess all of the defining characteristics of the chordate lineage (e.g. notochord and dorsal hollow nerve tube) and many of the characteristics of gnathostome fishes, such as one or two dorsal fins, large eyes, cartilaginous backbone, a skull with cartilaginous lateral walls and rudimentary vertebrae in adult life (Smith, 2010; Shimeld & Donoque, 2012). This mixed morphological evidence has fuelled scientific controversy over whether or not lampreys are fish (Shimeld, 2012). The prevailing view is that lampreys are closely related to gnathostomes and as such they are regarded as primitive fish by most taxonomists. Awaiting more conclusive scientific opinions, we do not take position in this debate and we consider lampreys as distant relatives of the fishes with their own taxonomic realm.*

GENUS

***Caspiomyzon***

Berg, 1906

***Caspiomyzon graecus*** Renaud & Economidis, 2010 ENDEMIC

Γκαβόχελο Ηπείρου+, Epirus brook lamprey

Endemic to the Louros river basin, confined to spring-fed streams and canals in the Arta plain near Filippiada. Non-parasitic species, with a very restricted geographical range and narrow habitat requirements. Potentially threatened by any changes to the underground and surface waters of its restricted habitats. Maximum size attained: Ammocoetes 18.9 cm TL, Adults 15.8 cm TL.

We follow the recent genetic studies (Lang et al., 2009; Geiger et al., 2014) that assigned this species (previously in the genus *Eudontomyzon*) to the genus *Caspiomyzon*. Morphological differences between lampreys are limited, therefore genetic studies remain the main means of species identification. However, in the case of the two valid Greek brook lamprey species, their assignment to *Caspiomyzon* is also supported by oral disc morphology (Freyhof J., pers. comm.).

IUCN Red List Status: **Not Evaluated**Habitats Directive: **Y-HTL\***Greek Red List: **Not Evaluated**Ecoregion: **5**\* The qualifier Y-HTL refers to *Eudontomyzon* spp.***Caspiomyzon hellenicus*** Vladykov, Renaud, Kott & Economidis, 1982 ENDEMIC

Ελληνικό γκαβόχελο+, Greek brook lamprey

Endemic to the lower Strymon river drainage including spring-fed streams near Drama (Kefalari and Mylopotamos) and Serres (Agios Ioannis). Non-parasitic. It inhabits shallow and cool, fairly fast-flowing streams with gravel substrates and aquatic vegetation. Maximum size attained: Ammocoetes 18.9 cm TL, Adults: 15.8 cm TL.

We follow the recent genetic studies (Lang et al., 2009; Geiger et al., 2014) that assigned this species (previously in the genus *Eudontomyzon*) to the genus *Caspiomyzon* (previously in the genus *Eudontomyzon*) to the genus *Caspiomyzon*, as in *C. graecus*.

IUCN Red List Status: **CR**Habitats Directive: **Y-HTL\***Greek Red List: **CR**Ecoregion: **1, (2)**\* The qualifier Y-HTL refers to *Eudontomyzon* spp.

GENUS

***Eudontomyzon***

Regan, 1911



***Eudontomyzon* sp. Almpaios** ENDEMIC

Γκαβόχελο Αλμωπαίου+, Almpaios brook lamprey+

This lamprey population is found in the Almpoecos River (also known as Moglenitsa), a tributary of the Aliakmon River; first reported in Economidis & Bănărescu (1991) and repeatedly collected within the last decade. Though its formal description as a valid taxon is pending, it should be considered of high conservation priority. Furthermore, another unidentified lamprey population may also exist in the Bulgarian reaches of the Evros River, but this was not confirmed by recent surveys (Kolev, 2013).

*This population, referred in Geiger et al. (2014) as Eudontomyzon sp. Vardar (erroneously identifying Almpaios as a tributary of Vardar, instead of Aliakmon River), appears more closely related genetically to other Balkan lampreys, than to the two Greek lampreys that we have reassigned to the Caspiomyzon genus.*

IUCN Red List Status: **Not Evaluated**

Habitats Directive: **Y-HTL\***

Greek Red List: **Not Evaluated**

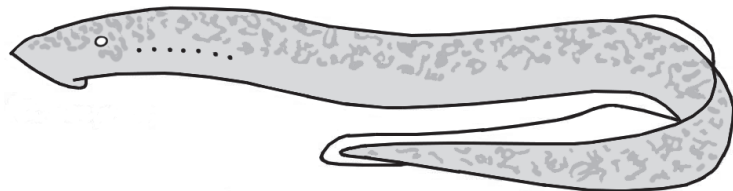
Ecoregion: **2**

\* The qualifier Y-HTL refers to *Eudontomyzon* spp.

GENUS

***Petromyzon***

Linnaeus 1758



***Petromyzon marinus*** Linnaeus, 1758 NATIVE

Θαλάσσιο πετρόμυζον+, Atlantic sea lamprey

North Atlantic and Mediterranean species. Anadromous, living offshore and migrating into rivers to spawn. A very rare species in the eastern part of the Mediterranean, its presence in Greece is poorly documented. Ichthyological surveys very seldom target this species. The only records of occurrence in Greek waters concern two individuals caught in the Thracian Sea (Economidis *et al.*, 1999) and an individual in marine waters of Kefalonia, in the Ionian (Karachle & Machias, 2014). Recent anecdotal sightings from local fishermen indicate its probable spawning in the Louros River. Adults at sea are parasitic on fishes, including larger marine fishes as well as cetaceans; ammocoetes live in sand and silt substrates in fast-flowing rivers. Maximum size attained: Ammocoetes 16.7 cm TL, Adults: 120 cm TL.

IUCN Red List Status: **LC**

Habitats Directive: **Y**

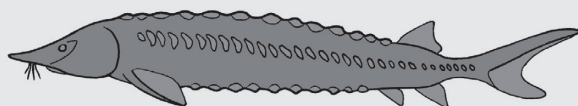
Greek Red List: **DD**

Ecoregion: **1, 5**

## CLASS ACTINOPTERYGII

## ORDER ACIPENSERIFORMES

## FAMILY ACIPENSERIDAE

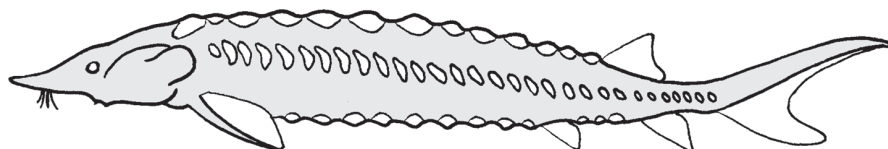


Sturgeons are primitive bony fishes with a cartilaginous skeleton; they are scaleless, with five rows of bony scutes along the body. They are large-bodied and long-lived species with a long triangular snout, toothless mouth and four barbels in front. Some species are anadromous, others restricted to freshwaters. All but one European species are Critically Endangered, mainly due to overfishing, damming, hydrological changes and pollution. Many of these fish are maintained in fish farms and often released in large rivers and lakes; these farmed individuals usually do not reproduce in the wild. Five species are reported in Greece (one alien).

## GENUS

*Acipenser*

Linnaeus, 1758

*Acipenser gueldenstaedtii* Brandt & Ratzeburg, 1833 ALIEN

Οξύρυγχος Δούναβη, Russian sturgeon

Non-indigenous species, native to the Caspian and Black Sea basin. Anadromous but resident freshwater populations are also known. Stocked in Greece, mostly to Lake Pamvotis; also in the Aaos Springs Reservoir and possibly to other artificial lakes, such as the Marathia Reservoir in Mykonos Island. Reported from Evros River in 2005; these individuals probably escaped or were released from Bulgarian aquaculture farms (Koutrakis *et al.*, 2011). No established populations and no evidence of successful reproduction in the wild in Greece. It can reach 236 cm TL.

IUCN Red List Status: **[CR]**

Greek Red List: -

Habitats Directive: **[Y]**

Ecoregion: -

*Acipenser naccarii* Bonaparte, 1836 NATIVE

Οξύρυγχος Αδριατικής, Adriatic sturgeon

Indigenous anadromous species of the Adriatic. Probably formerly present in the northern Ionian Sea and possibly also in the northwestern river basins, yet evidence is lacking to confirm former anecdotal

records (Economidis *et al.*, 2000a). However, the species' presumed native status in Greek waters is supported by the close proximity of alleged native populations that are said to have formerly reached southern Albania (Paschos *et al.*, 2008). Since southern Adriatic populations have declined (Rakaj, 1995), we suggest this species should be considered extinct in Greece. Adriatic sturgeons were stocked in the Kalamas River during a restoration project but there is no evidence that a population has been established. Similar to other anadromous sturgeons, this species requires deep lowland rivers that are free of dams. It reaches 200 cm TL.

IUCN Red List Status: <b>CR</b>	Habitats Directive: <b>Y</b>
Greek Red List: <b>(Current populations considered alien)</b>	Ecoregion: <b>(3)</b>

*Acipenser stellatus* Pallas, 1771 NATIVE

Αστροξυρούχι, Stellate sturgeon

Native to the Black, Caspian and Aegean Sea basins. In the past, it occurred in Evros and Strymon rivers, with the last record of the species in the Thracian sea in 1999 (Economidis *et al.*, 2000a), possibly however an escapee from fish farms. A very rare sturgeon species, with native reproducing populations probably extinct in Greece. A strongly migratory anadromous species, it needs large unobstructed deltas and deep rivers; it enters large rivers for reproduction. It reaches 222 cm TL.

IUCN Red List Status: <b>CR</b>	Habitats Directive: <b>Y-HTL</b>
Greek Red List: <b>DD</b>	Ecoregion: <b>1</b>

*Acipenser sturio* Linnaeus, 1758 NATIVE

Ευρωπαϊκός οξύρυγχος, Atlantic sturgeon

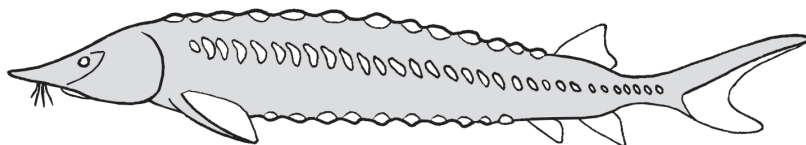
A critically endangered species with an historical distribution in Atlantic and Mediterranean Europe; possibly extirpated in Greece and the Mediterranean basin. Until 1975, the species was regularly harvested for its meat and caviar from the Evros Delta (Economidis *et al.*, 2000a). In the past, populations existed also in Nestos, Strymon, Pinios and Acheloos rivers, but now it is definitely extirpated in these basins. One individual was captured in 2005 in the Evros River and was assessed as a wild native by genetic analysis (Koutrakis *et al.*, 2011). However, this was the only finding of the species in the river since 1991, thus requiring confirmation. Nevertheless, a remaining very small spawning population cannot be excluded. In depth research on sturgeons in the Evros is imperative, applying DNA studies to detect potential relicts of native sturgeon populations. If a wild population still exists in Evros, this should be one of Greece's most important biodiversity conservation priorities. A strongly migratory anadromous species, it requires undammed deep rivers, entering the lower sections for reproduction. It can reach 600 cm TL.

IUCN Red List Status: <b>CR</b>	Habitats Directive: <b>Y</b>
Greek Red List: <b>DD</b>	Ecoregion: <b>1,2,(4),5</b>

GENUS

***Huso***

Brandt &amp; Ratzeburg 1833

***Huso huso*** (Linnaeus, 1758) NATIVE

Μουρούνα, Beluga

A globally threatened sturgeon, historically known from the Caspian, Adriatic and Black Sea and the Sea of Marmara. There is circumstantial evidence of its former presence in the Northern Aegean (e.g. Geldiay & Balik, 1999), but scientific confirmation of the species' distribution is blurred by lack of documentation and the coexistence of other sturgeon species in the same region. Due to the close proximity of former native stock in the Northeastern Aegean and Sea of Marmara (Fricke *et al.*, 2007) we speculate that at least occasionally individuals probably did reach Greek waters (see Paschos *et al.*, 2008); this was, however, contested due to the low salinity tolerance of the species (Economidis *et al.*, 2000a). We suggest the species be considered extinct in Greece, since neighbouring populations have collapsed. Non-indigenous farmed sturgeons and sturgeon hybrids are sometimes found in Greece, these, however, being escapees or introductions from Bulgarian fish farms; the last detection of the species was in 2006 in the Evros River (Koutrakis *et al.*, 2011). The species is anadromous, entering large rivers for reproduction. One of the largest freshwater fishes, it can reach 800 cm TL.

IUCN Red List Status: **CR**Habitats Directive: **Y-HTL**Greek Red List: **(Current populations considered alien)**Ecoregion: **(1)**

ORDER **ANGUILLIFORMES**

FAMILY **ANGUILLIDAE**

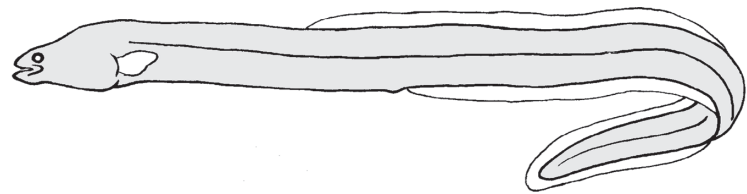


Catadromous fishes, spending juvenile and adult life in fresh or brackish water, with adults returning to the sea to spawn. The members of this family have elongated, snake-shaped bodies with continuous dorsal, caudal and anal fins. They lack pelvic fins. A single native species in Greece.

GENUS

***Anguilla***

(Schrank, 1798)



***Anguilla anguilla*** (Linnaeus, 1758) NATIVE Marine Euryhaline

Χέλι, European eel

Formerly widely distributed throughout Greece, including many inland waters of the Greek islands. Found in lagoons, river mouths, wetlands, rivers and small streams, often reaching high elevations. The most remarkable migratory fish; a catadromous traveller, it inhabits inland waters and then migrates to the Sargasso Sea to spawn. The available habitats for the species in Greek inland waters have decreased dramatically in recent decades, mainly due to the construction of dams and other hydraulic structures that obstruct fish migration. There is also alarming evidence of declining trends in eel landings from inland waters, which is attributed to anthropogenic impacts and/or to reduced arrival rates of young eels (glass eels) from the sea. It can reach 133 cm TL.

*The related Anguilla japonica (native to Japan and the East China Seas) has been introduced in aquaculture units with potential escapes in the wild (Corsini-Foka & Economidis, 2007), however, its presence in the wild in Greece's freshwaters is unconfirmed.*

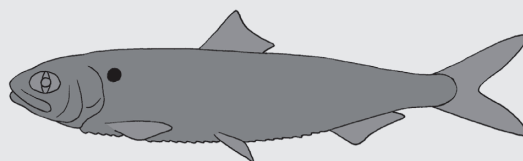
IUCN Red List Status: **CR**

Greek Red List: **NT**

Habitats Directive: **N**

Ecoregion: **1, 2, 3, 4, 5, 6, 7, 8**



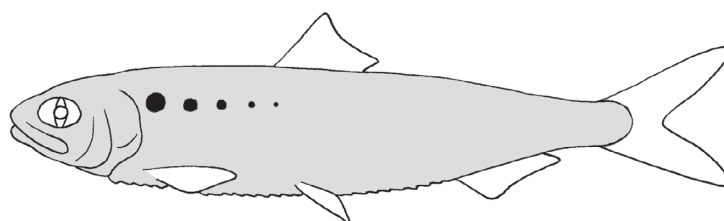
ORDER **CLUPEIFORMES**FAMILY **CLUPEIDAE**

Usually fusiform body with silvery colouration, head without scales and pelvic fins placed far back, below dorsal fin. Mostly marine, but some species enter lowland freshwaters; most form large schools. Important edible species, such as sardines and herrings, are included in this family. Three species are found in freshwaters in Greece.

## GENUS

***Alosa***

Linck, 1790

***Alosa fallax*** (La Cepède, 1803) NATIVE Marine Euryhaline

## Σαρδελομόνα, Twaite shad

Formerly widespread at sea and in larger rivers; this anadromous fish has declined in numbers and distribution. Recorded in the Evros, Filiouris, Lake Vistonis basin, Nestos, Strymon, Pinios (including Karla Lake), Acheloos, Louros, Arachthos and Kalamas river basins. A single older record exists from a Cretan river (Bianco *et al.*, 1996). The species may be present in other rivers (such as Loudias, Aliakmon and Axios) but it is poorly surveyed. This strongly migratory fish travels from the sea up to rivers to spawn during spring; in the Evros, populations spawn as high up as the lower Ardas River. The migrations of the species are severely impacted by dams, weirs and other barriers. It can reach 60 cm TL.

IUCN Red List Status: **LC**Greek Red List: **DD**Habitats Directive: **Y-HTL**Ecoregion: **1,2,5,6*****Alosa macedonica*** (Vinciguerra, 1921) ENDEMIC

## Λιπαριά, Macedonian shad

Endemic to Lake Volvi in Northern Greece, extirpated from Lake Koronia. A lacustrine (landlocked) pelagic species, moving from the upper water layers to deeper waters in the winter. Formerly a commercially important fish species, the fishery and demand for the species have declined since 1980 (Bobori & Psaltopoulou, 2012). It reaches 35 cm TL.

*This species is similar to Alosa vistonica (Geiger et al., 2014) and is genetically related to Black Sea Alosa species. It is considered a colonist from the Black Sea that entered the northern Aegean before the last Pleistocene transgression of the Mediterranean*

(Bobori et al., 2001b; Faria et al., 2012).

IUCN Red List Status: **VU**  
 Greek Red List: **VU**

Habitats Directive: **Y-HTL**  
 Ecoregion: **1**

***Alosa vistonica*** Economidis & Sinis, 1986 ENDEMIC

Θρίτσα, Thracian shad

Endemic to Lake Vistonis. One of the rarest fish species of Europe that has not been recorded since the early 1990s. It might be already extinct. Hydrological degradation, salinity changes and pollution have severely degraded the aquatic environment of Lake Vistonis and the lower parts of the Kossinthos and Kompsatos rivers, which constitute its only known habitats. A new dam and river diversion proposal threatens the lower Kompsatos river, which provides freshwater to Lake Vistonis (HCMR data). It reaches 17 cm TL.

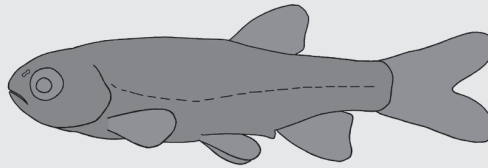
*This species co-occurs with Alosa fallax in the Vistonis basin, but its biology and origins are very different. It is related to Alosa macedonica (Geiger et al., 2014), generically similar to the Black Sea Alosa species.*

IUCN Red List Status: **CR**  
 Greek Red List: **CR**

Habitats Directive: **Y-HTL**  
 Ecoregion: **1**

## ORDER CYPRINIFORMES

## FAMILY CYPRINIDAE

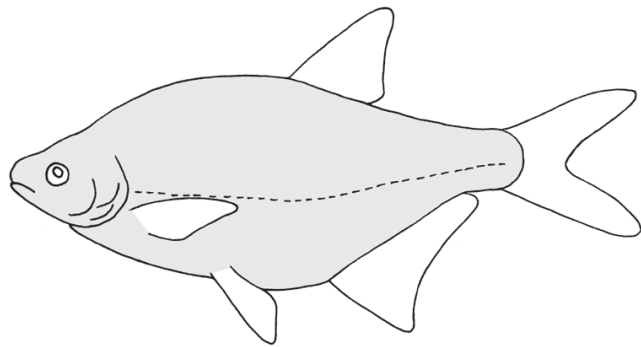


A large, diverse and widely distributed family, including over 2.400 species in Europe, Asia, Africa and North and Central America. Cyprinids inhabit mainly fresh or brackish waters. They have two sets of paired fins, three unpaired fins, toothless jaws, and strong species-specific pharyngeal teeth. There is only one dorsal fin and some species have barbels. Many species have evident scales; others have minute scales and may appear scaleless. The number of pharyngeal teeth, the number of rays in the dorsal and anal fins, the presence and number of barbels, and the number of scales along the lateral line are useful diagnostic characters in species identification. Seventy nine species in Greece, seven are alien.

GENUS

***Abramis***

Cuvier, 1816

***Abramis brama*** (Linnaeus, 1758) NATIVE

Λεστιά, Common bream

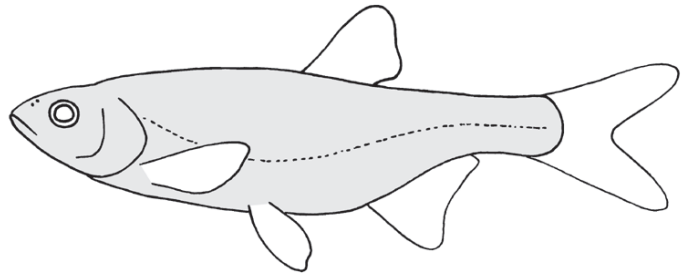
Native distribution in Greece is confined to the Evros and Strymon Rivers and to Lake Volvi (including Richios River). Allegedly introduced into Filiouris River (current status unknown). A shoaling benthopelagic fish of large, slow flowing and deep lowland rivers, big canals and lakes. It reaches 82 cm TL.

IUCN Red List Status: **LC**Greek Red List: **LC**Habitats Directive: **N**Ecoregion: **1**

GENUS

***Alburnoides***

Jetteles, 1861

***Alburnoides bipunctatus*** (Bloch, 1782) NATIVE

Ευρωπαϊκό τσιρωνάκι, European spirlin

Cyprinids of the genus *Alburnoides* are present in Aaos, Aliakmon, Mavroneri, Axios, Loudias, Strymon and Nestos, as well as in Pinios and Sperchios rivers. In Kottelat & Freyhof (2007), most of these populations are attributed to *A. bipunctatus*, however, based on recent genetic studies some of these populations are recognized as distinct species. They all inhabit streams and rivers with fast-flowing waters, often in the sub-montane and montane areas, sometimes in lowland cool water reaches as well. It reaches 16 cm TL (HCMR data).

In the recent genetic study of Geiger et al. (2014), *A. strymonicus* and *A. thessalicus* (Pinios, Aliakmon and Axios drainages) are identified as candidate valid species, while the *Alburnoides* population of the Sperchios River (referred to as *Alburnoides* sp. Sperchios) is prominently different from the other *Alburnoides* populations. The taxonomic status of the Aaos population, reported as *A. bipunctatus ohridanus* by Zardoya et al. (1999), remains unclear. Based on available evidence, we include *A. strymonicus* in our list, as a separate species (see below). We also contend that *A. thessalicus* and the *Alburnoides* sp. Sperchios deserve full species status too. A more thorough taxonomic review is however pending.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2,3,4*****Alburnoides prespensis*** (Karaman, 1924) ENDEMIC S BALKANS

Τσιρωνάκι Πρεσπών, Prespa spirlin

Present in Lakes Prespa and their tributaries. Populations from the Aaos are likely to belong to this species also. Mainly found along lake shores, often in schools. Populations have declined due to water abstraction, pollution and impact of alien species (Freyhof & Kottelat, 2008). It can reach 9 cm TL.

A recent study (Bogutskaya et al., 2010) established two new *Alburnoides* species in nearby Albanian drainages, with which the Aaos taxon should be compared for possible morphological and genetic affinities. Other fish species of the Aaos are closely related to the fishes of the Prespa lakes and indeed Geiger et al. (2014) found no molecular evidence to distinguish the two Albanian species from *A. prespensis*.

IUCN Red List Status: **VU**Habitats Directive: **N**Greek Red List: **VU**Ecoregion: **3*****Alburnoides strymonicus*** (Chichkoff, 1940) ENDEMIC S BALKANS

Τσιρωνάκι Στρυμόνα, Strymon spirlin

Present in Strymon (including Aggitis), Marmaras stream and Nestos river. It inhabits streams and mainly the middle sections of rivers with moderate to fast-flowing waters, as well as dam reservoirs. It reaches 15 cm TL.

Until recently, this taxon has not been referenced as a distinct species (e.g. Kottelat & Freyhof, 2007), with the exception of Economidis et al. (2009), a recent monograph on the Nestos ichthyofauna. However, since its original description by Chichkoff, it has been inferred that there is genetic distance between this species and its conspecifics, corroborated by later genetic studies such as Zardoya et al. (1999), Perea et al. (2010) and Geiger et al. (2014). In the proposed updated taxonomy in Geiger et al. (2014) it was also revalidated as a species.

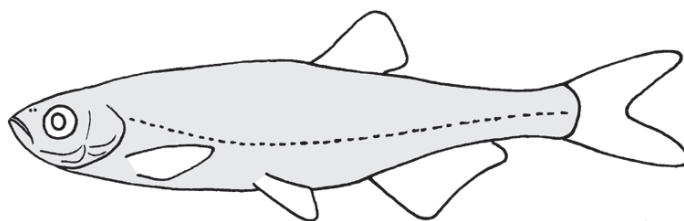
IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **N**  
Ecoregion: **1**

GENUS

***Alburnus***

Rafinesque, 1820



***Alburnus alburnus*** (Linnaeus, 1758) NATIVE

Ευρωπαϊκό σίρκο, European bleak

In Greece, the nominate species is confined to the Evros basin, where it is widespread. Alleged to be native in the past also in Nestos basin (Drensky, 1930); at present, however, the bleak populations living in the dam lakes of Nestos River are considered translocated, with unknown origin (Zivkov, 1987; Apostolou, 2005; Apostolou *et al.*, 2010). A common shoaling species of large rivers and lakes; populations migrate upstream in rivers to spawn. It may reach 18 cm TL.

The genera *Alburnus* and *Chalcalburnus* were merged by Freyhof & Kottelat (2007) into a single genus, *Alburnus*.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1**

***Alburnus belvica*** Karaman, 1924 NEAR ENDEMIC

Μπελοτσιρόνι, Prespa bleak

Endemic to Prespa Lakes (Greece, Albania and FYROM) where it is one of the most common fishes. A pelagic species, inhabiting lakes and slow flowing lowland water courses. It migrates in tributaries of the lakes to spawn, from May to August. It reaches 25 cm TL.

This bleak, formerly included in the genus *Chalcalburnus* by Economidis (1986), was not considered to belong to the “shemaya (*Chalcalburnus*) group” by Freyhof & Kottelat (2007).

IUCN Red List Status: **VU**  
Greek Red List: **VU**

Habitats Directive: **N-LR**  
Ecoregion: **3**

***Alburnus macedonicus*** Karaman, 1928 NEAR ENDEMIC

## Σίρκο Δοϊράνης, Doiran bleak

Endemic to Lake Doirani (Greece and FYROM). A lacustrine species, spawning near the lakeshore. Populations have declined and are totally dependent on this small trans-boundary lake, thus it is one of the most range-restricted bleaks in Greece. The lake's reduced water levels (dropped by six metres since 1990), due to over-abstraction for irrigation, are cited as its main threat (Economidis & Chrysopolitou, 2009). It can reach 15.8 cm TL.

IUCN Red List Status: **CR**Habitats Directive: **N**Greek Red List: **CR**Ecoregion: **2*****Alburnus scoranza*** Bonaparte, 1845 ENDEMIC S BALKANS

## Σίρκο της Σκόδρας+, Scoranza bleak+

Endemic to central western Balkan rivers from the Drin drainage, including lakes Skadar and Ohrid, south to the Aoos. In Greece, restricted to a short section of mid Aoos River, mainly within the Konitsa plateau and the Albanian border. Prefers larger and deeper river water bodies with still waters. It can reach 16 cm TL.

*The Aoos population of this species was first noted in Economou et al. (2007a) as A. cf. scoranza; it was recently genetically confirmed as this species in Geiger et al. (2014).*

IUCN Red List Status: **LC**Habitats Directive: **N**

Greek Red List: -

Ecoregion: **3*****Alburnus thessalicus*** Stephanidis, 1950 ENDEMIC S BALKANS

## Θεσσαλόσιρκο, Thessaly bleak

Endemic to Thessalian Pinios (including Karla Lake), Aliakmon, Axios, Gallikos and Loudias rivers and Vegoritida Lake basin. It is a gregarious pelagic species, living and foraging close to the water surface. It is widespread and commonly found in larger rivers, lakes and some reservoirs. It reaches 16 cm TL (HCMR data).

*The lower Strymon bleak population, previously attributed tentatively to this species in Economou et al. (2007a), is now included in *Alburnus* sp. Volvi.*

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **2*****Alburnus vistonis*** Freyhof & Kottelat, 2007 ENDEMIC

## Αλία, Vistonis shemaja+

Endemic to Lake Vistonis basin, including Kossinthos and Kompsatos rivers. The populations from the adjacent Filiouris and Vosvozis river basins probably belong to this species. A lacustrine species that migrates to the upper reaches of stream tributaries to spawn in riffles with strong currents. Dams and weirs block its upward migration, endangering localized populations. In the Vistonis basin, populations have sharply declined particularly due to anthropogenic salinity changes in the lake and

are further threatened by planned dam and water abstraction projects. It reaches 25 cm TL.

The larger-bodied bleaks, formerly in the genus *Chalcalburnus* (including *A. volviticus*, and *A. vistoncus*) have been called “*Shemajas*” (Freyhof & Kottelat, 2007). See also taxonomic note under the closely related *A. volviticus*.

IUCN Red List Status: **CR**

Habitats Directive: **Y-CTC**

Greek Red List: **CR**

Ecoregion: **1**

***Alburnus volviticus*** Freyhof & Kottelat, 2007 ENDEMIC

Γελάρτζα, *Yelartza shemaja*+

Endemic to the Lake Volvi basin. Extirpated from Lake Koronia. A fairly large-sized schooling shemaja of open waters and river mouths. In spring, the species migrates to upland stream reaches for reproduction in fast-flowing cool waters. Main threats to the species are anthropogenic desiccation and barriers to migration in streams. It reaches 30 cm TL.

The large migratory *Alburnus* (formerly *Chalcalburnus*) of the northern Aegean and Marmara Sea drainages, including the two localized Greek species (*A. volviticus* and *A. vistoncus*) show strong genetic affinities (Geiger et al., 2014).

IUCN Red List Status: **EN**

Habitats Directive: **Y-CTC**

Greek Red List: **EN**

Ecoregion: **1**

***Alburnus* sp. Volvi** ENDEMIC

Σίρκο της Βόλβης+, *Volvi bleak*

Endemic to lakes Volvi and Koronia (including Richios River) and to the lower stretch of Strymon River, including Lake Kerkini. Extirpated from Lake Koronia after its recent dessication; it is abundant in Volvi and Kerkini. Found in lakes and open waters of medium to large rivers. It can reach 14.9 cm TL.

This small bleak is under taxonomic revision, being first noted in Freyhof & Kottelat (2007). Genetic analysis (Geiger et al., 2014) has shown the distinctiveness of this species from other *Alburnus* species, including its sympatric *A. volviticus*.

IUCN Red List Status: -

Habitats Directive: **N**

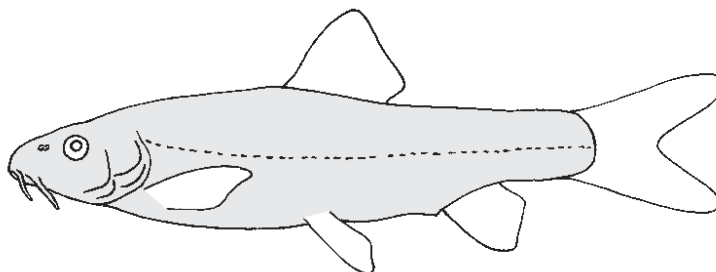
Greek Red List: -

Ecoregion: **1**

GENUS

***Barbus***

Cuvier & Cloquet, 1816



***Barbus balcanicus*** Kotlík, Tsigenopoulos, Ráb & Berrebi, 2002 ENDEMIC S BALKANS

Βαλκανική μπριάνα, *Large spot barbel*

A widespread, small barbel. It inhabits rivers Gallikos, Axios, Loudias and Aliakmon, as well as streams flowing into the northern Thermaikos Gulf (including Mavroneri stream). Also found in Lake

Vegoritis and Doirani basins. It usually prefers upland and mid-elevation streams and rivers with fast to moderate flow and gravel substrate. The species moves upstream for spawning. In some river reaches it has been extirpated by overexploitation of surface waters and weirs (e.g. Anthemountas stream near Thessaloniki). It reaches 24 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **2**

***Barbus cyclolepis*** Heckel, 1837 ENDEMIC S BALKANS

Θρακική μπριάνα, Thracian barbel+

Found in Thraki, from Lake Vistonis basin and eastwards; also in neighbouring drainages in Bulgaria and Turkey. A fairly widespread rheophilic species, it inhabits mostly streams with gravel substrates. It reaches 30 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **1**

***Barbus euboicus*** Stephanidis, 1950 ENDEMIC

Ευβοϊκή μπριάνα, Evia barbel

The distribution of this species is restricted to Manikiotiko stream in central-eastern Evia Island. This small rheophilic barbel is critically endangered; during summer the stream it inhabits dries up almost completely and the population is confined to a few remaining pools. Water abstraction and barriers to movement are serious threats to this species; it is of national conservation priority. It can reach 18 cm TL.

*The Manikiotiko river population is genetically distinct compared to other species of barbel from neighbouring basins of Evia and eastern central Greece (Geiger et al., 2014). The genetic and geographical isolation of this species render it one of the top priorities for species conservation in Greece.*

IUCN Red List Status: **CR**  
Greek Red List: **CR**

Habitats Directive: **Y-CTC**  
Ecoregion: **4**

***Barbus macedonicus*** Karaman, 1928 ENDEMIC S BALKANS

Μακεδονική μπριάνα, Macedonian barbel

A rheophilic species found in Thessalian Pinios, Aliakmon, Loudias and Axios river basins. It inhabits deeper river sections and certain reservoirs (e.g. Polyphytos dam lake). Migrates during spawning. A large-bodied barbel, it reaches 72 cm TL (HCMR Data).

*Unlike other Greek endemic large barbels, this species is closely related to the widespread European Barbus barbus (Gante, 2011). The Pinios population was originally described as B. barbus thessalus by Stephanidis (1971); although this was assigned as B. thessalus by Economidis & Bobori (2003), genetic evidence suggests that the Pinios and the Aliakmon populations have very similar haplotypes (Tsigenopoulos & Berrebi, 2000). The name B. thessalus was not sustained in Kottelat & Freyhof (2007) or other more recent publications, such as the genetic study of Geiger et al. (2014).*

IUCN Red List Status: **DD**  
Greek Red List: **LC**

Habitats Directive: **Y-HTL**  
Ecoregion: **2**



***Barbus peloponnesius*** Valenciennes, 1842 NEAR ENDEMIC

Πελοποννησιακή μπριάνα, Peloponnese barbel

A widespread small barbel. Found in Western Greece, from Kalamas southwards to Pamisos River in the Peloponnese. It is currently absent in the Louros river, although said to exist there in the past (Economidis, 1991; Bianco, 1998). Also found in southern Albania with potential presence in the Pavllo River (Markova *et al.*, 2010). A rheophilic species, it inhabits rivers and streams with gravel and rocky substrates; it is resistant to extremely low flow conditions. In some smaller streams and tributaries, populations have suffered from water abstraction and anthropogenic barriers to migration. It usually reaches 19 cm TL; exceptionally it has been recorded to reach 30 cm TL (HCMR data).

According to Geiger *et al.* (2014), the Kalamas and Aoos barbel populations belong to *B. prespensis*. Markova *et al.* (2010) also ascribed the Aoos population closer to *B. prespensis* but assigned the Kalamas population closer to *B. peloponnesius*. Here, we retain the Kalamas population in *B. peloponnesius*, but we assign the Aoos population to *B. prespensis*.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **5*****Barbus pergamonensis*** Karaman, 1971 ENDEMIC ASIA MINOR

Μπριάνα Περγάμου+, Bergama barbel

A rheophilic barbel of Western Anatolia; in Greece, it occurs in Evergetoulas stream on Lesvos Island. It inhabits streams and the upper sections of rivers. It reaches 17 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **CR**Ecoregion: **7*****Barbus prespensis*** Karaman, 1924 ENDEMIC S BALKANS

Μπριάνα Πρέσπας, Prespa barbel

*Barbus prespensis*, formerly thought to be confined to Prespa Lakes and their tributaries, is now considered to have a wider distribution in rivers of southern Albania and northwestern Greece, including the Aoos River. Within the Prespa basin, there is evidence of a *B. prespensis* population decline because suitable habitats for reproduction have been degraded by anthropogenic changes (Catsadorakis *et al.*, 1996). It reaches 30 cm TL.

According to the genetic studies by Markova *et al.* (2010) and Geiger *et al.* (2014), the Aoos barbel population (previously considered as *B. rebeli*, now removed from the Greek fish list) should be assigned to *B. prespensis*, to which we agree. However, we should point out a critical morphological difference between the Prespa and the Aoos populations; namely, the Prespa fish have serration on the 4th ray of the dorsal fin (Economidis & Daoulas, 2003), but the Aoos fish lack serration (Economidis, pers. comm.), resembling in this respect the other barbels of the western Balkans (*B. rebeli* and *B. peloponnesius*). The variability of this character should thus be studied in the future.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **3**

***Barbus sperchiensis*** Stephanidis, 1950 ENDEMIC

Μπριάνα Σπερχειού, Sperchios barbel

Found in Sperchios and Thessalian Pinios rivers, as well as in other small streams flowing into the Pagasitikos Gulf; these include the population of Cholorema stream near Almyros, which was previously described as *B. cyclolepis cholorematicus* by Stephanidis (1971). Barbel populations in the stream basins of adjacent Northern Evia presumably belong to this species. A population in the uplands of central-western Evia Island attributed to this species by Kottelat & Freyhof (2007) is under investigation. Barbel specimens recently collected in the Kifissos river (Attica) presumably also belong to this species and are almost certainly an anthropogenic introduction (HCMR data). *Barbus sperchiensis* is a typically rheophilic barbel species that mostly inhabits streams with gravel substrates; in some small upland intermittent streams it is often the only fish present. It can reach 27 cm TL.

IUCN Red List Status: **NT**Habitats Directive: **Y-CTC**Greek Red List: **NT**Ecoregion: **2,4*****Barbus strumicae*** Karaman, 1955 ENDEMIC BALKANS

Μπριάνα του Στρυμόνα, Strumica barbel

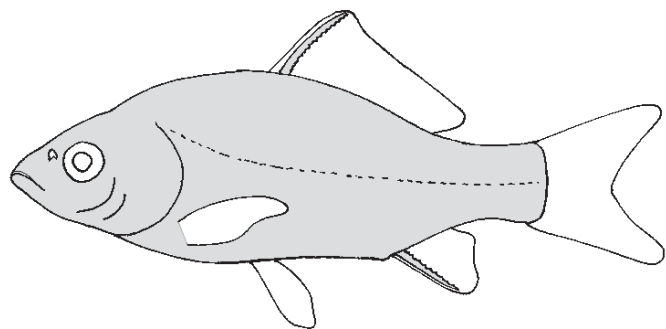
Endemic to the Eastern Balkans; its range in Northern Greece extends from Chalkidiki peninsula streams to Nestos river. It is also found in streams of Lakes Koronia and Volvi basins and in Lake Kerkini. A widespread fluvio-lacustrine barbel, it inhabits mostly streams and rivers with gravel substrate but will also live in the littoral zone of lakes and reservoirs. It can reach 30 cm TL (HCMR data).

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **1**

GENUS

***Carassius***

Nilsson, 1832

***Carassius auratus*** (Linnaeus, 1758) ALIEN

Κοινό χρυσόψαρο, Common goldfish

Non-indigenous species from Central and Eastern Asia, introduced as an ornamental fish for aquaria and ponds. It is difficult to distinguish from, and often confused with, the closely related and also widespread *Carassius gibelio* (Rylkova *et al.*, 2013). It has been established in several natural and artificial water bodies in Greece, including Lake Kourna (Crete), Pezi reservoir (Ikaria) and Ladopotamos stream (Agion Oros). It inhabits rivers, lakes, and well vegetated ponds and ditches with stagnant or slow-flowing water. It can reach 32 cm TL.

Until recently *C. auratus*, *C. carassius* and *C. gibelio* were commonly confused in biological and fisheries literature, especially

with the use of unfortunate subspecies designations. For a long period, *C. gibelio* was considered as a subspecies of *C. auratus* (Kottelat, 1997) and this created many documentation problems in Greece. There is also the possibility that some feral populations of *C. auratus* have been misidentified as *C. gibelio* (e.g. in Prespa Lakes, Kalous et al., 2012); further investigation is required to clarify the species' distribution in Greece.

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IUCN Red List Status: **LC**

Habitats Directive: **N**

Greek Red List: -

Ecoregion: -

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### *Carassius carassius* (Linnaeus, 1758) NATIVE

Κουτσουράς, Crucian carp

Native from Eastern Europe to Asia beyond the Caspian Sea, this is now one of the rarest fish species in Greece. It was formerly found at least in Thraki and perhaps in Makedonia and Thessaly, but as with *Cyprinus carpio*, its historic distribution is poorly documented. Today, the species may already be extinct in Greece, probably due to competition and/or interbreeding with the invasive *Carassius gibelio*. Genetic introgression with this closely-related invasive alien has been proposed as a reason for the decline of *C. carassius* (Rylková et al., 2013). It was last recorded in Greece in the Evros river basin in the early 1970s (Economidis, 1974), with no recent records despite extensive surveys in both Greece and Bulgaria. The species inhabits large and small lakes, ponds and lowland rivers, canals and ditches. It can reach 64 cm TL.

*Carassius carassius* was allegedly recorded as existing in Thessaly (Lake Karla) by Apostolidis (1892). However, the historical existence of this species in Thessaly has been disputed by Stephanidis (1950) and Economidis (1973). Unfortunately a review of the species' historical distribution and the specific reasons for its rapid demise have not yet been explored. It should now be considered regionally endangered and any conservation effort requires further distributional and genetic data.

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IUCN Red List Status: **LC**

Habitats Directive: **N**

Greek Red List: **DD**

Ecoregion: **1,2**

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### *Carassius gibelio* (Bloch, 1782) ALIEN

Πεταλούδα, Prussian carp

This species' provenance has been disputed. Some authorities consider it as native from central-eastern Europe while others insist it was introduced from Asia. It is considered as an alien in Greece, since the very similar *Carassius carassius* formerly existed in its place, in northeastern Greece. Nowadays *C. gibelio* is one of the most widespread introduced fishes in Greece, often unintentionally introduced together with juveniles of *Cyprinus carpio*. It is highly invasive, because it is able to survive in adverse conditions (polluted eutrophic waters) and to reproduce with gynogenesis. In many countries, it is regarded as a serious pest species often negatively affecting natural limnosystems and inland water fisheries (Perdikaris et al., 2012). It inhabits still or slow-flowing water bodies, such as lakes and all types of reservoirs and lowland rivers, canals and ditches. It reaches 40 cm TL.

Formerly this species was often called *C. auratus* or *C. auratus gibelio*; it is definitely not closely related to *C. carassius*. Although close to the common goldfish that originates from the Orient, the populations of *C. gibelio* in Eastern Europe are considered as resulting from a natural postglacial range expansion, while the rest of Europe was colonized due to anthropogenic transfers. There is evidence that various genetic strains have been introduced in recent decades and different strains/populations were detected in genetic stock assessments (Tsipas et al., 2009; Takada et al., 2010; Rylková et al., 2013). Some non-native *C. gibelio* populations

have a propensity for hybridization among species of the same genus (Hänfling et al., 2005). Identification from wild type common goldfish or Gin-buna carp is difficult and should be done in the laboratory and/or through the use of genetic methods.

IUCN Red List Status: -  
Greek Red List: **LC**

Habitats Directive: **[N]**  
Ecoregion: -

***Carassius langsdorfii*** (Temminck & Schlegel, 1846) ALIEN

Αγριοχρυσόψαρο Ιαπωνίας+, Gin-buna carp

Non-indigenous triploid species, introduced from Japan. Recently identified genetically in lakes of the Acheloos river basin (Tsipas et al., 2009). Currently, it is almost impossible to distinguish it from *Carassius auratus* and *C. gibelio* in the field, and thus it cannot be excluded that certain populations of these species might be identified as *C. langsdorfii* in the future. It reaches 39 cm TL.

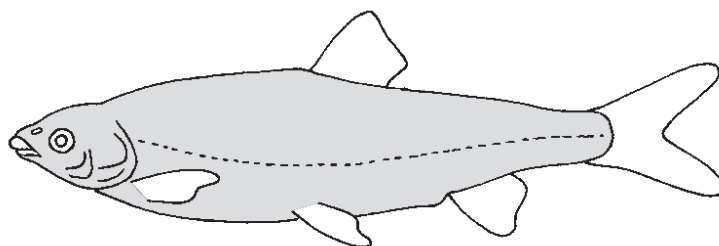
IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **[N]**  
Ecoregion: -

GENUS

***Chondrostoma***

Agassiz, 1832



***Chondrostoma prespense*** Karaman, 1924 NEAR ENDEMIC

Σκουμπούζι, Prespa nase

The distribution of this endemic nase is restricted to Prespa Lakes. During the spawning season, it enters the tributaries of the lakes (such as Agios Germanos stream in the Greek section of the basin). Its reproductive migrations take place exclusively at night. It can reach 30 cm TL.

IUCN Red List Status: **VU**  
Greek Red List: **VU**

Habitats Directive: **N**  
Ecoregion: **3**

***Chondrostoma vardareense*** Karaman, 1928 ENDEMIC S BALKANS

Σύρτης, Vardar nase

A southern Balkans endemic, found in Greece in Pinios, Loudias, Aliakmon, Axios, Strymon, Nestos and Evros river basins. A distinct nase population is also present in Aaos River, but its taxonomy is unresolved. It inhabits river sections with fast-flowing waters with rocky to stony substrate. It reaches 50 cm TL.

Previous genetic studies have assigned the Aaos population to *C. vardareense* (Zardoya & Doadrio, 1999; Doadrio & Carmona, 2004; Robalo et al., 2007). Geiger et al. (2014), however, identified this population as *C. ohridanus*, a species present in the Drin drainage, including Lakes Skadar and Ohrid. Therefore, the Aaos nase population should be considered as distinct from the *C. vardareense* Greek populations, and thus further studied.

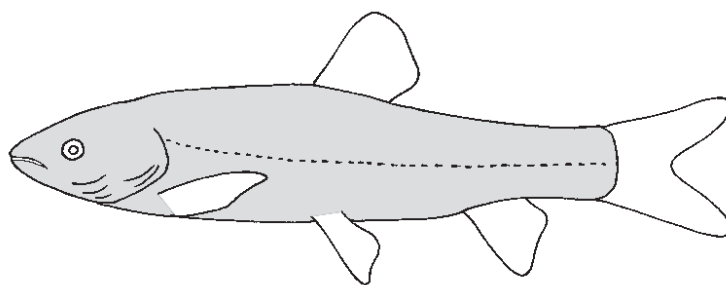
IUCN Red List Status: **NT**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2,3**

GENUS

***Ctenopharyngodon***

Steindachner, 1866

***Ctenopharyngodon idella*** (Valenciennes, 1844) ALIEN

Χορτοφάγος κυπρίνος, Grass carp

Non-indigenous species, native to eastern Asia. Widely introduced around the world for weed control. No evidence of it reproducing in the wild in Greece, but it is regularly stocked. Adult individuals are found in several lakes and reservoirs and in middle and lower stretches of large rivers, ranging from the Evros to small reservoirs on Crete. Its negative impacts on lake ecology have been well documented, such as in Lake Pamvotis (Leonardos *et al.*, 2008). Prefers slow-flowing or stagnant waters with rich vegetation. It reaches 150 cm TL.

IUCN Red List Status: -

Habitats Directive: **[N]**

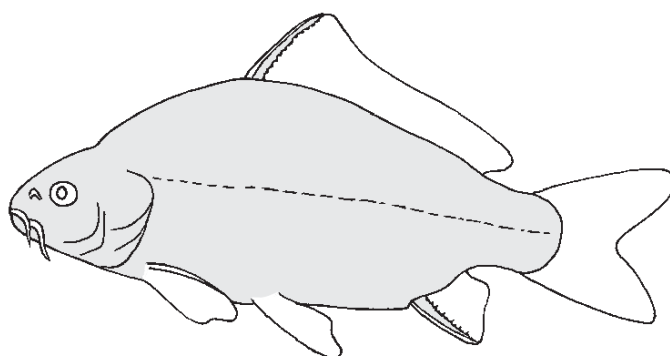
Greek Red List: -

Ecoregion: -

GENUS

***Cyprinus***

Linnaeus, 1758

***Cyprinus carpio*** Linnaeus, 1758 NATIVE

Κυπρίνος, European carp

Widespread Eurasian species, considered native from the Black Sea to the Aral Sea basin. Widely introduced throughout the Old World, since Greco-Roman times (Balon, 1995). Presumably native in northeastern Greece (Thraki and Makedonia-Thessaly Ecoregions) due to these areas' Danubian and Black Sea biogeographical affinities. There are many recent introductions and many domesticated strains sustain established populations in the wild throughout Greece's mainland and in certain islands. It is doubtful that the "wild form" (related to the "sazan" forms of the Danube) survives in Greek territory; carp populations outside their presumed native range should be considered as translocated and naturalized. Nowadays, it is widely reared in aquaculture units and stocked in natural and artificial water bodies, since it is one of the most important freshwater culinary resources, especially prized for its meat in northern Greece. It inhabits slow-flowing or still waters, such as lakes, ponds, canals and rivers with rich vegetation. It reaches 110 cm TL.

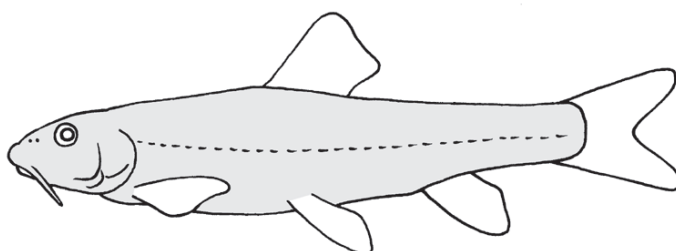
The provenance of the European carp remains unresolved. Hoffman (1995) suggests that the carp was already known to Greeks

before Roman times (e.g. it was described by Aristotle), and he mapped the natural native range of this species as including the eastern part of the Balkan Peninsula. Repeated stockings and hybridization with domesticated and/or non-native (east-Asian) strains have reduced the genetic purity of European wild populations, which have been included in the Red List of European fishes (Freyhof & Brooks, 2011). As for Greece, the wild carp might be extirpated from Greece since all studied populations seem to belong to domesticated strains.

IUCN Red List Status: **VU**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1, 2, (3)**

GENUS  
**Gobio**  
Cuvier, 1816



***Gobio bulgaricus*** Drensky, 1926 ENDEMIC S BALKANS

Βουλγαροκωβιός+, Aegean gudgeon

In Greece, from Aliakmon to Evros river drainages. This widespread species inhabits streams and rivers with moderate flow, and substrate consisting of sand, pebble and boulders. It reaches 13 cm TL (HCMR data).

The populations in the Makedonia-Thessaly Ecoregion (Aliakmon and Axios) may represent a different species, referred as *G. balcanicus* in Geiger et al. (2014). However, we maintain *G. bulgaricus* for the time being, pending further investigation and formal description.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2**

***Gobio feraeensis*** Stephanidis, 1973 ENDEMIC

Φεροκωβιός, Thessaly gudgeon

*Gobio feraeensis* was originally described from the Velestino Spring, which maintained connection to Lake Karla. Kottelat & Freyhof (2007) tentatively recognised the native distribution of this species as extending to the whole drainage of the Pinios river. It inhabits springs, streams, canals and river sections with moderate flow, preferring sandy substrates. It reaches 12 cm TL (HCMR data).

This species is morphologically similar to other gudgeons of the genus *Gobio* of northern Greece, but is genetically distinct (Geiger et al., 2014).

IUCN Red List Status: **VU**  
Greek Red List: **VU**

Habitats Directive: **N**  
Ecoregion: **2**

***Gobio skadarensis*** Karaman, 1937 ENDEMIC S BALKANS

Κωβιός της Σκόδρας+, Skadar gudgeon

Present in several rivers of Albania and Montenegro, including Lake Skadar. In Greece, it is present in the Aoos river drainage at a very restricted area of its mid section (from Konitsa till the Albanian border). Habitat preference and behavior very similar to *Gobio bulgaricus*. It can reach 12 cm TL (HCMR data).

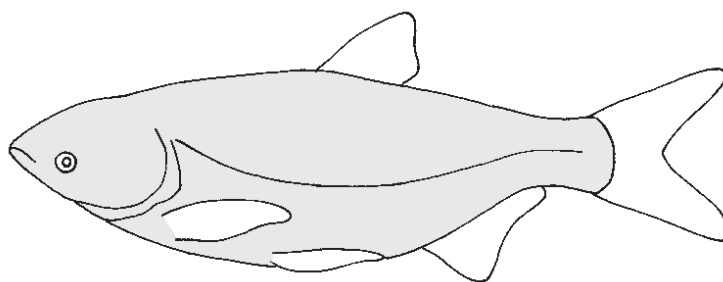
This species was formerly known under the name *Gobio gobio*; recently several taxa in this complex have been split to the species level in southeast Europe (Šanda et al., 2005).

IUCN Red List Status: **EN**Habitats Directive: **N**Greek Red List: **VU**Ecoregion: **3**

GENUS

***Hypophthalmichthys***

Bleeker, 1860

***Hypophthalmichthys molitrix*** (Valenciennes, 1844) ALIEN

Ασημοκυπρίνος, Silver carp

Non-indigenous species from eastern Asia, introduced worldwide for aquaculture and for controlling algal blooms. Frequent stockings in Greece (Perdikaris *et al.*, 2010) but no evidence of established self-sustaining populations. However, long-lived individuals survive in some lakes, such as Lakes Volvi and Pamvotis. It inhabits still water bodies, such as lakes, canals, reservoirs and ponds. It can reach 105 cm TL.

IUCN Red List Status: **[NT]**Habitats Directive: **[N]**

Greek Red List: -

Ecoregion: -

***Hypophthalmichthys nobilis*** (Richardson, 1845) ALIEN

Μαρμαροκυπρίνος, Bighead carp

Non-indigenous species from China that has been introduced worldwide. Populations of the species are sustained only by stocking; in Greece, it has been repeatedly introduced in several lakes and rivers (Economou *et al.*, 2001; Perdikaris *et al.*, 2010), including Lake Pamvotis and Evros River. It inhabits shallow and warm backwaters, lakes and flooded areas with slow currents. It reaches 146 cm TL.

IUCN Red List Status: **[DD]**Habitats Directive: **[N]**

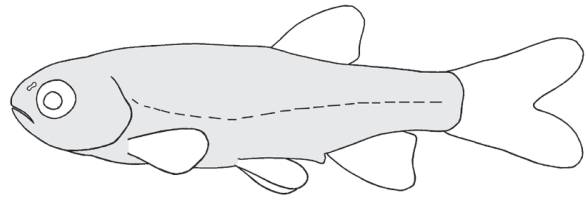
Greek Red List: -

Ecoregion: -

GENUS

***Ladigesocypris***

Karaman, 1972



***Ladigesocypris ghigii*** (Gianferrari, 1927) ENDEMIC

Γκιζάνι, Gizani

Endemic to Rhodes. It survives in the highly unstable environment of the island's streams, which may flood during winter, but dry up for most of their length during the dry season. It inhabits slow-flowing river stretches and spring areas. Previously assessed as "critically endangered," it was dropped to the rank of "vulnerable" on the basis of recent distributional surveys during an EU Life conservation project. It reaches 10 cm TL.

A genetic study (Perea et al., 2010) assigned this species to the genus *Squalius*. However, in Geiger et al. (2014) the genus *Ladigesocypris* is retained. A closely related species, *L. irideus*, is found in aquatic systems of southwestern Turkey.

IUCN Red List Status: **VU**

Habitats Directive: **Y**

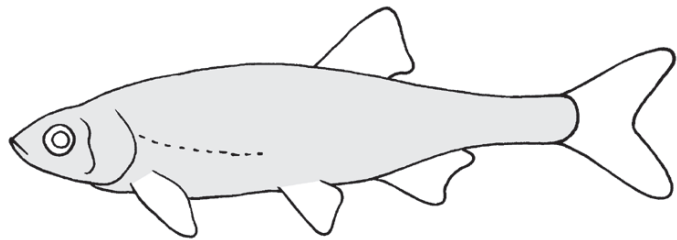
Greek Red List: **EN**

Ecoregion: **7**

GENUS

***Leucaspis***

Heckel & Kner, 1858



***Leucaspis delineatus*** (Hechel, 1843) NATIVE

Μικροσίρκο, European sun bleak+

Its distribution in northern Greece is known to extend from Rihios and Strymon to the Evros River drainages. Recently the species was also found in a small lowland tributary of Thessalian Pinios, which is beyond its known biogeographic range (HCMR data). Though the Evros river valley is currently the species' stronghold in Greece, it is rarely recorded and can easily be confused in the field with young bleak (*Alburnus* species). Localized and vulnerable to habitat destruction, it is a floodplain pond species. It inhabits slow-flowing river stretches, streams, canals, still oxbows, lakes and wetlands. It reaches 9 cm TL.

IUCN Red List Status: **LC**

Habitats Directive: **N**

Greek Red List: **DD**

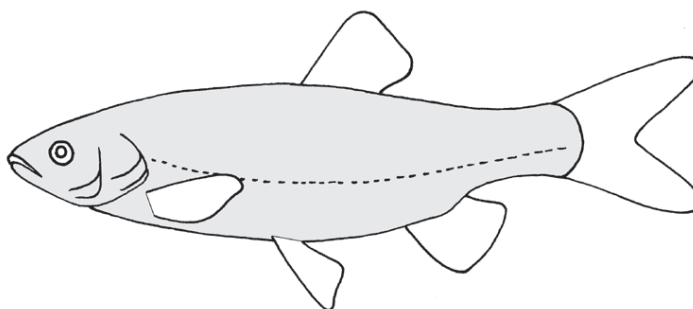
Ecoregion: **1,2**



GENUS

***Leuciscus***

Agassiz, 1832

***Leuciscus aspius*** (Linnaeus, 1758) NATIVE

Ασπρογρίβαδο, Asp

Inhabits the Evros and Strymon rivers, including Lake Kerkini. Present also in Lake Volvi until the late '70s, but now considered very rare (Bobori & Psaltopoulou, 2012), or possibly extirpated. A predatory fish that requires open waters of lowland rivers and lakes. Migrates upstream to spawn. It reaches 120 cm TL.

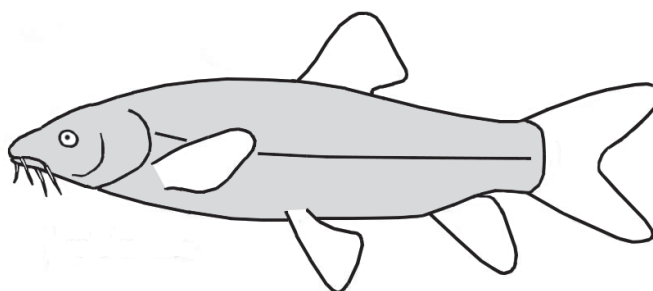
Previously ascribed to the genus *Aspius*, recent genetic studies transferred this species to the genus *Leuciscus* (Perea et al., 2010; Geiger et al., 2014). Here we adopt this change since there has been wider acceptance in several updated checklists (e.g. Freyhof & Huckstorff, 2006; Froese & Pauly 2014).

IUCN Red List Status: **LC**Habitats Directive: **Y\***Greek Red List: **DD**Ecoregion: **1**\* In the Habitats Directive referred as *Aspius aspius*.

GENUS

***Luciobarbus***

Heckel 1843

***Luciobarbus albanicus*** (Steindachner, 1870) ENDEMIC

Στρωσίδι, Albanian barbel+

Endemic to western Greece, from the river basins of Kalamas in the North to Pinios River in the Peloponnese. Despite its name, it is not present in Albanian territory. Abundant in Lakes Trichonis, Amvrakia, Ziros, and in Plastira (Tavropos) and Kremasta reservoirs. Some populations have declined, as in Lake Pamvotis and in some rivers such as upper Acheloos, above Mesochora Dam. It is a fluvio-lacustrine species, inhabiting both lentic and lotic waters with muddy to sandy bottoms. Lake populations move to tributaries to spawn; river populations move upstream during the reproductive spring migration. These migrations are often hampered by dams and weirs. It reaches 60 cm TL.

This species has recently been transferred to the genus *Barbus* (under which it was originally described) and presented as being valid under the name "*Barbus albanicus*" (Eschmeyer, 2014; Froese & Pauly, 2014). In the above species accounts, the closely related *Luciobarbus graecus* was retained in the genus *Luciobarbus*. On the basis of available genetic and morphological evidence (Tsigenopoulos et al., 2000, 2003; Kottelat & Freyhof, 2007; Geiger et al., 2014), we consider the species sufficiently distinct from other species of the genus *Barbus* to justify its inclusion in the genus *Luciobarbus*.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **5**

***Luciobarbus graecus*** (Steindachner, 1896) ENDEMIC

Σκαρούφι, Greek barbel

Endemic to Lakes Yliki and Paralimni in the Beotian Kifissos basin and Sperchios River. Recently introduced to the adjacent basins of artificial Lake Beletsi (Mt. Parnitha) and Lake Marathon in Attica (HCMR data); they belong to the Western Aegean Ecoregion, therefore these transplanted populations may be considered naturalized. Also found in 2014 in Kifissos River, Attica (HCMR data), probably introduced. The species inhabits water bodies in lowland plains, lakes, rivers and larger streams. It usually reaches about 70 cm TL; an exceptionally large individual of 110 cm TL was recently recorded in Lake Yliki (HCMR data).

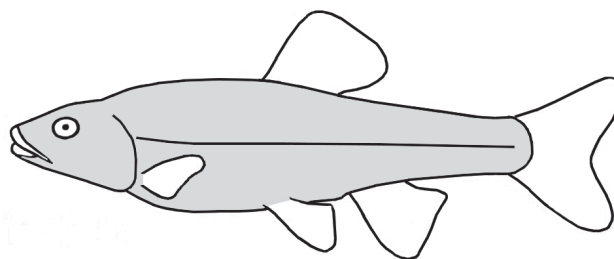
An intriguing finding that awaits a biogeographical interpretation is the close morphological and genetic affinities of *L. graecus* with *L. lydianus* and *L. kottelati* of western Asia Minor (Tsigenopoulos & Berrebi, 2000; Turan et al., 2008; Geiger et al., 2014).

IUCN Red List Status: **EN**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **4**

GENUS

***Pachychilon***

Steindachner, 1882

***Pachychilon macedonicum*** (Steindachner, 1892) ENDEMIC S BALKANS

Μαυροτσιρώνι, Macedonian moranec

Endemic to Gallikos, Axios, Loudias, Aliakmon, Mavroneri and Pinios river drainages; also found in Lakes Doirani, Vegoritis and Agra. A recently recorded population from Bogdanos stream (Lakes Koronia-Volvi basin) is presumably introduced, since it is outside its known historical range (Bobori *et al.*, 2014). It inhabits marshlands, lakes, rivers and other water courses mainly on lowland plains. It reaches 19 cm TL.

IUCN Red List Status: **DD**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **2*****Pachychilon pictum*** (Heckel & Kner, 1858) ENDEMIC S BALKANS

Χειλάς, Ohrid moranec

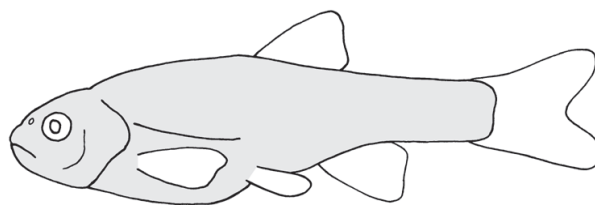
Localized, and extremely range-restricted in Greece; found only in the mid Aaos River, especially in the Konitsa plain. It inhabits slow-flowing rivers, canals and backwaters. It can reach 18 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **DD**Ecoregion: **3**

GENUS

***Pelasgus***

Kottelat &amp; Freyhof, 2007

***Pelasgus epiroticus*** (Steindachner, 1896) ENDEMIC

Ηπειρώτικη τσίμα, Epirus minnow

A range-restricted minnow, endemic to Lake Pamvotis and the surrounding area. Although there are older reports of its presence in Louros River, this was not confirmed in recent surveys (HCMR data), and was probably a misidentification. The Lake Pamvotis population collapsed in the late 1990s (Perdikaris *et al.*, 2003), with only single individuals recorded during the last decade (Leonardos *et al.*, 2008). Both the lake's increasing pollution and the introduction of alien species are implicated in this dramatic decline. For these reasons, this minnow should be considered as near extinct and in urgent need of conservation measures. Its habitat includes lake and canal waters often in association with springs and rich aquatic vegetation. It reaches 10 cm TL.

*This species, as well as Pelasgus prespensis were formerly included within the genus Paraphoxinus.*

IUCN Red List Status: **CR**Habitats Directive: **Y-CTC**Greek Red List: **CR**Ecoregion: **5*****Pelagius laconicus*** (Kottelat & Barbieri, 2004) ENDEMIC

Λακωνικός πελασγός, Evrotas minnow

A range-restricted species, endemic to the Evrotas river basin and a section of the upper Alfios river basin. It inhabits springs and spring-fed streams, preferring shallow areas close to the shore, with slow-to-no flow and dense vegetation. It can reach 6 cm TL.

*This species, as well as P. stymphalicus, P. thesproticus and P. marathonicus were formerly included within the genus Pseudophoxinus.*

IUCN Red List Status: **CR**Habitats Directive: **N-LR**Greek Red List: **CR**Ecoregion: **5*****Pelagius marathonicus*** (Vinciguerra, 1921) ENDEMIC

Αττικόψαρο, Marathon minnow

Endemic to central eastern Greece; populations present in Marathon plain (Attika), Erassinos (Attika), Upper Kifissos (Attika), Assopos and Kifissos (Viotia), the wider Sperchios basin, Cholorema stream (Pagasitikos Gulf) and central western Evia Island. Discovered in 2009 and 2012 also in two locations in Thessalian Pinios (in Makryremma and in Xiniada drainage canal) (HCMR data). This possibly is a very recent anthropogenic translocation, since the Pinios River is outside the species' known range. It prefers lentic habitats and slow-flowing waters, inhabiting springs, lowland streams, swamps and canals; often finding shelter among dense vegetation. Its habitats are threatened mainly by drought,

water abstraction and pollution; some populations may have been recently lost due to these pressures. It reaches 6.5 cm TL.

IUCN Red List Status: **NT**  
Greek Red List: **EN**

Habitats Directive: **Y-CTC**  
Ecoregion: **4**

***Pelasgus prespensis*** (Karaman, 1924) NEAR ENDEMIC

Τσίμα της Πρέσπας, Prespa minnow

Endemic to Prespa Lakes. It inhabits still waters and lake shores, with abundant aquatic vegetation. The Prespa population significantly declined during the last two decades; currently a major threat faced by the species is the introduction of alien fish species such as *Pseudorasbora parva*. It can reach 6.5 cm TL.

IUCN Red List Status: **EN**  
Greek Red List: **EN**

Habitats Directive: **Y-CTC**  
Ecoregion: **3**

***Pelagius stymphalicus*** (Valenciennes, 1844) ENDEMIC

Στυμφαλικός πελασγός, Stymphalia minnow

An endemic of the Peloponnese and western Greece. Populations exist in Lake Stymphalia, lower Alfios, Pamissos and Pinios rivers (as well as smaller systems of Western Peloponnese and the Argolic Gulf); also, in lower Acheloos, Evinos and Mornos basins. Introduced to Lake Tsivlos (Krathis River) and recently discovered in the Peloponnesian Assopos River (close to Nemea village, HCMR data). It inhabits lakes, spring-fed ponds, rivers and streams with slow current and wetland vegetation. It reaches 7 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **4, 5**

***Pelagius thesproticus*** (Stephanidis, 1939) NEAR ENDEMIC

Θεσπρωτικός πελασγός, Thesprotian minnow

Its range extends from Kalamas to Arachthos river basin, including Corfu and Lefkas Island. Also present in southern Albania. It inhabits springs, streams, and various ponds; usually found in shallow water with slow flow and dense vegetation. It reaches 6 cm TL.

*Genetic diversity within P. thesproticus is highly structured spatially (Geiger et al., 2014), suggesting the existence of several geographically isolated populations which represent different evolutionary units and should be managed separately.*

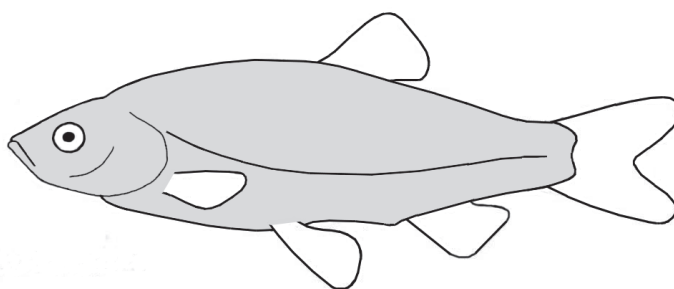
IUCN Red List Status: **NT**  
Greek Red List: **NT**

Habitats Directive: **Y-CTC**  
Ecoregion: **5**

GENUS

***Petroleuciscus***

Bogutskaya, 2002

***Petroleuciscus borysthenicus*** (Kessler, 1859) NATIVE

Τσαϊλάκι, Black sea chub+

Its range in Greece extends from Evros to Strymon River drainage; also in Lake Volvi and Richios stream. It inhabits wetlands, lakes, lowland rivers and the lower reaches of slow-flowing upland rivers, usually with sandy or muddy substrate. It can reach 19 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1*****Petroleuciscus smyrnaeus*** (Boulenger, 1896) ENDEMIC ASIA MINOR

Σμυρνοπετρόλευκος, Smyrna chub

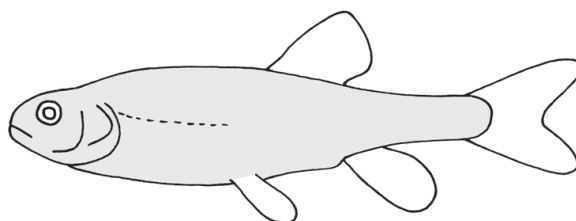
In Greece, it is restricted to Lesvos Island (Voulgaris, Potamia, Tsiknias and Milopotamos streams); also present in Asia Minor. Localized and vulnerable to habitat degradation. It inhabits slow-flowing to still waters. It reaches 12 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **VU**Ecoregion: **7**

GENUS

***Phoxinus***

Rafinesque, 1820

***Phoxinus strymonicus*** Kottelat, 2007 ENDEMIC BALKANS

Στρυμονόγαστρος, Aegean minnow

Recently described species, known only from Strymon River (Aggitis basin) in Greece. Possibly also found in Bulgaria and perhaps in adjacent catchments in Makedonia and Thraki, but populations in these areas remain unclassified. Populations of unidentified *Phoxinus* species exist locally in Loudias and Axios in the Makedonia-Thessaly Ecoregion, and Marmaras, Nestos (Bulgarian section), Filiouris and Evros (Bulgarian section) in the Thraki Ecoregion. This small fish inhabits streams with clear and cool waters often with dense vegetation; these water bodies often depend on cold-water springs. It reaches 6 cm TL.

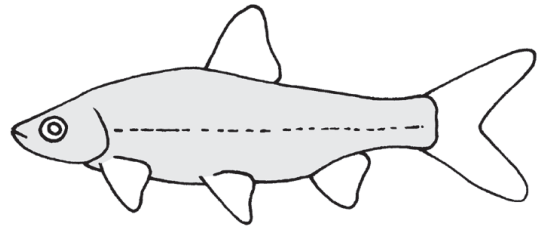
*Phoxinus* populations have very isolated and localized distributions in northern Greek and transboundary river basins and their taxonomy has not yet been clarified.

IUCN Red List Status: **EN**Habitats Directive: **N**Greek Red List: **EN**Ecoregion: **1,(2)**

GENUS

***Pseudorasbora***

Bleeker, 1860

***Pseudorasbora parva*** (Temminck & Schlegel, 1846) ALIEN

Ψευδοράσμπορα, Topmouth gudgeon

Non-indigenous species from eastern Asia, spreading rapidly in Greek lakes and rivers, especially within the larger basins of northern Greece. An extremely invasive and harmful alien species, a potential food competitor to the native ichthyofauna. It mostly inhabits lowland rivers, canals and lakes; also slow-flowing streams, and occasionally upland areas (e.g. upper Aliakmon River, near Grevena city, and Agios Germanos stream, Prespa Lakes). It reaches 16 cm TL (HCMR data).

IUCN Red List Status: **[LC]**Habitats Directive: **[N]**

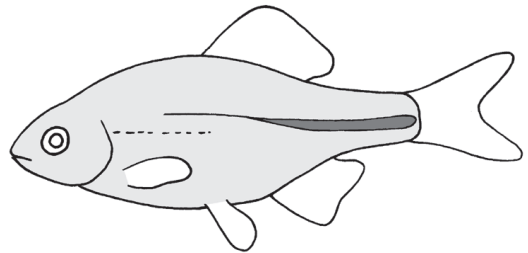
Greek Red List: -

Ecoregion: -

GENUS

***Rhodeus***

Agassiz, 1832

***Rhodeus amarus*** (Bloch, 1782) NATIVE

Μουρμουρίτσα, European bitterling

Its range in Greece extends from Strymon to Evros River. The Lakes' Koronia-Volvi population was previously attributed to this species; the Prespa Lakes population, long considered alien, remains of unknown taxonomic status. This species inhabits still or slow-flowing waters, with dense vegetation (often with helophytes) and sandy substrates. It depends on the presence of freshwater mussels for its reproduction. It may reach 10 cm TL.

Greek bitterlings were recently split into two species; fishes in the Makedonia-Thessaly ecoregion being called *R. meridionalis*, those in the Thraki ecoregion assigned to *R. amarus* (Bohlen et al., 2006). According to Bryja et al. (2010) the Volvi Lake bitterling population is genetically different from both *Rhodeus* species present in Greece; Geiger et al. (2014), however, could not demonstrate strong genetic distinction among populations inhabiting water bodies of northern Greece and called all populations *R. meridionalis*. The provenance of a *Rhodeus* population in Lakes Prespa remains unclarified. Crivelli et al. (1997) and Talevski et al. (2009) refer to the Prespa population as *R. amarus*. However, Krstic (2012) refers to this population as being the product of an introduction.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **1,(3)**

***Rhodeus meridionalis*** Karaman, 1924 ENDEMIC S BALKANS

Βαβούκι, Vardar bitterling

A Balkan endemic, found in Greece from Thessalian Pinios to Axios Rivers, including Lake Doirani. It also has a wider range in western Makedonia (e.g. Vegoritis basin). This species has been introduced to Trichonis and Ozeros Lakes (Acheloos drainage, Koutsikos *et al.*, 2012). It inhabits still or slow-flowing lowland waters, including rivers, canals, ponds, lakes and various wetlands often with dense helophytes. It requires freshwater mussels for reproduction. It reaches 10 cm TL.

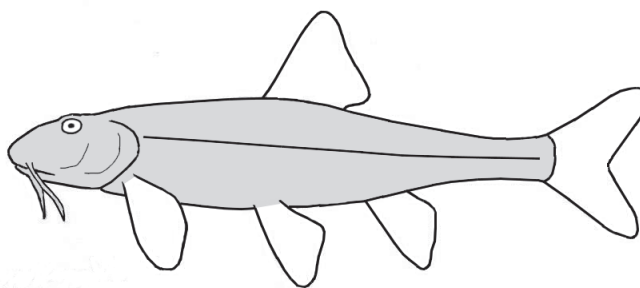
This range-restricted endemic is primarily distinguished by genetic analysis from the near identical *Rhodeus amarus* (Kottelat & Freyhof, 2007; but see Geiger *et al.*, 2014).

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **2**

GENUS

***Romanogobio***

Bănărescu, 1961

***Romanogobio elimeius*** (Kattoulas, Stephanidis & Economidis, 1973) ENDEMIC S BALKANS

Μυλωνάκι, Greek stone gudgeon

A species endemic to Pinios, Aliakmonas, Loudias, Axios and Mavroneri river basins. It inhabits swift-running waters, sometimes relatively deep waters, with gravel and cobble substrates. This rheophilic fish is vulnerable to water abstraction and anthropogenic degradation in flow regime. It reaches 12 cm TL (HCMR data).

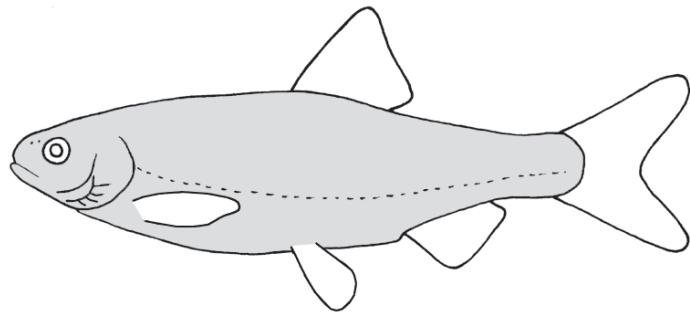
It has long been stated that a second *Romanogobio* taxon, formerly referred to as *R. kesslerii banarescui* (Economidis *et al.*, 1981) may exist in the Aliakmon, Axios and Pinios rivers. *R. banarescui* (Dimovski & Grupche, 1974) was considered as a subspecies of *R. kesslerii* by Bănărescu (1999). Kottelat (1997) stated that this independent lineage is diagnosable, and recognised it as a distinct species (of the genus *Gobio*) but Kottelat & Freyhof (2007) did not distinguish it from *R. elimeius*. Geiger *et al.* (2014) identified a genetically distinct population of *Romanogobio* in the Greek part of the Axios River, and called it *R. banarescui*, so it is nearly certain that if this taxon becomes valid it will be a new addition to the Greek ichthyofauna.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **DD**Ecoregion: **2**

GENUS

***Rutilus***

Rafinesque, 1820

***Rutilus panosi*** Bogutskaya & Iliadou, 2006 ENDEMIC

Δρομίτσα, Acheloos roach

A lacustrine species endemic to Acheloos river drainage, abundant in Trichonis, Amvrakia, Lysimachia and Ozeros lakes. Previous records of occurrence in Louros drainage remain unconfirmed. Introduced to Lakes Pamvotis (Ipeiros) and Taka (Peloponnese, HCMR data). It reaches 26 cm TL.

Bianco & Ketmaier (2014) proposed a revision of the genus *Rutilus* and resurrected the genus *Leucos*, naming the species *L. panosi*. However, *Leucos* is very closely related to *Rutilus*. Here the original genus is retained, pending further acceptance. Three unidentified *Rutilus* sp. specimens (perhaps *R. panosi*) were collected in the lower Kalamas River; these are considered as translocated and should be verified as such (these specimens were misidentified in Koutsikos et al., 2012 as *Scardinius acarnanicus*).

IUCN Red List Status: **VU**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **5*****Rutilus prespensis*** (Karaman, 1924) NEAR ENDEMIC

Πλατικά Πρέσπας, Prespa roach

Endemic to Prespa Lakes where it is one of the most abundant fishes. It inhabits various habitats near the lakeshores and reproduces in shallow, swampy waters. It can reach 25 cm TL.

Based on genetic data, Ketmaier et al. (2008) suggested that *R. prespensis* should be synonymized into *R. basak* (Neretva River). Geiger et al. (2014) found a very close genetic affinity between *R. prespensis* and *R. ohridanus* but distinguish these species clearly from *R. basak*. Tsoumani et al. (2014) have indicated significant divergence between the haplotypes of *R. prespensis* and *R. ohridanus*. We treat *R. prespensis* as a valid species.

IUCN Red List Status: **VU**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **3*****Rutilus rutilus*** (Linnaeus, 1758) NATIVE

Τσιρώνι, Common roach

Widely distributed in Europe (north of the Pyrenees and the Alps) and Northern Asia. In Greece it is present from Thessalian Pinios to Evros river drainages. Also found in Kastoria, Doirani, Volvi and Vegoritis lakes. The taxonomy of these roach populations is currently being examined and the Greek territory may include two species, *Rutilus rutilus* and *R. heckelii*. This fish inhabits a variety of habitats (nutrient-rich lakes, large- to medium-sized rivers, reservoirs and backwaters), but in Greece it is mainly found in lowland areas. It reaches 50 cm TL.

Larmuseau et al. (2009) identified fishes from Lake Volvi as *Rutilus heckelii*, a species also widespread in the Black and Caspian Sea basins. Also, Triantafyllidis et al. (2011) and Tsoumani et al. (2014) found the Lake Volvi population genetically differentiated



from the rest of the *R. rutilus* populations studied. In addition, Geiger et al. (2014) identified this population as *R. heckelii*. Finally, Bianco & Ketmaier (2014) proposed that some small-sized specimens of the Lake Volvi fishes be called *R. stoumboudae* (new species), but acceptance of this taxon is pending a more complete review.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2**

***Rutilus ylikiensis*** Economidis, 1991 ENDEMIC

Χιροκόβα, Yliki roach

Endemic to Boeotian Kifissos River drainage, including Yliki and Paralimni Lakes where it is abundant. A population has been recently discovered in Lake Marathon, Attika (certainly transplanted, HCMR data). Reported as introduced into Lake Volvi (Bianco & Ketmaier, 2014); no such report however can be found in the also recent monograph of Bobori & Psaltopoulou (2012). It inhabits lakes, slow-flowing canals and lowland river reaches. It reaches 29 cm TL.

Bianco & Ketmaier (2014) proposed a revision of this taxon and resurrected the genus *Leucos*, naming the species *L. ylikiensis*. Here the original genus is retained, pending further acceptance.

IUCN Red List Status: **EN**  
Greek Red List: **VU**

Habitats Directive: **Y-CTC**  
Ecoregion: **4**

***Rutilus* sp. Sperchios** ENDEMIC

Τσιρώνι Σπερχειού+, Sperchios roach+

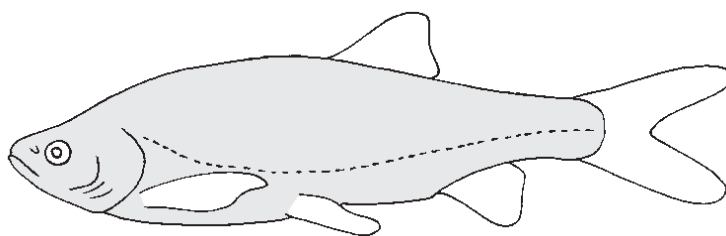
Endemic to the lower Sperchios River. The species was first reported in 1997 during an HCMR research project. Recently the existence of a thriving roach population in Sperchios has again been confirmed (HCMR data). The species inhabits lowland river sections and slow-flowing drainage canals and ditches including artificial distributaries in the Sperchios Delta. It reaches 25 cm TL.

Geiger et al. (2014) have indicated that this species is genetically distinct but closely related to *Rutilus ylikiensis*.

IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **N**  
Ecoregion: **4**

GENUS  
***Scardinius***  
Bonaparte, 1837



***Scardinius acarnanicus*** Economidis, 1991 ENDEMIC

Τσερούκλα, Trichonis rudd

Endemic to Acheloos river drainage, including all lakes of the basin. Also established in Ziros Lake where it was probably introduced in recent years. It inhabits lakes, large rivers and canals. It may reach

36 cm TL; perhaps exceptionally larger in some lakes.

Three individuals collected in the lower Kalamas River and reported as *Scardinius* sp. by Koutsikos et al. (2012) represent a misidentification; these specimens were *Rutilus* sp.

IUCN Red List Status: **NT**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **5**

***Scardinius erythrophthalmus*** (Linnaeus, 1758) NATIVE

Κοκκινοφτέρρα, European rudd

A widespread European species; in Greece present in Thessalian Pinios, Aliakmon, Loudias, Axios, Strymon, Nestos, Filiouri and Evros River basins, including the lakes in and among these basins. Introduced to several lakes of northern Greece, such as Lake Kastoria. It inhabits nutrient-rich, well vegetated lowland rivers, canals and lakes. It reaches 51 cm TL.

Stephanidis (1950) reported the presence of a *Scardinius erythrophthalmus* (var. *achrus*) population in the Cholorema stream (the only *S. erythrophthalmus* population within the western Aegean ecoregion). In recent years, this species was not collected in this basin (HCMR data); it may have become extirpated, due to water abstraction and consequent desiccation of large parts of this small river.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2**

***Scardinius graecus*** Stephanidis, 1937 ENDEMIC

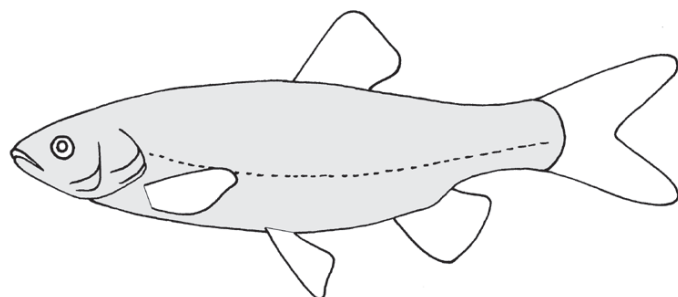
Καλαμίθρα, Greek rudd

An endemic lacustrine species confined to lakes Yliki and Paralimni, as well as to the lower Beotian Kifissos river basin. Translocated populations established in lakes Marathon and Beletsi in Attika. It inhabits lakes, reservoirs, canals and lowland slow-flowing water courses. It regularly reaches 40 cm TL, though its maximum size is possibly larger in the lakes.

IUCN Red List Status: **CR**  
Greek Red List: **VU**

Habitats Directive: **Y**  
Ecoregion: **4**

GENUS  
***Squalius***  
Bonaparte, 1837



***Squalius fellowesii*** (Günther, 1868) ENDEMIC ASIA MINOR

Ποταμοκέφαλος Αιγαίου+, Aegean chub

A Western Anatolian species, present in Greece only in two streams of Samos Island (HCMR data). During the summer, this species is restricted to a very small stretch in each of these two rivers. These

isolated populations are threatened by drought and water over-abstraction. It reaches 22 cm TL; specimens from the Asia Minor mainland lakes and reservoirs are often much larger.

Geiger et al. (2014) have indicated that the Samos *Squalius* populations are genetically identical to *S. fellowesii*.

IUCN Red List Status: **LC**

Habitats Directive: **N**

Greek Red List: -

Ecoregion: **7**

***Squalius keadicus*** (Stephanidis, 1971) ENDEMIC

Καιαδική μενίδα, Evrotas chub

A species endemic to the Evrotas river drainage, including the adjacent Vassilopotamos stream in the Evrotas Delta. One of the most ancient components of the European cyprinid ichthyofauna. Due to its confinement to a single river basin and the fact that the Evrotas River dries out almost completely in hydrologically adverse years, the species should be considered as endangered. It is strongly rheophilic, usually found in open sites of the river, with stony bottoms and relatively cool waters. It reaches 25 cm TL.

IUCN Red List Status: **EN**

Habitats Directive: **Y-CTC**

Greek Red List: **EN**

Ecoregion: **5**

***Squalius moreoticus*** (Stephanidis, 1971) ENDEMIC

Ποταμοκέφαλος του Μωριά, Stymphalia chub

Considered endemic to Stymphalia Lake and according to Kottelat & Freyhof (2007) also in Vouraikos River, but its actual status is unclear, especially after Stymphalia Lake dried out completely during the early 1990s. There are reports from local fishers that fishes, including chub, from other basins were introduced into Stymphalia after the catastrophic drought. This species may therefore be extinct from Stymphalia Lake, while combined genetic and morphological studies are required in order to identify any remaining populations, since distinguishing it from *Squalius peloponensis* in the field is currently impossible. It inhabits lakes and streams with flowing, clear waters. It may reach 21 cm TL.

Genetic data based on samples from Stymphalia Lake presented by Doadrio & Carmona (1998) and Zardoya et al. (1999) indicate closeness to *S. peloponensis* populations from the Evinos and Acheloos basins, but since collection of samples probably occurred after the Stymphalia drought event, they might not represent this species but rather *S. peloponensis*, as reiterated in Geiger et al. (2014). Despite the uncertainty of the current status of the Stymphalia and Vouraikos chubs, we retain *S. moreoticus* in this list, pending further investigation.

IUCN Red List Status: **EN**

Habitats Directive: **N**

Greek Red List: **EN**

Ecoregion: **5**

***Squalius orpheus*** Kottelat & Economidis, 2006 ENDEMIC S BALKANS

Ποταμοκέφαλος Θράκης, Maritza chub

Its range extends from Lake Volvi to Evros River in Northern Greece; also in Thassos Island, where it was probably introduced. It inhabits a wide variety of habitats, mostly small rivers and large streams with moderate current, but it also thrives in lakes and reservoirs. It reaches 60 cm TL.

Recent genetic analysis has revealed genetic affinities of *S. orpheus* from aquatic systems of Thraki with *Squalius* taxa inhabiting

Lesvos and Evia islands and taxa found in Turkey (Geiger et al., 2014).

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1**

***Squalius pamvoticus*** (Stephanidis, 1939) NEAR ENDEMIC

Ποταμοκέφαλος Παμβώτιδας, Pamvotis chub

Endemic to Pamvotis Lake, as well as Kalamas, Acheron, Louros and Arachthos River drainages. Probably also present in Lake Butrint basin (southernmost Albania). It inhabits streams with flowing, clear waters. It reaches 30 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **5**

***Squalius peloponensis*** (Valenciennes, 1844) ENDEMIC

Ποταμοκέφαλος Πελοποννήσου, Peloponnese chub

Endemic to the Peloponnese, with the exception of the drainages where *Squalius moreoticus* and *S. keadicus* are present. Chub populations of Acheloos, Evinos, and Mornos (as well as Pinios, Peloponnese) formerly assigned to *S. sp.* Evinos, we now assign also to *S. peloponensis*, since they are nearly morphologically identical. Although recorded in the Neda basin by Stephanidis (1971), it is currently absent from there. Also, introduced to Dafnonas stream on Mount Parnon, Southern Peloponnese (Koutsikos *et al.*, 2012). A fairly widespread species in the Peloponnese, inhabiting a wide variety of streams, rivers, and canals with slow to fast current; also found in reservoirs. It can reach 30 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **5**

***Squalius prespensis*** (Fowler, 1977) ENDEMIC S BALKANS

Ποταμοκέφαλος Πρέσπας, Prespa chub

Endemic to Prespa Lakes where it is common in a variety of habitats and especially along the shoreline of both lakes. Due to the species' large population, it is the only range-restricted endemic of the Prespa Lakes that is not considered imperilled. It inhabits mostly shallow lake waters close to shore and enters streams flowing in the lakes. It reaches 44 cm TL.

According to genetic data provided by Geiger et al. (2014) the molecular structure of *S. prespensis* is almost identical to that of *S. platyceps*, a species recently described by Zupancic et al. (2010) from the Drin River system.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **3**

***Squalius vardarensis*** Karaman, 1928 ENDEMIC S BALKANS

## Ποταμοκέφαλος Μακεδονίας, Vardar chub

A widespread chub present in Sperchios, Pinios (Thessaly), Mavroneri, Axios, Gallikos and Aliakmon rivers, as well as Lakes Doirani, Vegoritis and Kastoria. The chub populations of Northern and Central Evia (Kirinthos, Kireas and Nileas streams) possibly belong to this species (pending, however, further investigation). It inhabits rivers and streams usually with moderate flow; also common in reservoirs and sometimes in lakes and spring-fed marshes. It reaches 60 cm TL (HCMR data).

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **2,4*****Squalius cf. cii*** (Richardson, 1856) ENDEMIC ASIA MINOR

## Ποταμοκέφαλος Ανατολίας, Lesbos chub

In Greece - and Europe - restricted to Lesbos Island. A northwestern Anatolian species, which Stoumboudi *et al.* (2006) tentatively identified as *Squalius cii*. It inhabits lakes and streams with moderate flow. During the summer drought in Lesbos Island, the species often survives only in isolated pools. Some populations are threatened by water abstraction and habitat alteration. It reaches 31 cm TL.

*The taxonomy of Lesbos island populations is currently under revision. Genetic analysis shows that the island contains more than one taxa, with one taxon showing phylogenetic affiliation to Squalius orpheus (Geiger et al., 2014). See also taxonomic remark under S. orpheus.*

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **VU**Ecoregion: **7*****Squalius sp. Aaos*** ENDEMIC S BALKANS

## Ποταμοκέφαλος Αώου+, Aaos chub

This is an unnamed species restricted, in Greece, to the Aaos basin. It inhabits rivers and streams with slow- to moderate-flowing waters and is common in a variety of stream habitats, up to about 900 m elevation. It reaches 35 cm TL.

*Zupancic et al. (2010) who described S. platyceps as a new species of the Drin River system based on morphological data, noted slight morphological differences between the Drin and the Aaos populations. In contrast, in the recent genetic study of Geiger et al. (2014) this chub population was assigned to S. platyceps. However, in the same study there is almost no genetic distance among S. platyceps, S. prespensis and the Aaos chub population. For these reasons, we retain the name S. sp. Aaos originally given by Kottelat & Freyhof (2007).*

IUCN Red List Status: **NT** (proposed by Kottelat & Freyhof, 2007)Habitats Directive: **N**

Greek Red List: -

Ecoregion: **3*****Squalius sp. Evia*** ENDEMIC

## Ποταμοκέφαλος Εύβοιας+, Evia chub

Present only in the lower stretches of Manikiotiko stream in central-eastern Evia Island. It prefers habitats with moderate to fast current and gravel bottom. During the summer droughts, the species survives in isolated pools; therefore it is seriously threatened by anthropogenic pressures within this

very small stream basin. It may reach 30 cm TL.

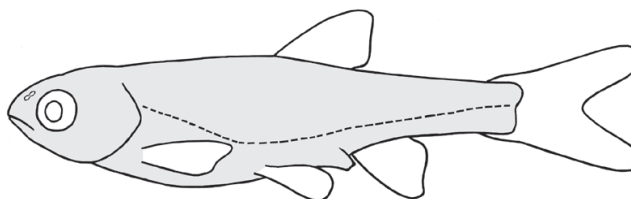
The isolated population of the Manikiotiko stream has been shown to differ genetically from other *Squalius* populations of Evia Island and central-eastern Greece (e.g. Doadrio & Carmona, 1998; Geiger et al., 2014); however it shows affinities to some *Squalius* populations of Thraki and Thassos and Lesvos Islands (Zardoya & Doadrio, 1999; Geiger et al., 2014). We assert that this population represents a conservation and research priority.

IUCN Red List Status: <b>CR</b> (proposed by Kottelat & Freyhof, 2007)	Habitats Directive: <b>N</b>
Greek Red List: -	Ecoregion: <b>4</b>

GENUS

***Telestes***

Bonaparte, 1837



***Telestes beoticus*** (Stephanidis, 1939) ENDEMIC

Πασκοβίζα, Beotian riffle dace

Endemic to the Kifissos River (Viotia) including Yliki Lake and Assopos river basins. Previously considered extirpated in Assopos but rediscovered there in 2014 (HCMR data). It inhabits moderate- to fast-running clear streams; often near springs. Sometimes also found in fast-flowing canals. Forms small schools, frequently close to aquatic vegetation, woody debris and among tree roots. Severely threatened by water abstraction and pollution within its very restricted global range. It may reach 13 cm TL.

IUCN Red List Status: <b>EN</b>	Habitats Directive: <b>Y-CTC</b>
Greek Red List: <b>EN</b>	Ecoregion: <b>4</b>

***Telestes pleurobipunctatus*** (Stephanidis, 1939) NEAR ENDEMIC

Λιάρα, Epiros riffle dace

A rheophilic cyprinid inhabiting many rivers and streams of western Greece (including Corfu Island) and northwestern Peloponnese. Also present in Lake Butrint basin (southern Albania). It inhabits streams with moderate to swift current and has been recorded often in upland areas (up to 1000 m elevation, as in Acheloos River). It is also locally abundant in lowland cold-water spring-fed streams. In late winter, it undertakes migrations upstream to spawn in cool water streams (often near springs, Barbieri *et al.*, 2007). It reaches 22 cm TL.

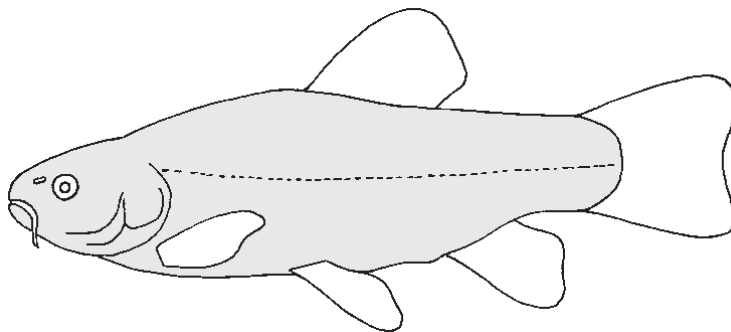
Molecular data show a well-structured pattern of spatial genetic variation within *T. pleurobipunctatus* and indicate the existence of substantial cryptic diversity representing different subclades (Geiger et al., 2014). Several authors have assigned the Peloponnese populations, from Pinios and Alfios rivers, to *T. alfiensis* (Zardoya and Doadrio, 1999; Freyhof et al., 2006; Gilles et al., 2010; Perea et al., 2010; Dubut et al., 2012). Although this species has appeared in the checklist revision of Koutsikos et al. (2012), it is not validated by a published description. Awaiting more conclusive evidence from taxonomic research, we retain the nominate species name here.

IUCN Red List Status: <b>LC</b>	Habitats Directive: <b>Y-CTC</b>
Greek Red List: <b>LC</b>	Ecoregion: <b>5</b>

GENUS

***Tinca***

Cuvier, 1816

***Tinca tinca*** (Linnaeus, 1758) NATIVE

Γλήνι, European tench

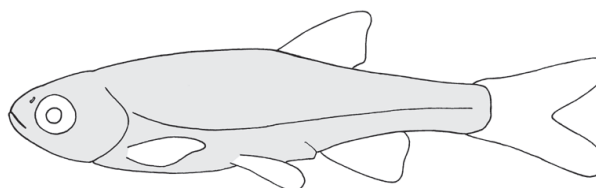
Widespread Eurasian species. Repeated introductions throughout Europe have blurred the original distribution of the species. However, we consider the northern and northeastern Greek populations native (i.e. those of Thessaly, Makedonia and Thraki). Introduced to several basins of western Greece (including Trichonis and Prespa Lakes) and the Peloponnese (established in Pamisos River, HCMR data). It inhabits shallow waters with still to slow flow and rich vegetation. It reaches 70 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **DD**Ecoregion: **1,2**

GENUS

***Tropidophoxinellus***

Stephanidis, 1974

***Tropidophoxinellus hellenicus*** (Stephanidis, 1971) ENDEMIC

Γουρνάρα, Hellenic minnowroach+

Endemic to Pinios (Peloponnese) and Acheloos river basins (common also in the lakes of Acheloos basin); recently found also in Vergas river (Kotychi basin, Peloponnese, HCMR data). It inhabits lakes, reservoirs and lowland waters with low current, forming schools in open water. It reaches 12 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **5*****Tropidophoxinellus spartiaticus*** (Schmidt-Ries, 1943) ENDEMIC

Χρυσή μενίδα, Spartian minnowroach+

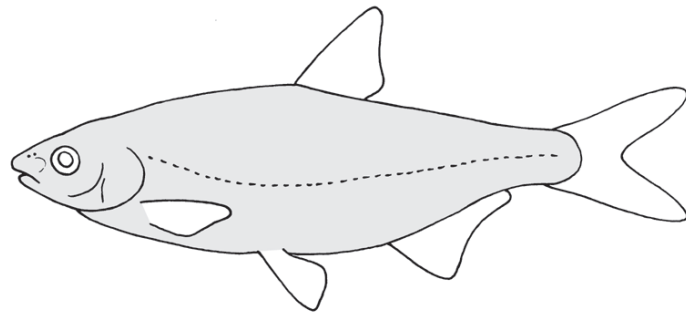
Endemic to southern Peloponnese; its range extends from Neda to Evrotas river basins. It inhabits lowland rivers, streams and canals with moderate to low current; usually, richly vegetated habitats. Some populations are threatened by lowland wetland drainage and water abstraction. It can reach 12 cm TL.

IUCN Red List Status: **VU**Habitats Directive: **N-LR**Greek Red List: **VU**Ecoregion: **5**

GENUS

***Vimba***

Fitzinger, 1873

***Vimba melanops*** (Heckel, 1837) ENDEMIC S BALKANS

Μαλαμίδα, Dark vimba

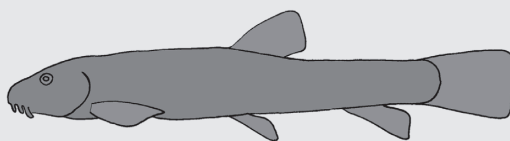
Typically a fish of large Balkan rivers flowing through northern Greece into the Aegean Sea; also found in lakes, reservoirs and other lowland water courses. Its range extends from Pinios (Thessaly) to Evros river basins (but not recorded in Nestos or Vistonis-Filiouris drainages). It inhabits deep rivers, larger stream tributaries, lakes, reservoirs and other lowland water courses, usually with relatively moderate to low current. Strongly migratory during spring. It reaches 35 cm TL.

IUCN Red List Status: **DD**Habitats Directive: **N**Greek Red List: **VU**Ecoregion: **1,2**

The *V. melanops* populations of rivers Axios, Strymon, Volvi and Evros show low genetic divergence and are genetically close to taxa inhabiting Asia Minor (Geiger et al., 2014). The more southern population of Pinios is highly divergent, emerging as a phylogenetically distinct lineage (Hänfling et al., 2009).



## FAMILY COBITIDAE

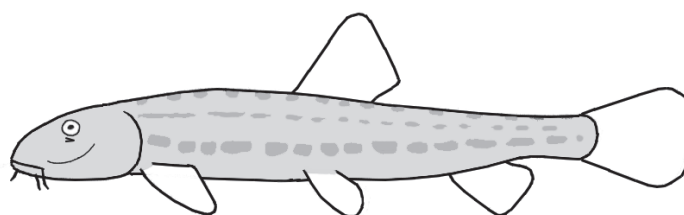


A family of small-sized fish with a unique elongated body form. They occur throughout Eurasia and northwestern Africa; mainly inhabiting riverine ecosystems. The common name of the family is “spined loaches” due to the presence of an erectile spine below the eye. They have a small bottom-facing mouth with three to six pairs of barbels. The pigmentation pattern is a character important for species identification. Eleven species are present in Greece.

GENUS

***Cobitis***

Linnaeus, 1758

***Cobitis arachthosensis*** Economidis & Nalbant, 1996 ENDEMIC

Αραχθοβελονίτσα, Arachthos spined loach

Endemic to the lower Arachthos River. It inhabits richly vegetated river and canal habitats with still to moderate flow, and sandy to silty substrates. It reaches 11 cm TL.

*This species is genetically closely related to C. hellenica (Bohlen et al., 2006) and its validity possibly requires a re-examination.*

IUCN Red List Status: **EN**Greek Red List: **EN**Habitats Directive: **Y-CTC**Ecoregion: **5*****Cobitis hellenica*** Economidis & Nalbant, 1996 ENDEMIC

Λουροβελονίτσα, Louros spined loach

Endemic to Louros and Kalamas river basins; introduced to lake Pamvotis (Leonardos *et al.*, 2008). It prefers habitats with sandy to muddy substrate with vegetation; present from still waters to moderate flow conditions. It may reach 11 cm TL.

*Economidis & Nalbant (1996) described Cobitis hellenica from Louros and C. arachthosensis from Arachthos and mentioned the occurrence of a Cobitis population in Kalamas. On the basis of genetic evidence, Bohlen et al. (2006) identified the Kalamas population as C. hellenica. They also established close relationships between C. hellenica and C. arachthosensis, a finding also supported by genetic analysis performed by Geiger et al. (2014).*

IUCN Red List Status: **EN**Greek Red List: **VU**Habitats Directive: **Y-CTC**Ecoregion: **5**

***Cobitis meridionalis*** Karaman, 1924 NEAR ENDEMIC

## Βρυγοβελονίτσα, Prespa spined loach

Endemic to Prespa Lakes (Greece, Albania, FYROM). It prefers sandy and muddy substrates with submerged vegetation; found in both lake environments and tributary streams. It reaches 13 cm TL.

IUCN Red List Status: **VU**Habitats Directive: **Y-CTC-**Greek Red List: **VU**Ecoregion: **3*****Cobitis ohridana*** Karaman, 1928 ENDEMIC S BALKANS

## Αχριδοβελονίτσα, Ohrid spined loach

Found in Greece only in Aoos river drainage, where it is confined to very few sites in the canals and spring-fed wetland areas of the Konitsa Plateau (Tachos, 2003; HCMR data). In terms of its total population and distribution in Greek territory, it is one of the scarcest taxa and its habitats are vulnerable to local anthropogenic degradation. It reaches 9 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **3*****Cobitis puncticulata*** Erk'akan, Atalay-Ekmekçi & Nalbant, 1998 NATIVE

## Στικτοβελονίτσα, Brown spined loach

A rare species, first described from northwestern Turkey, but also found in the lower Evros river floodplain wetlands (Freyhof *et al.*, 2008). The Evros population is confined to a restricted section of floodplain canals and wetlands near Lyra and Tychoero villages; repeated attempts to find the fish elsewhere along the river have failed (HCMR data 2009-2013). It prefers still to very slow-flowing waters with silty substrate and abundant submerged vegetation. It can reach 8 cm TL.

IUCN Red List Status: **CR**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **1*****Cobitis punctilineata*** Economidis & Nalbant, 1996 ENDEMIC

## Γραμμοβελονίτσα, Aggitis spined loach

The distribution of the species is restricted to the Aggitis River and associated wetlands (Strymon basin) in Northern Greece. It inhabits still to moderate-flowing clear waters, with silty and sandy substrate. It reaches 11 cm TL.

IUCN Red List Status: **VU**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **1*****Cobitis stephanidisi*** Economidis, 1992 ENDEMIC

## Φεροβελονίτσα, Velestino spined loach

Originally, the species was discovered in the Kefalovriso springs in Velestino (Lake Karla catchment, Thessaly). In 1998 the springs dried out and the species was extirpated from the area. In 2001 it was

recorded in Chasambali spring (Karla catchment). Since then, however, there is no evidence of the species' presence there. Furthermore, during 2011 and 2014 HCMR surveys, only *C. vardarensis* were collected in adjacent artificial pools and canals. The species requires springs and canals with silty substrate and aquatic vegetation. This loach is therefore one of the most enigmatic range-restricted fishes of Greece, apparently close to extinction. It reaches 9 cm TL.

*There is uncertainty on the validity of its species status, since its original description by Economidis (1992) and Economidis & Nalbant (1996) was probably based on a population that may be a colour morph variant of C. vardarensis.*

IUCN Red List Status: **CR**  
Greek Red List: **CR**

Habitats Directive: **Y-CTC**  
Ecoregion: **2**

***Cobitis strumicae*** Karaman, 1955 ENDEMIC S BALKANS

Θρακοβελονίτσα, Struma spined loach

A widespread loach, ranging from Strymon to Evros river basins, including Lakes Volvi and Koronia. A common species, inhabiting various wetlands, lakes, springs and rivers with sandy or silty substrate. It reaches 13 cm TL.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **1**

***Cobitis trichonica*** Stephanidis, 1974 ENDEMIC

Τριχωνοβελονίτσα, Trichonis spined loach

A localized endemic species, restricted to lakes Trichonis, Lysimachia, Amvrakia and Ozeros; also in the lower Acheloos River, and associated canals and wetlands. It inhabits slow-flowing waters, with sandy or silty substrate. It reaches 11 cm TL.

IUCN Red List Status: **EN**  
Greek Red List: **LC**

Habitats Directive: **Y**  
Ecoregion: **5**

***Cobitis vardarensis*** Karaman, 1928 ENDEMIC S BALKANS

Μακεδονική βελονίτσα, Vardar spined loach

A widespread loach found in Thessalian Pinios, Mavroneri, Aliakmon, Axios, Loudias and Gallikos river basins (Greece and FYROM). It inhabits still or slow-flowing waters with muddy or silty substrates. It can reach 12 cm TL.

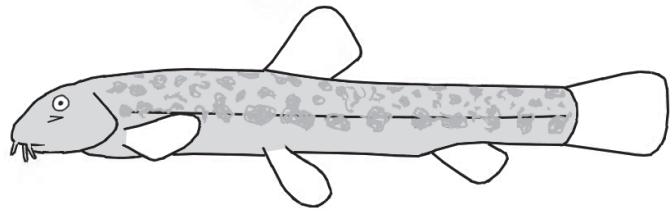
IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **2**

GENUS

***Sabanejewia***

Vladykov, 1929

***Sabanejewia balcanica*** (Karaman, 1922) ENDEMIC S BALKANS

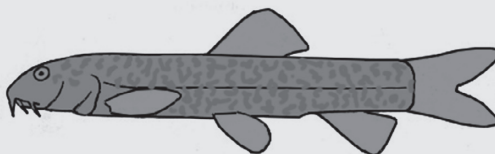
Χρυσοβελονίτσα, Balkan golden loach

In the northern Aegean basins, the species is found from Pinios to Anthemountas basins (including Lake Doirani); a disjunct population is also present in the Evros river drainage. Its populations are fairly localized due to specific habitat requirements, thus they are vulnerable to extirpation (and indeed some have been extirpated in the recent past). It inhabits streams with moderate current and sandy or gravelly substrate. It reaches 11 cm TL.

*In earlier studies, most of the European Sabanejewia taxa were considered as a subspecies of S. aurata. Economidis & Nalbant (1996) identified three subspecies of S. aurata in Greek waters: S. aurata balcanica in rivers of Thessaly and Makedonia (Axios, Gallikos, Anthemountas, Mavronei and Pinios), S. aurata doirani in Lake Doirani (in Axios River catchment) and S. aurata thrakica in Evros River. It is now recognized that S. aurata is an Asian species and does not occur in European waters (Kottelat 1997; 2012). According to Kottelat & Freyhof (2007) one Sabanejewia species is present in Greek waters, S. balcanica. Genetic studies (Perdices et al., 2003; Maresova et al., 2011), however, support a distinction between the Makedonian-Thessaly and the Evros populations and indicate that the former are closely related to the Doiran population, as well to the Morava River population forming a genetically distinct group that is noticeably dissimilar from other Balkan groups.*

IUCN Red List Status: **LC**Habitats Directive: **Y-CTC**Greek Red List: **LC**Ecoregion: **1,2**

## FAMILY NEMACHEILIDAE

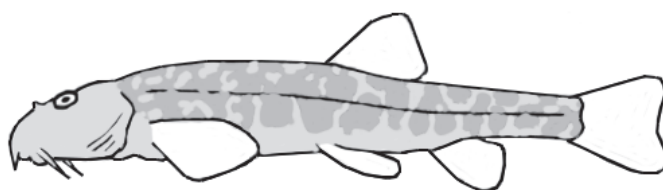


The stone loaches are widely distributed in Asia, Europe and parts of Africa. Their elongated body form and inferior mouth position are highly adapted for benthic living. They have three pairs of mouth barbels and, in contrast to spined loaches (Cobitidae), they lack a spine below the eyes. Four species present in Greece.

GENUS

***Barbatula***

H.F. Linck, 1790

***Barbatula barbatula*** (Linnaeus, 1758) NATIVE

Βίφος, Stone loach

A widespread Eurasian species, occurring in Greece in Axios and Aliakmon rivers; presumably introduced to the Bulgarian sections of Nestos and Evros rivers. It inhabits streams and medium-sized rivers, with fast current and stony to gravelly substrates. It reaches 16 cm TL.

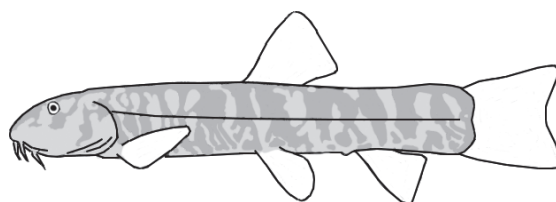
Recent molecular studies suggest that, at least the Axios population differs from *B. barbatula* (formerly described as a subspecies) and should be named *B. vardarensis* (Šedivá et al., 2008a; Janshidi et al., 2013; Geiger et al., 2014). This taxon is awaiting a formal description to be considered valid.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **2**

GENUS

***Oxynoemacheilus***

Bănărescu &amp; Nalbant, 1966

***Oxynoemacheilus bureschi*** (Drensky, 1928) ENDEMIC BALKANS

Πετροχείλι, Struma stone loach

A common central Balkan species (Greece, Bulgaria and FYROM); in Greece, found from Axios to Nestos river drainages, also in Lake Vistonis basin and the endoreic Nevrokopi streams. A small

benthic species that inhabits fast-flowing waters (usually found in the riffle sections of a river) with stony to gravelly substrates. It reaches 11 cm TL.

The species was first recorded in the Axios/Vardar system in 1999, and it has been speculated that it may have been a human-mediated introduction (Šedivá et al., 2008b; 2010). Further research is required to solve the phylogeography of genetically similar populations of the upper Strymon and Axios rivers. According to Šedivá et al. (2010), the populations in the Aggítis River are distinguished from the other *Oxynoemacheilus* populations and represent an isolated lineage, a view not supported by Geiger et al. (2014).

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IUCN Red List Status: **LC**  
 Greek Red List: **LC**

Habitats Directive: **N**  
 Ecoregion: **1,2**

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***Oxynoemacheilus pindus*** (Economidis, 2005) ENDEMIC S BALKANS

Πινδοβίος, Pindus stone loach

A species originally described from upper Aoos River, but also discovered in several rivers of southern Albania (Šanda et al., 2008). It inhabits fast-flowing streams with stony to gravelly substrates. It can reach 7.5 cm TL.

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IUCN Red List Status: **VU**  
 Greek Red List: **VU**

Habitats Directive: **N**  
 Ecoregion: **3**

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***Oxynoemacheilus theophilii*** Stoumboudi, Kottelat & Barbieri, 2006 ENDEMIC ASIA MINOR

Λεσβοβίος, Lesbos stone loach

A West Anatolian species, found in Greece only in Lesvos Island (where it is confined to the upper part of Evergetoulas stream). It inhabits fast-flowing, clear and cool waters with stony substrates. It reaches 7 cm TL.

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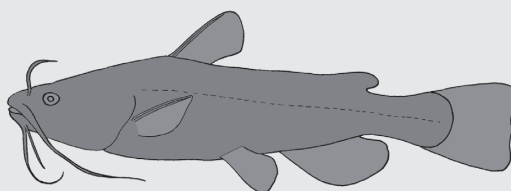
IUCN Red List Status: **LC**  
 Greek Red List: **CR**

Habitats Directive: **N**  
 Ecoregion: **7**

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## ORDER SILURIFORMES

## FAMILY ICTALURIDAE

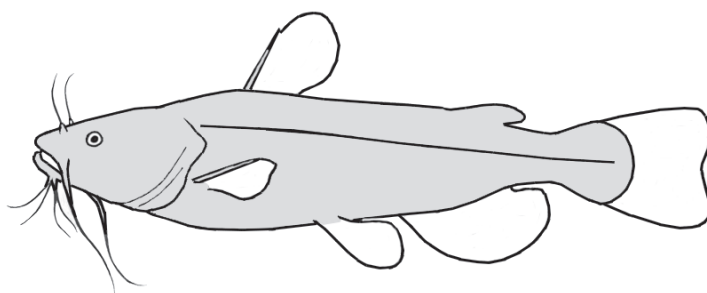


Family of catfish native to North and Central America. They can easily be distinguished from the European catfish by the presence of an adipose fin. Mouth with four pairs of barbels and skin without scales. Dorsal and pectoral fins with a sharp spine. One alien species in Greece.

## GENUS

*Ameiurus*

Rafinesque 1820

*Ameiurus cf. nebulosus* (Lesueur, 1819) ALIEN

Καφέ γατόψαρο, Brown bullhead

Non-indigenous species from North America. In Greece, a recently established population was located in 2012 in Lake Kerkini; probably introduced from Bulgaria through the transboundary waters of the Strymon River (Naziridis, Th. 2014, pers. comm.). The species has been repeatedly caught by fishers in this lake. This invasive alien, now widespread in Europe, thrives in a variety of habitats, including lakes and ponds with low oxygen and/or muddy conditions. It reaches 55 cm TL.

*The identification of the Kerkini specimens as A. nebulosus, based only on high-quality photographs, is tentative and requires confirmation. Ameiurus nebulosus has been identified in Bulgaria (Uzunova & Zlatanova, 2007); however, identification errors between A. nebulosus and the closely related A. melas are possible and indeed have happened in the past (Rutkayova et al., 2013). Molecular methods are thus required to confirm identification of the fishes in Greece, since Ameiurus species have been cultivated in Europe for many decades and hybrids are also possible but have never been recorded. Other exotic catfish escapees have also been allegedly sighted in Greece though none are published here until further effort is made to confirm identifications and establishment in the wild.*

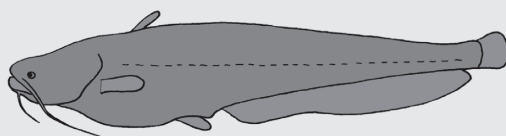
IUCN Red List Status: **[LC]**

Greek Red List: -

Habitats Directive: **[N]**

Ecoregion: -

FAMILY **SILURIDAE**

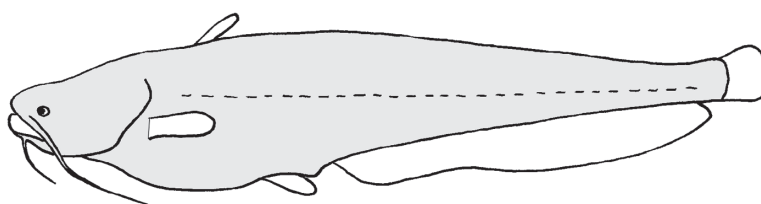


A catfish family found exclusively in Europe and Asia. They lack the adipose fin and the dorsal spine of Ictaluridae. They possess small pelvic fins but a very long anal fin. Mouth with two or three pairs of barbels. Two species in Greece.

GENUS

***Silurus***

Linnaeus, 1758



***Silurus aristotelis*** Garman, 1890 ENDEMIC

Γλανίδι, Aristotle's catfish

A species endemic to the lower Acheloos River (mainly in the lakes of the drainage). Also translocated to Lakes Pamvotis and Volvi, and recently to Lake Yliki (Beotian Kifissos). It inhabits slow-flowing rivers, streams, canals, and well-vegetated, nutrient-rich lakes with muddy substrate. It reaches 46 cm TL.

*This is one of the most distinctive Greek endemics. Economou et al. (1994) have postulated that the ontogenetic development of S. aristotelis indicates closer phylogenetic affinities to the Asiatic Silurus species (formerly known as Parasilurus).*

IUCN Red List Status: **DD**

Habitats Directive: **Y**

Greek Red List: **LC**

Ecoregion: **5**

***Silurus glanis*** Linnaeus, 1758 NATIVE

Γουλιανός, Wels catfish

Widespread in Europe and Asia. In Greece, present from Pinios to Evros river drainages. Introduced to Lake Pamvotis and to Alfios River (Peloponnese) (Economidis *et al.*, 2000). A population also reported in Sperchios River, but no recent documentation exists. It inhabits slow-flowing rivers, large deep streams, canals, well-vegetated lakes (such as Lake Volvi) and deep reservoirs (such as Polyphytos in the Aliakmon basin). One of the largest and heaviest freshwater fishes of Greece, it reaches 500 cm TL.

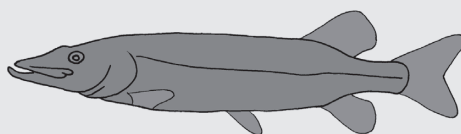
IUCN Red List Status: **LC**

Habitats Directive: **N**

Greek Red List: **LC**

Ecoregion: **1,2,(4)**



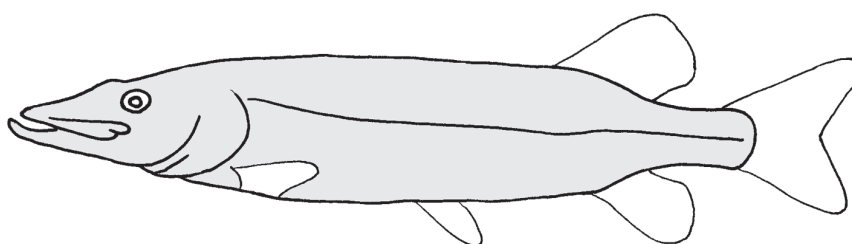
ORDER **ESOCIFORMES**FAMILY **ESOCIDAE**

A family of predatory fishes restricted to the Northern Hemisphere. Pikes have a streamlined body, a sharply pointed head, duck-like snout and sharp teeth. Dorsal and anal fins are positioned far back on the body. One species in Greece.

GENUS

***Esox***

Linnaeus, 1758

***Esox lucius*** Linnaeus, 1758 NATIVE

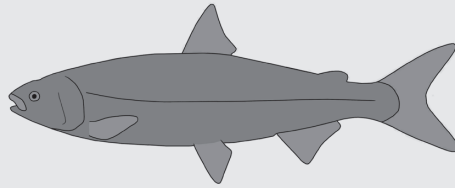
Τούρνα, Northern pike

A predatory freshwater fish with a Holarctic distribution. Found in lakes and large rivers of Northern Greece. Formerly present as far south as Thessalian Pinios River (not collected there even after many recent surveys) and in channels of the drained Lake Xinias, near Domokos (possibly extirpated). Populations have been translocated to several lakes; in some, such as Prespa Lakes, they did not become established. It typically inhabits richly vegetated lowland waters. It reaches 150 cm TL.

IUCN Red List Status: **LC**Greek Red List: **LC**Habitats Directive: **N**Ecoregion: **1,2**

ORDER **SALMONIFORMES**

FAMILY **COREGONIDAE**

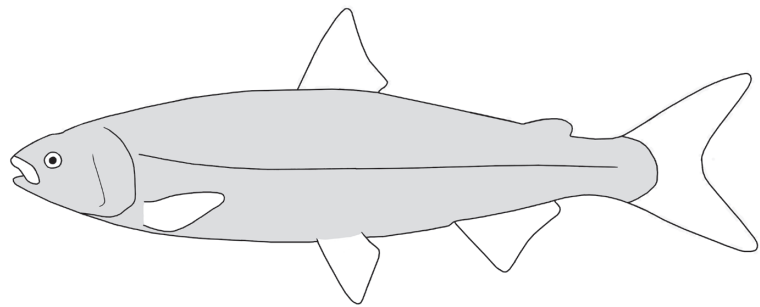


A family of medium-sized species characterized by slender, oval body laterally compressed, covered with numerous cycloid scales. Teeth small, rudimentary or absent. Most species are pelagic and form schools. At least one alien species recorded in Greece.

GENUS

***Coregonus***

Linnaeus, 1758



***Coregonus* sp.** ALIEN

Κορήγιωπος, Whitefish

Whitefish are lacustrine, highly polymorphic, facultative anadrome, and preferentially zooplanktivorous salmoniforms with a wide distribution in Europe. It has been introduced to many lakes outside its native range for its commercial and recreational values. In Greece, whitefish populations have been established in Lake Vegoritis and the Tavropos Reservoir and were tentatively assigned to *C. lavaretus* (Economidis *et al.*, 2000; Economou *et al.*, 2001; Perdicaris *et al.*, 2010). Their exact provenance however requires further substantiation. It inhabits cool water lakes and big rivers. It reaches 73 cm TL.

Besides *C. lavaretus*, other *Coregonus* species, such as *C. albula* and *C. peled* may have been introduced to various transboundary waters (e.g. Nestos reservoirs in Bulgaria, Economou *et al.*, 2007a). Economidis (2009) includes these species to the list of the introduced fishes of Greece, however concrete evidence for their identification and occurrence in the wild in Greece is lacking.

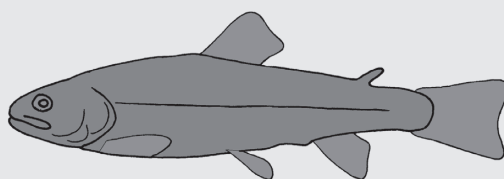
IUCN Red List Status: **[VU]**

Greek Red List: -

Habitats Directive: **[N]**

Ecoregion: -

## FAMILY SALMONIDAE

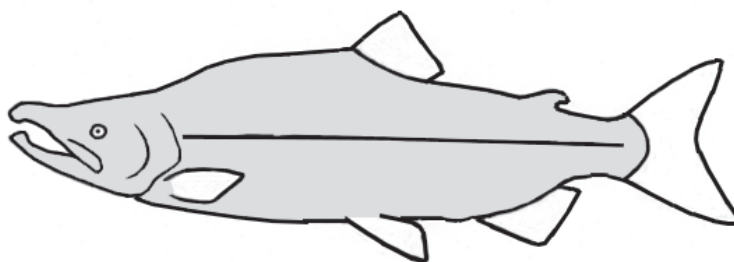


Native to the Northern Hemisphere, but widely introduced by humans to cold waters around the world for sport fishing and aquaculture. Salmonids are medium- to large-sized with a spotted body, an adipose fin and with a single row of sharp teeth in their mouths. They are predators, feeding on small crustaceans, aquatic insects and smaller fish. Many species are anadromous, entering freshwaters for spawning; however there are no anadromous species in the Mediterranean. Their phylogeny and taxonomy, especially for the taxa under the genus *Salmo*, remains controversial. Molecular studies have indicated a complexly structured genetic diversity, with many *Salmo* trout populations of the Balkans exhibiting a mixture of widely distributed haplotypes (Bernatchez, 2001; Apostolidis *et al.*, 2008a,b; 2011; Kohout *et al.*, 2013; Geiger *et al.*, 2014; Pustovrh *et al.*, 2014). One hypothesis maintains that anadromy is deeply rooted in the phylogeny of trout and implies that substantial mixing of Mediterranean trout populations took place during cool periods of the Pleistocene, when some trout populations were anadromous and migrated to other basins via the sea; this has created unique re-distribution phenomena among genetically different populations within the Mediterranean basin (Gibertoni *et al.*, 2010). Nearly 30 European *Salmo* species have been recognised by Kottelat & Freyhof (2007), of which five are native within Greek territory. Five more salmonid species have been reported as introduced in Greece. Introduction of alien salmonids and frequent stocking of natural systems with non-indigenous strains are recognized as a major threat to the genetic integrity of native trout populations, and have been implicated in the decline of other native fishes as well (Laikre *et al.*, 1999; Apostolidis *et al.*, 2008b; Korsu *et al.*, 2010).

GENUS

***Oncorhynchus***

Suckley, 1861

***Oncorhynchus kisutch*** (Walbaum, 1792) ALIEN

Σολομός κόχο, Coho salmon

Non-indigenous species from the Northern Pacific; although not established in Greece, escapees or released individuals have been reported in the upper Ladonas River (Alfios), Tavropos Reservoir (Acheloos), Lake Vegoritis and Gorgopotamos River (Sperchios). In some cases, such as at Tavropos Reservoir, repeated stocking was frequent (Economou *et al.*, 2001). They were possibly introduced

there for commercial purposes, usually escaped or released from local fish farms. It reaches 108 cm TL.

IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **[N]**  
Ecoregion: -

***Oncorhynchus mykiss*** (Walbaum, 1792) ALIEN

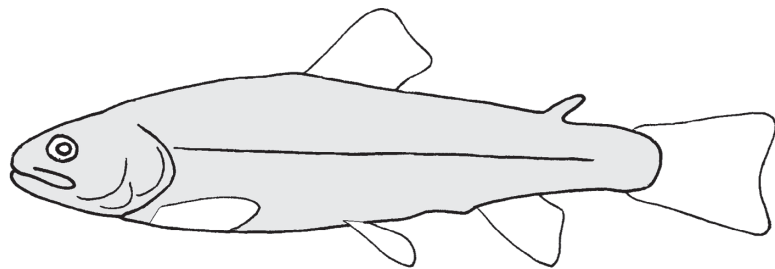
Ιριδίζουσα πέστροφα, Rainbow trout

Non-indigenous species with anadromous and landlocked forms, native to the Northern Pacific basins of North America and Asia. Widely introduced and stocked in Greek streams and lakes (Prespa Lakes, Aliakmon, Louros, Nestos, etc.) for commercial purposes and angling; it is widely reared in fish farms from where it frequently escapes. There are some indications of localized reproduction in the wild but this is probably very rare (Barbieri *et al.*, 2013; HCMR data). It inhabits cool water lakes and rivers; sometimes wondering down to lowland rivers especially near cool-water thermal refugia. It does not enter the sea in Greece. It reaches 120 cm TL.

IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **[N]**  
Ecoregion: -

GENUS  
***Salmo***  
Linnaeus, 1758



***Salmo farioides*** Karaman, 1938 ENDEMIC S BALKANS

Ιονική πέστροφα, West Balkan trout

Western Balkan endemic species, found in Greece in rivers Aooos, Kalamas, Arachthos, Acheloos, Evinos, Mornos and Alfios. Some isolated populations have dramatically declined, such as in tributaries of river Alfios, and should be considered “critically endangered.” The Vistritsa and Gorgopotamos populations (Sperchios basin) remain unidentified, but may belong to this species (potentially a product of introduction), since there are no historical references to its presence in this basin. The species has also been repeatedly stocked in parts of Nestos and Aliakmon rivers. Native populations are threatened by illegal overfishing and barriers to migration, such as dams, while genetic introgression through irresponsible stocking is also a major threat to this species. It inhabits clear, cold waters, often with rapids and small waterfalls in mountain streams. It reaches 50 cm TL.

Formerly, another trout species *S. dentex* was allegedly reported in the Aooos River. The species status and taxonomic distinctiveness of *S. dentex* has recently been disputed (Snoj *et al.*, 2010) and the species has therefore been deleted from the Greek fish list (see Koutsikos *et al.*, 2012).

IUCN Red List Status: -  
Greek Red List: **VU**

Habitats Directive: **Y-CTC**  
Ecoregion: **5**

***Salmo letnica*** (Karaman, 1924) ALIEN

## Πέστροφα Οχρίδας, Ohrid trout

Introduced from Lake Ohrid to the transboundary Prespa Lakes (Crivelli *et al.*, 1997) in the 1950s, where it can potentially hybridise with the local endemic trout *Salmo peristericus*. The degree of establishment of this introduced taxon and its current status within Greek territory is unknown. However, a single individual was caught again in 2011 in Megali Prespa (Koutseri, 2012). It can reach 76 cm TL.

IUCN Red List Status: **[DD]**Habitats Directive: **[N]**

Greek Red List: -

Ecoregion: -

***Salmo lourosensis*** Delling, 2011 ENDEMIC

## Πέστροφα Λούρου, Louros trout

A recently described and poorly studied species, restricted to the upper Louros River (Delling, 2010). Its status should be considered “critically endangered” due to its numerical rarity and extremely restricted distribution. Disease, pollution, genetic introgression with translocated native trout and competition with escaped *Oncorhynchus mykiss* may represent serious threats to this species. It reaches 32 cm TL.

IUCN Red List Status: -

Habitats Directive: **Y-CTC**Greek Red List: **EN**Ecoregion: **5*****Salmo macedonicus*** (Karaman, 1924) ENDEMIC S BALKANS

## Πέστροφα Μακεδονίας, Macedonian trout

Found in Greece only in Nestos, and localized areas of the Strymon River. Present in the Bulgarian section of the Evros/Maritsa River. Reported as “rare” in the Ardas tributary of Evros River by Economidis (1991), but not recorded in the Greek territory of this basin in recent years. Some populations have declined or vanished, due to overfishing or hydrological changes (e.g. the demise of the Angistro stream population in the Strymon). Locally, populations in Nestos have hybridized to some extent with translocated *Salmo fariodes* (Apostolidis *et al.*, 1997; 2011). It is a typical cold-water species with specialized requirements as all native trout. It reaches 40 cm TL.

*The potential presence of this species in the upper Axios is not clear. Kottelat & Freyhof (2007) state that in Axios River, two trout species are present, i.e. S. pelagonicus and S. macedonicus (the latter not recorded in Greek territory). Lo Brutto et al. (2010) contend that the Axios S. macedonicus and S. pelagonicus populations actually represent one species (but with different genetic haplotypes). The reason for these genetic mix-ups is probably a natural result of former inter-basin migrations of anadromous trout during the glacial periods, when adult Mediterranean trout probably migrated to sea (Gibertoni et al., 2010). Today no Greek population of trout enters the much warmer inter-glacial Mediterranean Sea and the isolated resident populations are threatened by anthropogenic introductions that produce genetic pollution.*

IUCN Red List Status: **DD**Habitats Directive: **Y-CTC**Greek Red List: **DD**Ecoregion: **1,2**

***Salmo pelagonicus*** Karaman, 1938 ENDEMIC S BALKANS

## Πέστροφα Πελαγονίας, Pelagonian trout+

Endemic to the Aliakmon and Axios river basins. Populations restricted to various cold-water streams are relatively isolated from each other; possibly genetically differentiated. Habitat requirements are similar to those of its close relative *S. macedonicus*. Native populations are seriously threatened by water development projects and genetic pollution by unregulated *Salmo* sp. introductions. It reaches 35 cm TL.

Hybridisation with translocated *S. farioides* has been reported by Apostolidis (2008a,b). Apostolidis (1892) mentions the presence of native trout (so-called *Salmo fario*) in the springs of the Pinios River in Thessaly. It is possible that this unclassified population has gone extinct, since repeated surveys in many upland areas of the basin have failed to collect any native trout.

IUCN Red List Status: **VU**Habitats Directive: **Y-CTC**Greek Red List: **VU**Ecoregion: **2*****Salmo peristericus*** Karaman, 1938 NEAR ENDEMIC

## Πέστροφα των Πρεσπών, Prespa trout

Endemic to Lake Megali Prespa; in Greek territory, spawning in Agios Germanos stream. It is also present in three rivers of FYROM also flowing into the lake. This salmonid is especially threatened by anthropogenic changes to its stream habitats (Crivelli *et al.*, 2009). It can reach 47 cm TL.

IUCN Red List Status: **EN**Habitats Directive: **Y-CTC**Greek Red List: **EN**Ecoregion: **3*****Salmo trutta*** Linnaeus, 1758 ALIEN

## Καφετιά πέστροφα+, Brown trout

Non-indigenous species from the Atlantic, North, White and Baltic Sea drainages. Not established in Greece; this record is based on only two specimens collected in the Upper Ladonas River (Alfios basin) in 2003 where a fish farm regularly kept and allegedly released fishes from riverside pens (Economou *et al.*, 2007a). Allegations of introduction have also been documented (Perdicaris *et al.*, 2010) but there is no case of any evidence of establishment. Although this species is uncommon in Greek trout farms, it is a potential biohazard since it may hybridize with local trout, or may be a disease vector. It reaches 150 cm TL.

IUCN Red List Status: **[LC]**Habitats Directive: **[N]**

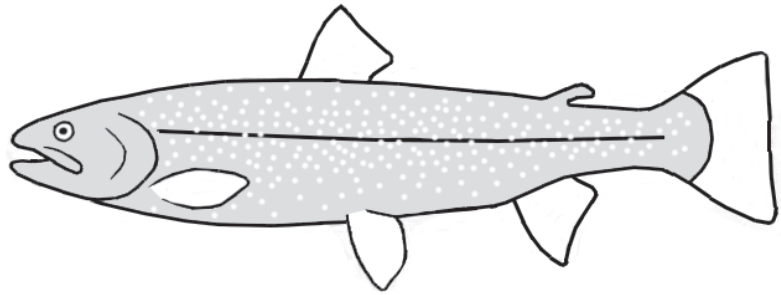
Greek Red List: -

Ecoregion: -

GENUS

***Salvelinus***

Richardson, 1836

***Salvelinus fontinalis*** (Mitchill, 1814) ALIEN

Σαλβελίνος, Brook charr

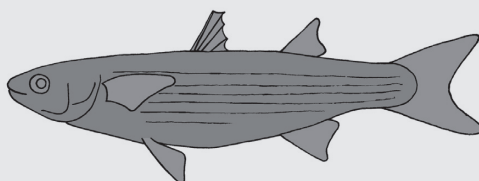
Non-indigenous species from North America, widely stocked in northern and central Europe. In Greece, it was introduced to Lake Vegoritis and to the Tavropos Reservoir (Economidis *et al.*, 2000; Economou *et al.*, 2001), however despite repeated stocking events at least in the latter reservoir, establishment is doubtful and its current status is unknown. Established populations have however been reported in Corsica, Italy, the Czech Republic and southern Germany (Kottelat & Freyhof, 2007). It inhabits cool, well-oxygenated streams and cool water lakes. It reaches 86 cm TL.

IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **N**  
Ecoregion: -

ORDER **MUGILIFORMES**

FAMILY **MUGILIDAE**

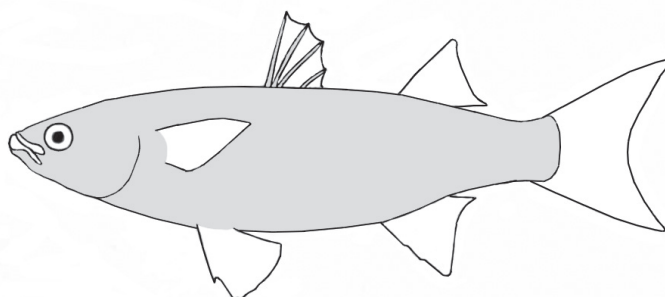


This family includes euryhaline species, present in marine coastal areas, lagoons and lowland inland freshwaters, often at considerable distances from the estuaries. These are pelagic fish, living in schools, often near the surface. The eyes are often partly covered by an adipose “eyefold” tissue. They have two short dorsal fins, well separated, the first with four slender spines and the second usually with nine or ten soft rays. Seven species (one alien) in Greek freshwaters.

GENUS

***Chelon***

Artedi, 1793



***Chelon aurata*** (Risso, 1810) NATIVE Marine Euryhaline

Μυξινάρι, Golden grey mullet

A marine species (Mediterranean, Black and Eastern Atlantic Sea), entering estuaries and lagoons, frequently also freshwaters. It reaches 60 cm TL.

We follow Durand et al. (2012) and Polyakova et al. (2013) who suggested the inclusion of this species - formerly assigned to genus *Liza*- to genus *Chelon*, endorsed also by Geiger et al. (2014).

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2,4,5,6,7**

***Chelon haematocheilus*** (Temminck & Schlegel, 1845) ALIEN Marine Euryhaline

Σαζανοκέφαλος, Redlips mullet

A non-indigenous species native to the East Asia Pacific coast. It was introduced to the Sea of Azov in the late 1960s for aquaculture and reached the Northern Aegean Sea in the mid 1990s. Established populations in the Thracian Sea that frequently enter lagoons and lower river reaches. It can reach 80 cm TL.

We follow Durand et al. (2012) and Polyakova et al. (2013) who suggested the inclusion of this species - formerly assigned to genus *Liza*- to genus *Chelon*, endorsed also by Geiger et al. (2014).

IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **N**  
Ecoregion: -



***Chelon labrosus*** (Risso, 1827) NATIVE Marine Euryhaline

Χειλονάρι, Thicklip grey mullet

A marine species (Mediterranean, Black and Eastern Atlantic Sea), entering lagoons and occasionally freshwaters. It reaches 85 cm SL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2,4,5,6,7*****Chelon ramada*** (Risso, 1827) NATIVE Marine Euryhaline

Μαυράκι, Thinlipped grey mullet

A widespread euryhaline species (Mediterranean, Black, Azov and Eastern Atlantic Sea), frequently entering estuaries, lagoons and rivers. This is one of the most frequent mugilid migrants into freshwaters, often entering lowland rivers and traveling at least up to 50 km from the river mouth. It reaches 70 cm TL.

We follow Durand et al. (2012) and Polyakova et al. (2013) who suggested the inclusion of this species - formerly assigned to genus *Liza* - to genus *Chelon*, endorsed also by Geiger et al. (2014).

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2,4,5,6,7*****Chelon saliens*** (Risso, 1810) NATIVE Marine Euryhaline

Γάστρος, Sharpnose grey mullet+

A marine species (Mediterranean, Black and Eastern Atlantic Sea), entering estuaries, lagoons and occasionally the lower reaches of rivers and streams. It can reach 53 cm TL.

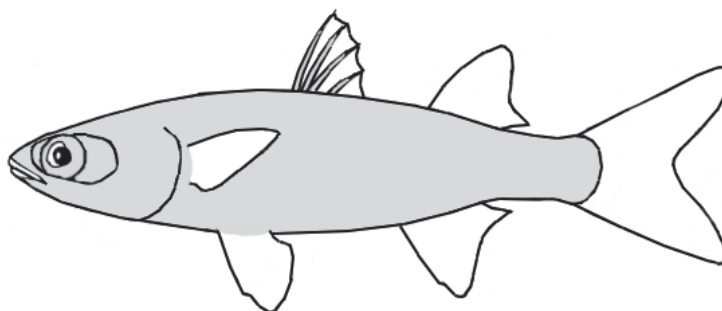
We follow Durand et al. (2012) and Polyakova et al. (2013) who suggested the inclusion of this species - formerly assigned to genus *Liza* - to genus *Chelon*, endorsed also by Geiger et al. (2014).

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2,4,5,6,7**

GENUS

***Mugil***

Linnaeus, 1758

***Mugil cephalus*** Linnaeus, 1758 NATIVE Marine Euryhaline

Κέφαλος, Striped grey mullet+

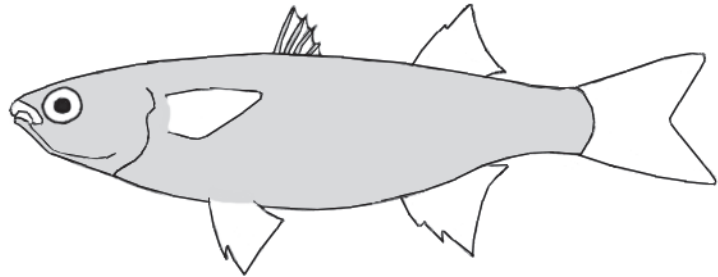
A cosmopolitan marine species present in coastal waters of tropical and temperate seas. Widespread in Greek transitional waters, including most river mouths and lagoons. It frequently enters the

lower stretches of rivers and streams. Although, like all native grey mullets, it does not reproduce in freshwaters, large adult fish may be found in rivers and lakes sometimes tens of kilometers from the sea. It reaches 105 cm TL.

IUCN Red List Status: **LC**  
 Greek Red List: **LC**

Habitats Directive: **N**  
 Ecoregion: **1,2,4,5,6,7**

GENUS  
***Oedalechilus***  
 Fowler, 1903



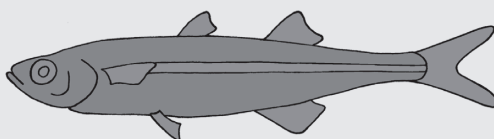
***Oedalechilus labeo*** (Cuvier, 1829) NATIVE Marine Euryhaline

Γρέντζος, Boxlip grey mullet+

A marine species (Mediterranean and Eastern Atlantic Sea, but not present in the Black Sea); also found inshore near river mouths, but rarely entering inland brackish or fresh waters. In Samothraki Island, it was recently collected in freshwater at river mouth sections of two streams (HCMR data). It reaches 25 cm TL.

IUCN Red List Status: -  
 Greek Red List: -

Habitats Directive: **N**  
 Ecoregion: **1**

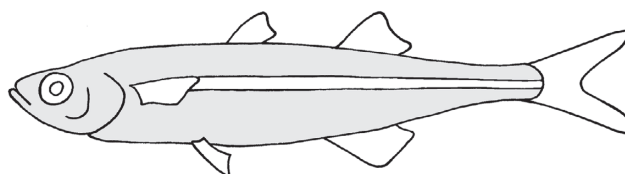
ORDER **ATHERINIFORMES**FAMILY **ATHERINIDAE**

Silversides or sandmelts are a worldwide euryhaline family inhabiting both marine and brackish waters in tropical and temperate regions. Some populations have been reported from freshwater environments. They are relatively small, their body is silvery and elongated, with a longitudinal stripe on the side, often highlighted by a dark line and two widely separated dorsal fins. One species (*Atherina boyeri*) has established entirely freshwater populations and is widespread in transitional waters and lower parts of some river deltas in Greece. In transitional waters, the related species *Atherina hepsetus* may also occur (e.g. Koutrakis *et al.*, 2000) but its status in freshwaters is poorly recorded.

## GENUS

***Atherina***

Linnaeus, 1758



***Atherina boyeri*** Risso, 1810 NATIVE Marine Euryhaline

Αθερίνα, Big-scaled sand smelt+

Widespread marine species of the Mediterranean, Black and Caspian Sea basins and the Eastern Atlantic. Frequently present in large numbers in lower reaches of rivers, coastal floodplain wetlands and lagoons. Important landlocked populations exist in Lake Trichonis, the Almyros spring-fed lake (Herakleion, Crete), and Lake Kourna (Rethymnon, Crete). It reaches 15 cm TL.

Recent genetic studies indicate high genetic discontinuity between Greek and other Mediterranean *A. boyeri* populations (Pujolar *et al.*, 2012). Substantial genetic divergence of Greek populations inhabiting freshwaters and lagoons from those living in the sea has been documented (Klossa-Kilia *et al.*, 2007; Kraitsek *et al.*, 2008). The Trichonis Lake population is genetically distinct from other Mediterranean populations; Geiger *et al.* (2014) consider this population as a potential candidate species and refer to it as *Atherina* sp.

IUCN Red List Status: **LC**

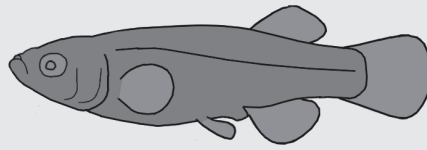
Greek Red List: **LC**

Habitats Directive: **N**

Ecoregion: **1,2,4,5,6**

## ORDER CYPRINODONTIFORMES

## FAMILY VALENCIIDAE

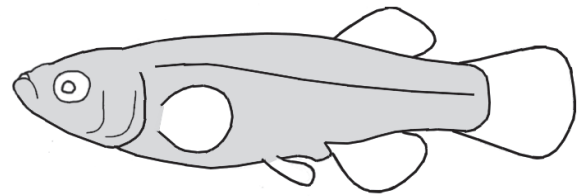


Valencias are related to killifish and toothcarps with only three species members confined within a restricted global distribution: southeastern Spain and the southwestern Balkans. Similar to the toothcarps, they are small-bodied fish with a flattened head and a small mouth directed upwards. Caudal fin margins are straight or rounded. Their dorsal and anal fins are aligned along a dorso-ventral axis. Two species in Greece.

GENUS

***Valencia***

Myers, 1928

***Valencia letourneuxi*** (Sauvage, 1880) NEAR ENDEMIC

Ιονικός ζουρνάς+, Corfu valencia

Endemic to the west coast of Greece and the adjacent Lake Butrint basin in southern Albania. The species has a fragmented and highly localized distribution, with some historically known populations being extirpated. Extant but vulnerable populations in microhabitats of Kalamas, Acheron, Louros and Arachthos river basins, as well as in the Vlychos springs. Recently rediscovered in Corfu Island (Melissoudi stream), but extirpated from Lefkas Island. The status of the populations in the following river basins probably refers to the newly described *Valencia robertae*: Astakos, Agios Dimitrios, Acheloos and Evinos. It inhabits spring-fed lowland wetlands and rivers, with slow running and clear water and rich aquatic vegetation; rarely found in the brackish edges of well-vegetated coastal lagoons. It is threatened by habitat degradation and competition with the introduced *Gambusia holbrooki* (Kalogianni *et al.*, 2012, 2014). It spawns in late spring, with a second peak possibly in autumn. It reaches 7 cm TL.

Besides the recently described *V. robertae* (see below), two more distinct groups of populations ascribed to *V. letourneuxi* are recognized in Vogiatzi *et al.* (2014) based on mitochondrial and microsatellite analysis. One distinct northern group comprising the Corfu and Acheron populations and a second one the populations within the Amvrakikos Gulf (Louros River, Arachthos River and Vlychos springs). As suggested by Vogiatzi *et al.* (2014), these two groups should be considered as distinct conservation units.

IUCN Red List Status: **CR**Greek Red List: **CR**Habitats Directive: **Y**Ecoregion: **5**

***Valencia robertae*** Freyhof, Kärst & Geiger 2014 ENDEMIC

Πελοποννησιακός ζουρνάς+, Peloponnese valencia+

A recently described species, endemic to Pinios and Alfios rivers (Peloponnese) and Mornos basin (central western Greece); probably also ranging into the Acheloos-Evinos basins. The population of the Peloponnese is on the brink of extinction; the Alfios subpopulation is probably recently extirpated primarily due to anthropogenic hydrological and habitat degradation. We suggest this new species should be categorized as Critically Endangered (CR) in both international and national conservation assessments. Similarly to its sister species *V. letourneuxi*, it inhabits spring-fed wetlands, lowland rivers with slow running and clear water with dense aquatic vegetation. It reaches 7 cm TL.

According to a recent genetic study (Vogiatzi et al., 2014), the *V. letourneuxi* Evinos population (at Kryoneri wetland) is very closely related to the *V. robertae* Mornos and Pinios populations and thus the Evinos population (and probably the Acheloos, Astakos and Agios Dimitrios ones, as well) should be assigned to *V. robertae*.

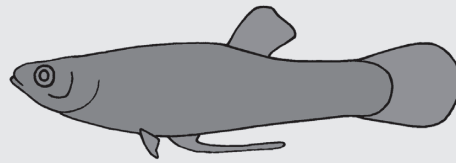
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IUCN Red List Status: -  
Greek Red List: -

Habitats Directive: **Y-CTC**  
Ecoregion: **5**

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FAMILY POECILIIDAE

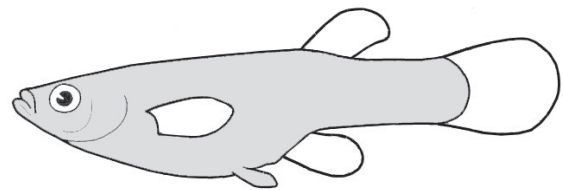


This family is widespread in fresh and brackish waters of America and Africa. The American species are viviparous, but the African ones are oviparous. A unique male reproductive organ, the gonopodium, may be present or not. Many species are reared as ornamental fish. Two alien species in Greece.

GENUS

***Gambusia***

Poey, 1854



***Gambusia holbrooki*** Girard, 1859 ALIEN

Κουνουπόψαρο, Eastern mosquitofish

Non-indigenous species from North America, introduced worldwide as a biological agent for mosquito control. It is the most widespread alien species in Greece's inland waters. It inhabits standing to slow-flowing waters, mostly in lowland areas but has been found in low densities in upland areas as well (e.g. Aliakmon River near Grevena, HCMR data). Found in a variety of lotic and lentic habitats, it may survive in polluted waters and sometimes in partially brackish conditions (e.g. Lake Koumoundourou). One of the most invasive alien vertebrates, directly affecting and displacing native fishes, often through trophic competition, agonistic interactions and predation. It reaches 8 cm TL.

Former documentation of the closely related *Gambusia affinis* in Greece refers to *G. holbrooki*. The two species differ in minute morphological differences and there is no confirmed presence of true *G. affinis* in Europe (Kottelat & Freyhof, 2007).

IUCN Red List Status: **[LC]**

Greek Red List: -

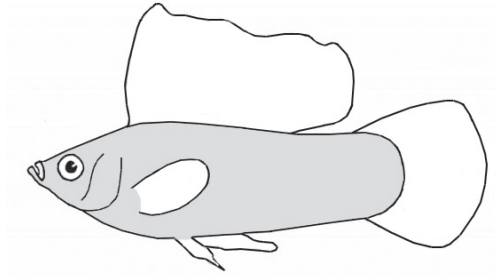
Habitats Directive: **[N]**

Ecoregion: -

GENUS

***Poecilia***

Bloch &amp; Schneider, 1801

***Poecilia latipinna*** (Lesueur, 1821) ALIEN

Μόλυ, Sailfin molly

Non-indigenous species from North America, introduced to several countries through the ornamental fish trade. A female-dominated feral molly population inhabits the brackish, geothermally heated Lake Vouliagmeni near Athens. This population contains three colour morphs at different proportions (silver-greenish, black and black spotted) and was positively identified as the sailfin molly based on meristic characters (HCMR data). It can reach 15 cm TL (6.3 cm in Lake Vouliagmeni).

*The natural form of P. latipinna is silvery grey, however, black and black-spotted phenotypes do occur occasionally in native populations (Angus, 1983). Selective breeding has also produced different colour patterns and shape variations, while various hybrids have been produced by genetic crossings involving Poecilia species (Ptacek, 2002; Loveless et al., 2010). We presume that the Lake Vouliagmeni sailfin molly population originated from a domestically bred black form of P. latipinna, which was produced through selective breeding and, once introduced into the wild, a proportion of the population reverted back to the wild-type (silver-greenish) phenotype.*

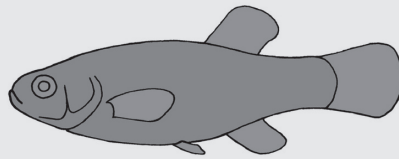
IUCN Red List Status: **[LC]**

Greek Red List: -

Habitats Directive: **[N]**

Ecoregion: -

FAMILY CYPRINODONTIDAE

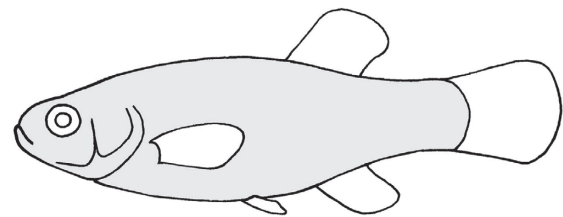


Toothcarps are widespread throughout the temperate and tropical regions of the world, with the exception of Australia. The majority of the species live in fresh or brackish waters and only a few are present in coastal marine environments. The family includes mostly very small fishes that have a flattened head, with a small mouth directed upwards. Two species in Greece.

GENUS

*Aphanius*

Nardo, 1827



*Aphanius almiriensis* Kottelat, Barbieri & Stoumboudi, 2007 ENDEMIC

Ζαχαριάς Αλμυρής, Almiri toothcarp

Endemic to northeastern Peloponnese, at a spring-fed wetland near Kato Almiri village (type locality) and at Moustos Lagoon (eastern Peloponnese). The species is presumed extinct in its type locality, possibly due to anthropogenic changes in the spring's hydrological regime. Despite repeated survey attempts, the last specimens were caught at Kato Almiri in 2003. It inhabits slightly brackish waters often in spring-fed pools, canals and coastal lagoons. It reaches 5 cm TL.

Genetic investigations have recently shown that most of the *Aphanius* populations of the Aegean Sea basin, currently attributed to *A. fasciatus*, belong to this species or species complex (Triantafyllidis et al., 2007). One of these populations (Kos Island), has been also found to differ morphologically from *A. fasciatus* (Barbieri et al., 2005), a result that indirectly supports the above genetic data. However, few populations have been investigated, thus until the taxonomy is settled, the only positively identified remaining population of this species is that of Moustos Lagoon.

IUCN Red List Status: **CR**

Greek Red List: **CR**

Habitats Directive: **Y-CTC**

Ecoregion: **4**

*Aphanius fasciatus* (Valenciennes, 1821) NATIVE

Ζαχαριάς, Mediterranean toothcarp

A euryhaline species usually found in brackish to hypersaline waters in large coastal wetlands of nearly all peri-Mediterranean countries, with the exception of the Iberian Peninsula. Widespread in Greece, especially along its western coast; most populations in the Aegean Sea basin are also assigned to this species (e.g. Lake Vistonis, Argolid lagoons and Koumoundourou Lake, Attika). Despite its tolerance to salinity it is a poor disperser and some isolated populations are threatened with local extirpation.



It inhabits still to slow-flowing waters, especially coastal lagoons; sometimes found in river mouths where it occasionally lives in freshwaters. It can reach 7.2 cm TL.

*The taxonomic status of populations in the Aegean Sea basin remains unconfirmed since they may belong to the A. almiriensis species complex (Triantafyllidis et al., 2007).*

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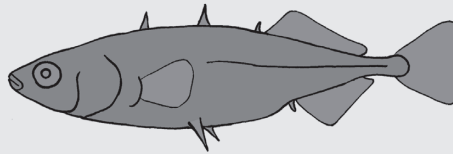
IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **Y**  
Ecoregion: **1,2,4,5,7**

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ORDER **GASTEROSTEIFORMES**

FAMILY **GASTEROSTEIDAE**

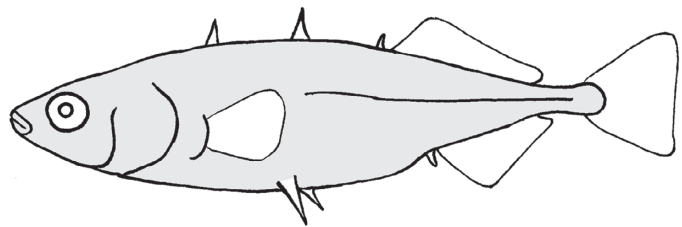


The stickleback family occurs only in the Northern Hemisphere. Body fusiform, laterally compressed, scaleless, in some species covered with bony plates along the sides. Three or more robust spines anterior to the dorsal fin. Some species have populations migrating between fresh and marine waters. Three species in Greece.

GENUS

***Gasterosteus***

Linnaeus, 1758



***Gasterosteus gymnurus*** Cuvier, 1829 NATIVE

Αγκαθερό, Western three-spine stickleback

A rather widespread freshwater species that does not migrate to marine waters as other members of this genus. Found in many large lowland rivers along the Ionian and Aegean coasts and at one location in Northern Evia Island (Bianco *et al.*, 1996). Also in coastal springs, such as Lerni springs (Peloponnese), and in Lake Vistonis. It inhabits shallow, well-vegetated clear waters, often with sandy substrate and rich vegetation. It reaches 11 cm TL.

IUCN Red List Status: **LC**

Greek Red List: **LC**

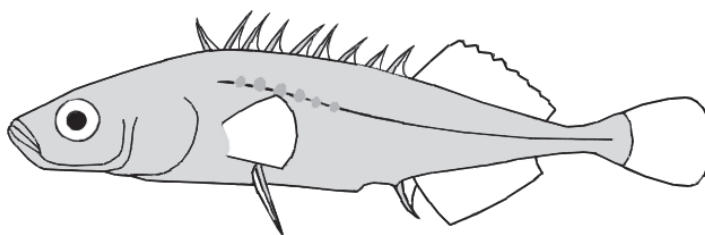
Habitats Directive: **N**

Ecoregion: **1,2,4,5**

GENUS

***Pungitius***

Coste, 1848

***Pungitius hellenicus*** Stephanidis, 1971 ENDEMIC

Ελληνοπυγόστεος, Greek stickleback

Endemic to the lower Sperchios river valley, with a localized distribution in small water bodies, such as Agia Paraskevi springs, east of Lamia, the drainage and irrigation channels near Moschochori village and some natural karstic sinkhole ponds near Kompotades village. Drainage of wetlands and springs has caused the local extirpation of some populations (e.g. at Mexiates wetland). It prefers well-oxygenated clear cool water, with rich vegetation mostly in spring-fed ponds, canals, ditches and wetlands. It exhibits cryptic behavior, with camouflage coloration. It may reach 5 cm TL.

IUCN Red List Status: **CR**Greek Red List: **CR**Habitats Directive: **N**Ecoregion: **4*****Pungitius platygaster*** (Kessler, 1859) NATIVE

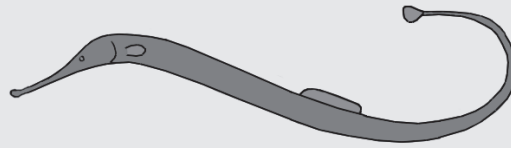
Ποντοπυγόστεος, Ukrainian stickleback

Although widespread in parts of Eastern Europe, this species is very rare in Greece. Confined to localized sites in wetlands of the lower Axios and Loudias rivers. It inhabits cool-water spring-fed swamps and slow-flowing streams and canals, with dense vegetation. It reaches 6 cm TL.

IUCN Red List Status: **LC**Greek Red List: **VU**Habitats Directive: **N**Ecoregion: **2**

## ORDER SYNGNATHIFORMES

## FAMILY SYNGNATHIDAE



A family found in temperate and tropical areas that includes the seahorses, the pipefishes and the sea dragons. Most species are marine; several enter brackish waters, while some are strictly freshwater. They are characterized by an elongated body and snout, fused jaws, absence of pelvic fins and a series of bony rings covering their bodies. At least one species regularly frequents freshwaters in Greece.

## GENUS

*Syngnathus*

Linnaeus, 1758

*Syngnathus abaster* Risso, 1827 NATIVE Marine Euryhaline

## Ταινιοσακοράφα, Black-striped pipefish

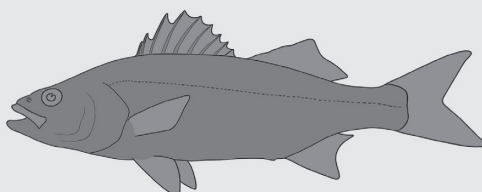
A widespread euryhaline marine species that enters transitional waters, including coastal lagoons and river mouths, and rarely freshwaters. Usually found in richly vegetated habitats. It reaches 21 cm TL.

*Nerophis ophidion* (L, 1758) and three other Sygnathid species may also be occasionally found in freshwaters and are frequently seen in transitional waters (Bobori & Economidis, 2006); however their regular residence in freshwaters has not been documented in Greece. Until further surveys, we follow Economou et al. (2007a) and Economidis (2009) who retain only *S. abaster* within the greek freshwater species list.

IUCN Red List Status: **LC**Greek Red List: **LC**Habitats Directive: **N**Ecoregion: **1,2,4,5,7**

## ORDER PERCIFORMES

## FAMILY MORONIDAE

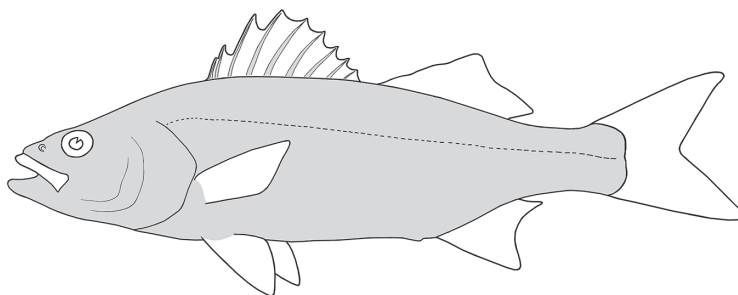


The temperate sea basses mainly live in the sea, but many species are reported to enter brackish waters and rivers. The family is widespread in the Atlantic Ocean, the Mediterranean and the Black Sea. A distinguishing characteristic of the family is the presence of two separated dorsal fins and two opercular spines. All species of the group have high economic value. Two species in Greece.

## GENUS

***Dicentrarchus***

Gill 1860

***Dicentrarchus labrax*** (Linnaeus, 1758) NATIVE Marine Euryhaline

Λαβράκι, European sea bass

A widespread marine species of the Mediterranean and Eastern Atlantic Sea. Often entering lagoons, estuaries and river mouths as well as lowland stretches of rivers. It reaches 103 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2,4,5,6,7*****Dicentrarchus punctatus*** (Bloch, 1792) NATIVE Marine Euryhaline

Στικτό λαβράκι, Spotted sea bass

A coastal species of the Mediterranean and Eastern Atlantic Sea. Mainly a marine species, occasionally entering lagoons and river mouths, as well as lower reaches of lowland rivers (e.g. Peristeras River, Peloponnese, HCMR data). It reaches 70 cm TL.

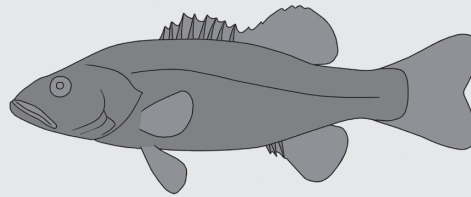
IUCN Red List Status: -

Habitats Directive: **N**

Greek Red List: -

Ecoregion: **1,2,4,5**

FAMILY **CENTRARCHIDAE**

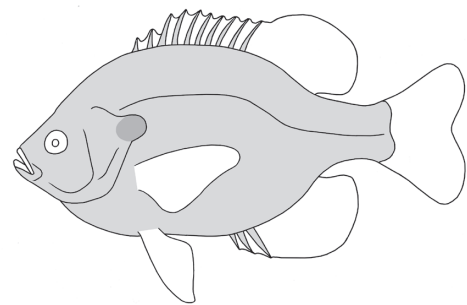


Sunfishes are native to fresh and brackish waters of North America. Widely introduced in Europe. They are distinguished by having a laterally compressed body, two dorsal fins, often broadly joined, a far-forward (thoracic) position of the pelvic fins, and at least three anal spines and five to thirteen spines on the anterior part of the dorsal fin. Two alien species in Greece.

GENUS

***Lepomis***

Rafinesque, 1819



***Lepomis gibbosus*** (Linnaeus, 1758) ALIEN

Ηλιόψαρο, Pumpkinseed

Non-indigenous species from North America. Widespread in many lakes and rivers, such as lakes Prespa, Kerkini, Volvi, Karla, and Taka, the Ladon reservoir, and rivers Evros, Strymon, Nestos, Axios, Pinios (Thessaly) and many others. Widely introduced accidentally or by aquarists as an ornamental fish. An extremely invasive and harmful alien that devours eggs and young native fishes and may swell to high population densities. It prefers vegetated lakes, ponds, reservoirs, as well as slow-running rivers, canals and streams. It often thrives in the incoming confluence of streams in artificial reservoirs. It may reach 40 cm TL.

IUCN Red List Status: **[LC]**

Greek Red List: -

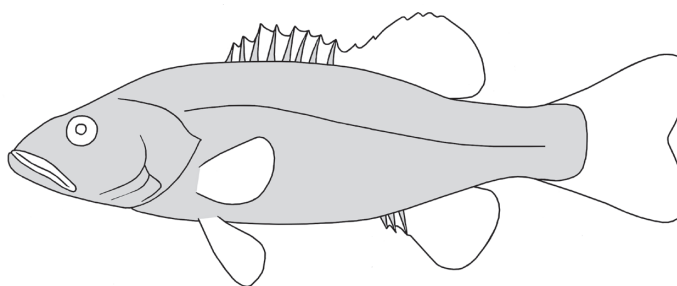
Habitats Directive: **[N]**

Ecoregion: -

GENUS

***Micropterus***

Lacépède, 1802

***Micropterus salmoides*** (La Cépède, 1802) ALIEN

Μεγαλόστομο λαβράκι, Largemouth bass

Non-indigenous species from North America; considered one of the most harmful alien species in Mediterranean freshwaters because it preys on native fishes and other aquatic animals. Reported only once in Greece, in 2003, in canals near Lessini (lower Acheloos); there is no evidence of its establishment (Corsi-Foka & Economidis, 2007). It inhabits lakes, reservoirs, ponds, swamps, and backwaters or pools, and rivers. It can withstand fairly polluted waters and slightly brackish conditions. It reaches 97 cm TL.

*Though documentation of this species in Greek freshwaters does not fulfill our criteria for inclusion in this list, we nevertheless retain it here due to its invasiveness and potential harmful impact.*

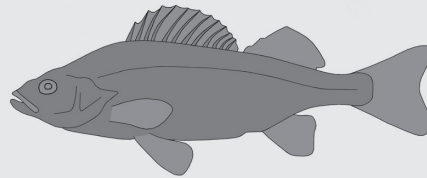
IUCN Red List Status: **[LC]**

Greek Red List: -

Habitats Directive: **[N]**

Ecoregion: -

FAMILY PERCIDAE

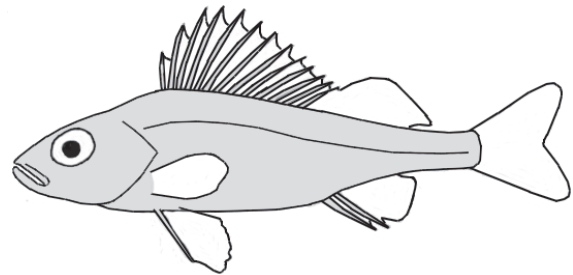


Perches are a family of predatory fish found in fresh and brackish waters of the Northern Hemisphere. Characterized by the presence of a spine on the operculum, two dorsal fins (separate or narrowly joined) and one or two anal spines. Three species in Greece (one alien).

GENUS

***Gymnocephalus***

Linnaeus, 1758



***Gymnocephalus cernua*** (Linnaeus, 1758) ALIEN

Ευρωπαϊκός Γυμνοκέφαλος+, Eurasian ruffe

A non-indigenous invasive species; widespread in many basins in Europe and Asia. An established population was recorded for the first time in Lake Kerkini in 2012, where it was probably introduced through the Strymon River from Bulgaria (first recorded in Bulgaria in 2006, see also Petriki *et al.*, 2014). It inhabits eutrophic lakes, large rivers and brackish estuarine waters; it prefers slow flowing waters with silty substrates. It reaches 25 cm TL.

IUCN Red List Status: **[LC]**

Greek Red List: -

Habitats Directive: **[N]**

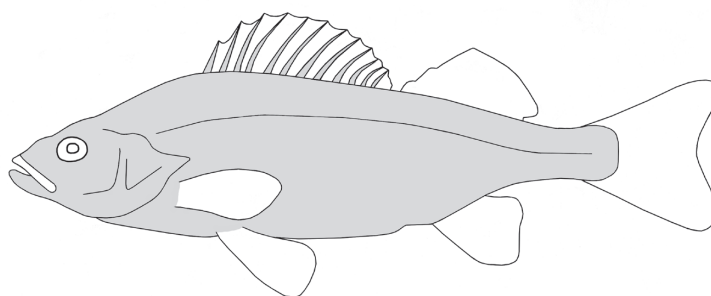
Ecoregion: -



GENUS

***Perca***

Linnaeus, 1758

***Perca fluviatilis*** Linnaeus, 1758 NATIVE

Περκί, European perch+

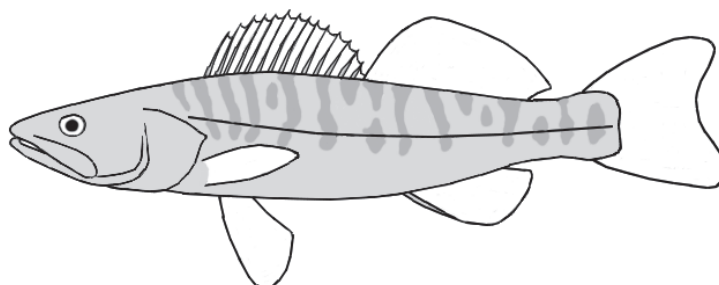
Widespread in northern and northeastern Greece, from Aliakmon to Evros river basins. It inhabits a wide range of habitats in rivers, lakes, reservoirs and canals. It reaches 68 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **LC**Ecoregion: **1,2**

GENUS

***Sander***

Oken, 1817

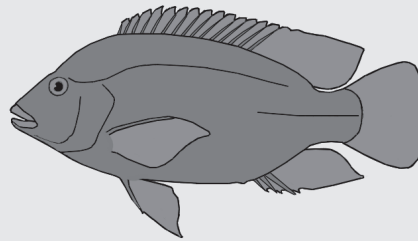
***Sander lucioperca*** (Linnaeus, 1758) NATIVE

Ποταμολαύρακο, Pikeperch

A widespread predatory fish in many European lakes and large rivers. Native to Evros River; introduced to the Strymon River, possibly through transboundary waters from Bulgaria (Crivelli *et al.*, 1995). It inhabits large, turbid rivers and eutrophic lakes, and occasionally enters brackish waters in estuaries. It may reach 115 cm TL.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **DD**Ecoregion: **1**

FAMILY CICHLIDAE

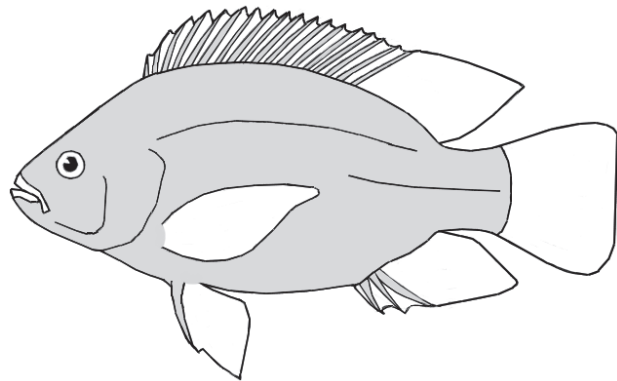


Cichlids are a large fish family present in fresh and brackish waters of Asia, Africa and America, primarily in the tropics. Most species have a deep-body shape, a continuous dorsal fin with seven to twenty-five spines, an interrupted lateral line, and the pharyngeal bones fused into a single tooth-bearing structure. One alien species in Greece.

GENUS

***Oreochromis***

Günther, 1889



***Oreochromis niloticus*** (Linnaeus, 1758) ALIEN

Τιλάπια Νείλου, Nile tilapia

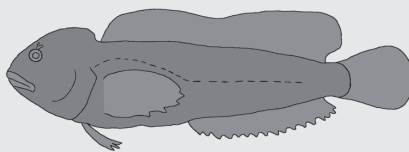
Non-indigenous species of African origin. In Greece, it has been introduced or escaped from aquaculture units. Currently known to be established only in Thermopylae hot springs catchment (eastern central Greece). Introductions formerly recorded also in Kremasta reservoir (Acheloos drainage) and in the lower Arachthos Delta wetlands, near an aquaculture unit. It requires warm waters in lowland rivers, canals and lakes. It reaches 68 cm TL.

IUCN Red List Status: -

Greek Red List: -

Habitats Directive: **[N]**

Ecoregion: -

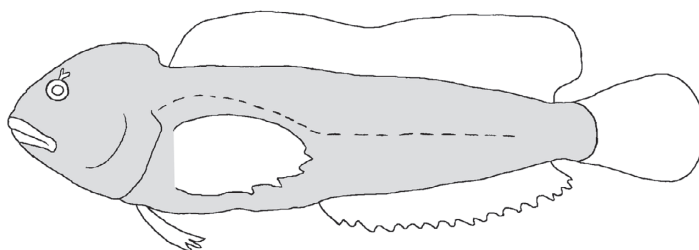
FAMILY **BLENNIIDAE**

Blennies include small benthic fishes, generally marine and widely distributed in tropical and temperate seas. Only a few species are euryhaline or live permanently in freshwaters. They have an elongated scaleless body, long dorsal and anal fins and pelvic fins situated anteriorly to the pectoral ones. Only two species regularly recorded in freshwaters in Greece.

## GENUS

***Salaria***

Forskål, 1775

***Salaria economidisi*** Kottelat, 2004 ENDEMIC

Τριχωνοσαλιάρα, Trichonis blenny

Endemic to Lake Trichonis and probably also present in other water bodies of the Acheloos basin (Kottelat, 2004; see also Geiger *et al.*, 2014). A benthic territorial species that is abundant in Lake Trichonis. It prefers sandy and gravelly substrates with large stones near lakeshores and streams; often with dense vegetation. It reaches 12 cm TL.

IUCN Red List Status: **CR**Greek Red List: **LC**Habitats Directive: **N**Ecoregion: **5*****Salaria fluviatilis*** (Asso, 1801) NATIVE

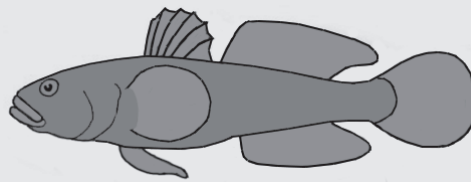
Ποταμοσαλιάρα, Freshwater blenny

A peri-Mediterranean species, also widespread in Greece, occurring in many rivers of the Greek mainland; also in lakes and reservoirs such as Lakes Doirani, Koronia, Volvi and Vistonis. Although this species does not normally live or reproduce in marine waters, it can tolerate brackish water conditions. The Acheloos basin populations may belong to *S. economidisi* that has been described from the Trichonis sub-basin. Also found in some insular water bodies of Crete, Corfu, Evia and Ikaria Islands. Some populations may have become recently extirpated due to hydrological and habitat degradation (e.g. Selinous, Peloponnese); this species is vulnerable to anthropogenic pressures, especially in small catchments. It inhabits lakes and streams with moderate to fast current and rocky substrates. It can reach 17 cm TL.

At river mouths and transitional waters, two marine blenny species, *Salaria pavo* and *Parablennius sanguinolentus*, can also be commonly encountered.

IUCN Red List Status: **LC**Greek Red List: **LC**Habitats Directive: **N**Ecoregion: **1,2,4,5,6,7**

FAMILY **GOBIIDAE**

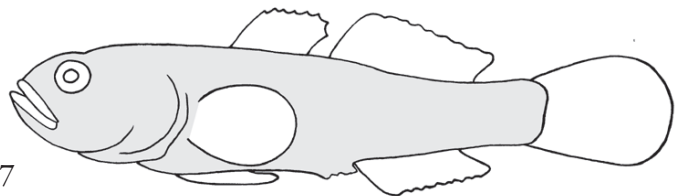


Gobies are widespread worldwide, but most species are found in tropical and sub-tropical areas. They are mainly in marine and brackish waters, but the freshwater species are also numerous. A characteristic of the family is the thoracic position of the pelvic fins, fused to form an adhesive disc. Gobies have two dorsal fins and a massive head with a short snout and slightly prominent cheeks. They are typically nest spawners, with eggs usually guarded by the male. Nine species in Greek freshwaters (one is a presumed alien).

GENUS

***Economidichthys***

Bianco, Bullock, Miller & Roubal, 1987



***Economidichthys pygmaeus*** (Holly, 1929) ENDEMIC

Λουρογωβιός, Western Greece goby

Endemic to western Greece. Found in Kalamas, Louros, Arachthos and Acheloos rivers, as well as in lakes Pamvotis, Trichonis, Lysimachia, Ziros and Ozeros, in springs Vlychos and Chiliadou and in the Mornos delta. Recently introduced to the Beotian Kifissos, Lake Yliki and Lake Taka in the Peloponnese (HCMR data). It is a predominantly demersal species, inhabiting both flowing and stagnant shallow waters with abundant vegetation and feeds chiefly on benthic invertebrates and crustaceans. In Lake Trichonis, the species has an annual life cycle with a single spawning period in spring, and dies shortly after reproduction. In other aquatic systems (rivers Louros and the Aghios Dimitrios springs in the Acheloos Delta), some individuals attain up to two years of age and some reproductive activity is observed in autumn. It reaches up to 6 cm TL.

IUCN Red List Status: **LC**

Greek Red List: **LC**

Habitats Directive: **Y-CTC**

Ecoregion: **5**

***Economidichthys trichonis*** Economidis & Miller, 1990 ENDEMIC

Νανογωβιός, Trichonis dwarf goby

The smallest European freshwater fish; endemic to lakes Trichonis and Lysimachia of the Acheloos drainage. It inhabits mainly the sublittoral zone and lives in the water column, feeding chiefly on planktonic prey. It is locally abundant in areas with dense submerged aquatic vegetation forming tight

shoals congregating near the bottom. It is a sexually dimorphic species and exhibits parental care behaviour, with the male constructing nests in the cavities of reeds, guarding the eggs until they hatch. It has an annual life cycle and reaches a maximum of about 3 cm TL.

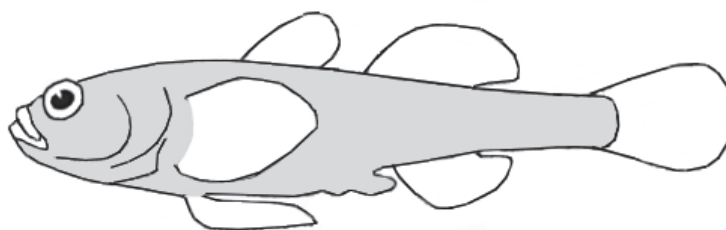
IUCN Red List Status: **EN**  
Greek Red List: **LC**

Habitats Directive: **Y-CTC**  
Ecoregion: **5**

GENUS

***Knipowitschia***

Iljin, 1927



***Knipowitschia caucasica*** (Berg, 1916) NATIVE

Ποντογωβιός, Caucasian dwarf goby

A widespread Ponto-Caspian species, inhabiting wetlands along the northern Aegean basins in Makedonia and Thraki (Rivers Mavroneri, Aliakmon, Axios, Gallikos, Strymon, Nestos, Filiouris and Evros; also in Lakes Vistonis and Volvi). Also present in certain islands (Evia, Lesvos); an older record from Samothraki (see Papakonstantinou, 2014) has not been substantiated by recent surveys in 2013 and 2014 (HCMR data). Euryhaline, inhabiting fresh to hypersaline waters, including rivers, canals and coastal lagoons, often in weedy shallows on muddy and sandy substrates. It reaches 5 cm TL.

Older references to *K. caucasica* in the Ionian ecoregion presumably refer to the *K. milleri* complex (Vanhove et al., 2012). We recommend to ascribe populations located south of and including the Acheron, formerly identified as *K. caucasica*, *K. panizzae* and *K. milleri*, to *K. cf. milleri*, pending further taxonomic clarification.

IUCN Red List Status: **LC**  
Greek Red List: **LC**

Habitats Directive: **N**  
Ecoregion: **1,2,4,7**

***Knipowitschia goerneri*** Ahnelt, 1991 ENDEMIC

Κερκυρογωβιός, Corfu dwarf goby

Endemic to the Korission lagoon catchment on south Corfu Island. This tiny goby was originally found in a spring-fed freshwater wetland near the lagoon and in brackish waters within Korission lagoon. The fringing wetland habitats have been degraded by water abstraction and human land-use change. Due to its extremely range-restricted distribution and narrow wetland habitat requirements it should be considered one of the most rare and threatened fishes in Greece. It reaches 3 cm TL.

IUCN Red List Status: **DD**  
Greek Red List: **CR**

Habitats Directive: **N-LR**  
Ecoregion: **5**

***Knipowitschia milleri*** (Ahnelt & Bianco, 1990) ENDEMIC

Αχερωνογωβιός, Acheron spring goby

Known to be endemic to the Acheron River drainage. Other *Knipowitschia* gobies of the Ionian ecoregion are genetically and morphologically very similar to this species and this has promoted an unofficial “lumping” of formerly unnamed or erroneously named fishes into a provisional *Knipowitschia* cf. *milleri* species complex (Vanhove *et al.*, 2012). The genetic similarity between Acheron and Trichonis fishes was also confirmed in Geiger *et al.* (2014). A recently discovered insular *Knipowitschia* population in Zakynthos Island closely resembles this species also (this should be provisionally recorded as *K. cf. milleri* [Zakynthos], as it represents an evolutionarily significant population unit (HCMR data)). These dwarf gobies inhabit lowland lotic and lentic waters with abundant submerged vegetation on sandy to muddy substrates; often also found in slightly brackish waters in coastal lagoons and salt marshes. They reach 3 cm TL.

*The taxonomy of the dwarf gobies of the Ionian basins is far from clarified, since this species complex ranges from the Acheron to the northwest Peloponnese. In the past, morphological identification has produced a record of K. panizae in the Evinos River (Bianco pers. obs. in Ahnelt & Bianco 1990), but from recent surveys and genetic analyses we interpret this record as erroneous (HCMR data). Vanhove et al. (2012) showed a strong genetic similarity of most Ionian Knipowitschia populations with K. milleri, including the sites where the alleged K. panizae was collected. K. panizae has therefore been deleted from this version of Greece’s fish checklist.*

IUCN Red List Status: **CR**Habitats Directive: **N-LR**Greek Red List: **VU**Ecoregion: **5*****Knipowitschia thessala*** (Vinciguerra, 1921) ENDEMIC

Θεσσαλογωβιός, Thessaly goby

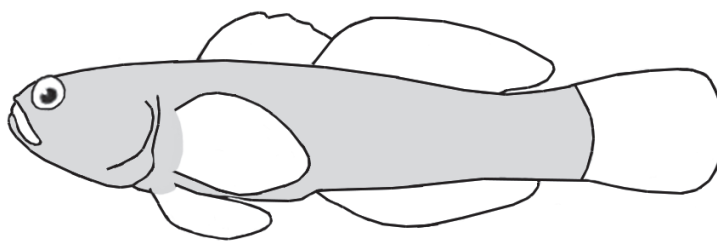
Endemic to the Pinios river basin; present in the entire lowland portion of the Thessaly plain, including Lake Karla. A short-lived species that is threatened by point source pollution, habitat destruction and river desiccation, due to water abstraction and mismanagement. It inhabits a variety of aquatic habitats, including large rivers, streams, canals and lowland reservoirs. It reaches 5 cm TL.

IUCN Red List Status: **EN**Habitats Directive: **N**Greek Red List: **EN**Ecoregion: **2**

GENUS

***Millerigobius***

Bath, 1973

***Millerigobius macrocephalus*** (Kolombatovic, 1891) NATIVE Marine Euryhaline

Μακροκέφαλος γωβιός, Large-headed goby

A small marine goby, endemic to the Mediterranean Sea; found also in Lake Vouliagmeni (Attika), in slightly brackish inland waters. Lake Vouliagmeni is a unique tectonic spring-and-cave lake that is included as an inland “freshwater” limnosystem in recent surveys (Economou *et al.*, 2007a). We speculate that the species was not introduced there by humans (Vanhove *et al.*, 2011). It reaches 4.5 cm TL.

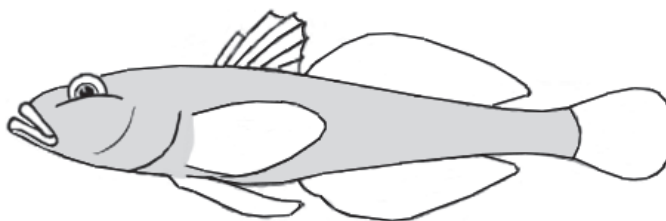
An unrelated marine goby, *Pomatoschistus marmoratus*, a common coastal species often also enters river mouths; we do not yet include it in this checklist because data on its frequent residence in freshwaters is fragmentary.

IUCN Red List Status: **LC**Habitats Directive: **N**Greek Red List: **NE**Ecoregion: **4**

GENUS

***Neogobius***

Iljin, 1927

***Neogobius fluviatilis*** (Pallas, 1814) ALIEN

Ποντιακός νεογωβιός, Pontian monkey goby

Presumably a non-indigenous species in Greece, but this status is unconfirmed (Zogaris & Apostolou, 2011). A fish of Black and Azov Sea basins, whose native distribution includes the Sea of Marmara. Recorded recently in the Greek and Bulgarian sections of the Evros basin. It prefers rivers down to estuaries and lagoons but is also found in rivers, streams and lakes; prefers sandy substrates. It reaches 24 cm TL.

IUCN Red List Status: **[LC]**Habitats Directive: **[N]**

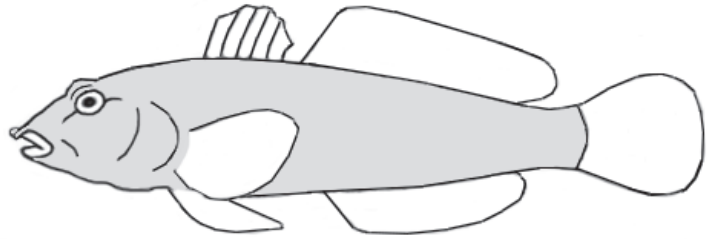
Greek Red List: -

Ecoregion: -

GENUS

***Proterorhinus***

Smitt 1900



***Proterorhinus semilunaris*** (Heckel, 1837) NATIVE

Πινογωβιός, Western tubenose goby

A native species of the northern Aegean river basins of Strymon and Evros, at the edge of its wider distribution, which extends to the Black Sea rivers and estuaries. It mainly inhabits freshwaters, but may also be present locally in brackish waters. It reaches 10 cm TL.

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IUCN Red List Status: **LC**

Greek Red List: **LC**

Habitats Directive: **N**

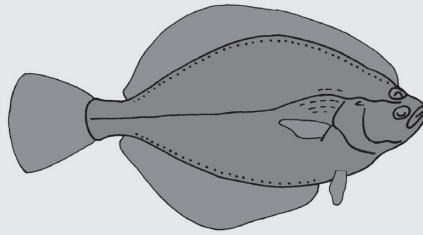
Ecoregion: **1**

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ORDER PLEURONECTIFORMES

FAMILY PLEURONECTIDAE

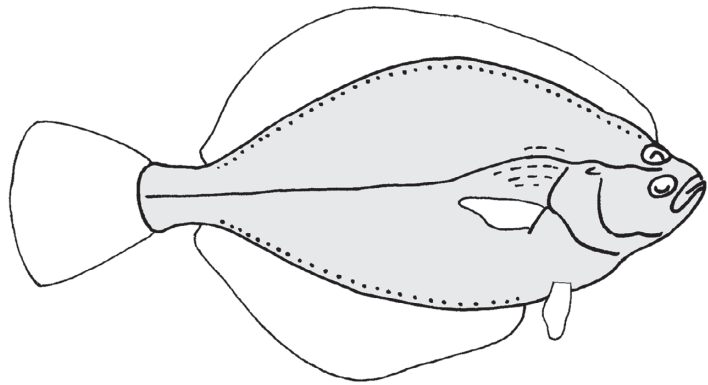


Flatfishes are marine benthic species, characterized by the absence of bilateral symmetry in the adult, with both eyes on the same side of the body. Body pigmented only on the upper side; the pigmented side's colour pattern may adapt to match the substrate. At least one species regularly recorded in freshwaters in Greece.

GENUS

***Platichthys***

Girard, 1854



***Platichthys flesus*** (Linnaeus, 1758) NATIVE Marine Euryhaline

Φασί, Atlantic flounder+

A marine species that locally enters brackish and fresh waters of rivers, coastal lakes and lagoons. In Greece, it was recorded in Northern Aegean coastal lagoons (Nestos and Evros River, Vistonis Lake), but evidence for its frequent presence in freshwaters is still lacking. It reaches 60 cm TL.

Perhaps other species of flatfish also enter transitional waters and may also regularly occur in the lower reaches of large rivers (i.e. *Solea* sp. in the lower Sperchios Delta, HCMR data 2014).

IUCN Red List Status: **LC**

Greek Red List: **LC**

Habitats Directive: **N**

Ecoregion: **1**

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## Summary checklist

The following list is developed to compare current species names and older scientific names (as they were presented in Economidis's seminal checklist of 1991). Based on our experience, the best applicable standardized English and Greek names for these species are also presented. Alien species are noted with an asterisk (\*).

Current Species Names	Authority	Species Names in Economidis, 1991	English Names	Greek Names
<b>Petromyzontidae</b>				
<i>Caspiomyzon graecus</i>	Renaud & Economidis, 2010	<i>Eudontomyzon hellenicus</i>	Epirus brook lamprey	Γκαβόχελο Ηπείρου
<i>Caspiomyzon hellenicus</i>	Vladykov, Renaud, Kott & Economidis, 1982	<i>Eudontomyzon hellenicus</i>	Greek brook lamprey	Ελληνικό γκαβόχελο
<i>Eudontomyzon</i> sp. <i>Almopeos</i>		not listed	Almopeos brook lamprey	Γκαβόχελο Αλμοπαίου
<i>Petromyzon marinus</i>	Linnaeus, 1758	same	Atlantic sea lamprey	Θαλάσσιο Πετρόμυζον
<b>Acipenseridae</b>				
<i>Acipenser gueldenstaedtii</i> *	Brandt & Ratzeberg, 1833	not listed	Russian sturgeon	Οξύρυγχος Δούναβη
<i>Acipenser naccarii</i>	Bonaparte, 1836	same	Adriatic sturgeon	Οξύρυγχος Αδριατικής
<i>Acipenser stellatus</i>	Pallas, 1771	same	Stellate sturgeon	Αστροζυρύχι
<i>Acipenser sturio</i>	Linnaeus, 1758	same	Atlantic sturgeon	Ευρωπαϊκός οξύρυγχος
<i>Huso huso</i>	(Linnaeus, 1758)	same	Beluga	Μουρούνα
<b>Anguillidae</b>				
<i>Anguilla anguilla</i>	(Linnaeus, 1758)	same	European eel	Χέλι
<b>Clupeidae</b>				
<i>Alosa fallax</i>	(La Cepède, 1803)	same (1 subspecies: <i>A.f. nilotica</i> )	Twaite shad	Σαρδελομάννα
<i>Alosa macedonica</i>	(Vinciguerra, 1921)	<i>Alosa (Caspialosa) macedonica</i>	Macedonian shad	Λιπαριά
<i>Alosa vistonica</i>	Economidis & Sinis, 1986	<i>Alosa (Caspialosa) caspia vistonica</i>	Thracian shad	Θρίτσα
<b>Cyprinidae</b>				
<i>Abramis brama</i>	(Linnaeus, 1758)	same	Common bream	Λεστιά
<i>Alburnoides bipunctatus</i>	(Bloch, 1782)	same (2 subspecies: <i>A.b. ohridanus</i> , <i>A.b. thessalus</i> )	European spirlin	Ευρωπαϊκό τσιρωνάκι
<i>Alburnoides prespensis</i>	(Karaman, 1924)	not listed	Prespa spirlin	Τσιρωνάκι Πρεσπών
<i>Alburnoides strymonicus</i>	(Chichkoff, 1940)	listed as subspecies <i>A.b. strymonicus</i>	Strymon spirlin	Τσιρωνάκι Στρυμόνα
<i>Alburnus alburnus</i>	(Linnaeus, 1758)	same (3 subspecies: <i>A.a. macedonicus</i> , <i>A.a. thessalicus</i> , <i>A.a. strumicae</i> )	European bleak	Ευρωπαϊκό σίρκο
<i>Alburnus belvica</i>	Karaman, 1924	<i>Chalcalburnus belvica</i>	Prespa bleak	Μπελοτσιρόνι
<i>Alburnus macedonicus</i>	Karaman, 1928	listed as subspecies <i>Alburnus alburnus macedonicus</i>	Doiran bleak	Σίρκο Δοϊράνης
<i>Alburnus scoranza</i>	Bonaparte, 1845	not listed	Scoranza bleak	Σίρκο της Σκόδρας
<i>Alburnus thessalicus</i>	Stephanidis, 1950	listed as subspecies <i>A.a. thessalicus</i>	Thessaly bleak	Θεσσαλόσρκο
<i>Alburnus vistonicus</i>	Freyhof & Kottelat, 2007	listed as subspecies <i>Chalcalburnus chalcoides macedonicus</i>	Vistonis shemaja	Αλάια
<i>Alburnus volviticus</i>	Freyhof & Kottelat, 2007	listed as subspecies <i>Chalcalburnus chalcoides macedonicus</i>	Yelartza shemaja	Γελάρτζα

Current Species Names	Authority	Species Names in Economidis, 1991	English Names	Greek Names
<i>Alburnus</i> sp. Volvi		listed as subspecies <i>A. alburnus macedonicus</i> and <i>A. a. strumicae</i>	Volvi bleak	Σίρκο της Βόλβης
<i>Barbus balcanicus</i>	Kotlík, Tsigenopoulos, Ráb & Berrebi, 2002	not listed	Large spot barbel	Βαλκανική μπριάνα
<i>Barbus cyclolepis</i>	Heckel, 1837	same (4 subspecies: <i>B.c. cyclolepis</i> , <i>B.c. strumicae</i> , <i>B.c. sperchiensis</i> , <i>B.c. cholorematicus</i> )	Thracian barbel	Θρακική μπριάνα
<i>Barbus euboicus</i>	Stephanidis, 1950	same	Evia barbel	Ευβοϊκή μπριάνα
<i>Barbus macedonicus</i>	Karaman, 1928	<i>Barbus barbus</i> (2 subspecies: <i>B.b. macedonicus</i> , <i>B.b. thessalus</i> )	Macedonian barbel	Μακεδονική μπριάνα
<i>Barbus peloponnesius</i>	Valenciennes, 1842	same (3 subspecies: <i>B.p. peloponnesius</i> , <i>B.p. petenyi</i> , <i>B.p. rebeli</i> )	Peloponnese barbel	Πελοποννησιακή μπριάνα
<i>Barbus pergamonensis</i>	Karaman, 1971	not listed	Bergama barbel	Μπριάνα Περγάμου
<i>Barbus prespensis</i>	Karaman, 1924	same	Prespa barbel	Μπριάνα Πρέσπας
<i>Barbus sperchiensis</i>	Stephanidis, 1950	listed as subspecies <i>B. cyclolepis sperchiensis</i>	Sperchios barbel	Μπριάνα Σπερχειού
<i>Barbus strumicae</i>	Karaman, 1955	listed as subspecies <i>B. cyclolepis strumicae</i>	Strumica barbel	Μπριάνα Στρυμόνα
<i>Carassius auratus</i> *	(Linnaeus, 1758)	not listed	Common goldfish	Κοινό χρυσόψαρο
<i>Carassius carassius</i>	(Linnaeus, 1758)	same	Crucian carp	Κουτσουράς
<i>Carassius gibelio</i> *	(Bloch, 1782)	listed as subspecies <i>C. auratus gibelio</i>	Prussian carp	Πεταλούδα
<i>Carassius langsdorfii</i> *	(Temminck & Schlegel, 1846)	not listed	Gin-buna carp	Αγριοχρυσόψαρο Ιαπωνίας
<i>Chondrostoma prespense</i>	Karaman, 1924	<i>C. prespensis</i>	Prespa nase	Σκουμπούζι
<i>Chondrostoma vardarensis</i>	Karaman, 1928	<i>C. vardarensis</i>	Vardar nase	Σύρτης
<i>Ctenopharyngodon idella</i> *	(Valenciennes, 1844)	same	Grass carp	Χορτοφάγος κυπρίνος
<i>Cyprinus carpio</i>	Linnaeus, 1758	same	European carp	Κυπρίνος
<i>Gobio bulgaricus</i>	Drensky, 1926	listed as subspecies <i>G. gobio bulgaricus</i>	Aegean gudgeon	Βουλγαροκωβιός
<i>Gobio feraeensis</i>	Stephanidis, 1973	listed as subspecies <i>G. gobio feraensis</i>	Thessaly gudgeon	Φεροκωβιός
<i>Gobio skadarensis</i>	Karaman, 1937	not listed	Skadar gudgeon	Κωβιός της Σκόδρας
<i>Hypophthalmichthys molitrix</i> *	(Valenciennes, 1844)	same	Silver carp	Ασημοκυπρίνος
<i>Hypophthalmichthys nobilis</i> *	(Richardson, 1845)	<i>Aristichthys nobilis</i>	Bighead carp	Μαρμαροκυπρίνος
<i>Ladigesocypris ghigii</i>	(Gianferrari, 1927)	listed as subspecies <i>L. ghigii ghigii</i>	Gizani	Γκιζάνι
<i>Leucaspis delineatus</i>	(Hechel, 1843)	same	European sun bleak	Μικροσίρκο
<i>Leuciscus aspius</i>	(Linnaeus, 1758)	<i>Aspius aspius</i>	Asp	Ασπρογρίβαδο
<i>Luciobarbus albanicus</i>	(Steindachner, 1870)	<i>Barbus albanicus</i>	Albanian barbel	Στρωσίδι
<i>Luciobarbus graecus</i>	(Steindachner, 1896)	<i>Barbus graecus</i>	Greek barbel	Σκαρούνι
<i>Pachychilon macedonicum</i>	(Steindachner, 1892)	<i>Rutilus macedonicus</i>	Macedonian moranec	Μαυροτσιρώνι
<i>Pachychilon pictum</i>	(Heckel & Kner, 1858)	<i>P. pictus</i>	Ohrid moranec	Χειλάς
<i>Pelasgus epiroticus</i>	(Steindachner, 1896)	listed as subspecies <i>Paraphoxinus epiroticus epiroticus</i>	Epirus minnow	Ηπειρώτικη τσίμα

Current Species Names	Authority	Species Names in Economidis, 1991	English Names	Greek Names
<i>Pelasgus laconicus</i>	(Kottelat & Barbieri, 2004)	listed as subspecies <i>Pseudophoxinus stymphalicus stymphalicus</i>	Evrotas minnow	Λακωνικός πελασγός
<i>Pelasgus marathonicus</i>	(Vinciguerra, 1921)	listed as subspecies <i>Pseudophoxinus stymphalicus marathonicus</i>	Marathon minnow	Αττικόψαρο
<i>Pelasgus prespensis</i>	(Karaman, 1924)	listed as subspecies <i>Paraphoxinus epiroticus prespensis</i>	Prespa minnow	Τσίμα της Πρέσπας
<i>Pelasgus stymphalicus</i>	(Valenciennes, 1844)	listed as subspecies <i>Pseudophoxinus stymphalicus stymphalicus</i>	Stymphalia minnow	Στυμφαλικός πελασγός
<i>Pelasgus thesproticus</i>	(Stephanidis, 1939)	listed as subspecies <i>Pseudophoxinus stymphalicus thesproticus</i>	Thesprotian minnow	Θεσπρωτικός πελασγός
<i>Petroleuciscus borysthenicus</i>	(Kessler, 1859)	<i>Leuciscus borysthenicus</i>	Black sea chub	Τσαϊλάκι
<i>Petroleuciscus smyrnaeus</i>	(Boulenger, 1896)	not listed	Smyrna chub	Σμυρνοπετρόλευκος
<i>Phoxinus strymonicus</i>	Kottelat, 2007	<i>P. phoxinus</i>	Aegean minnow	Στρυμονόγαστρος
<i>Pseudorasbora parva</i> *	(Temminck & Schlegel, 1846)	same	Topmouth gudgeon	Ψευδοράσμπορα
<i>Rhodeus amarus</i>	(Bloch, 1782)	listed as subspecies <i>R. sericeus amarus</i>	Bitterling	Μουρμουρίτσα
<i>Rhodeus meridionalis</i>	Karaman, 1924	listed as subspecies <i>R. sericeus amarus</i>	Vardar bitterling	Βαβούκι
<i>Romanogobio elimeius</i>	(Kattoulas, Stephanidis & Economidis, 1973)	listed as subspecies <i>Gobio uranoscopus elimeius</i>	Greek stone gudgeon	Μυλωνάκι
<i>Rutilus panosi</i>	Bogutskaya & Iliadou, 2006	<i>R. ylikiensis</i>	Acheloos roach	Δρομίτσα
<i>Rutilus prespensis</i>	(Karaman, 1924)	listed as subspecies <i>R. ohridanus prespensis</i>	Prespa roach	Πλατικά Πρέσπας
<i>Rutilus rutilus</i>	(Linnaeus, 1758)	same (3 subspecies: <i>R.r. mariza</i> , <i>R.r. doiranensis</i> , <i>R.r. vegariticus</i> )	Common roach	Τσιρώνι
<i>Rutilus ylikiensis</i>	Economidis, 1991	same	Yliki roach	Χιροκόβα
<i>Rutilus</i> sp. Sperchios		not listed	Sperchios roach	Τσιρώνι Σπερχειού
<i>Scardinius acarnanicus</i>	Economidis, 1991	same	Trichonis rudd	Τσερούκλα
<i>Scardinius erythrophthalmus</i>	(Linnaeus, 1758)	same	European rudd	Κοκκινοφτέρα
<i>Scardinius graecus</i>	Stephanidis, 1937	same	Greek rudd	Καλαμίθρα
<i>Squalius fellowesii</i>	(Günther, 1868)	not listed	Aegean chub	Ποταμοκέφαλος Αιγαίου
<i>Squalius keadicus</i>	(Stephanidis, 1971)	<i>Leuciscus keadicus</i>	Evrotas chub	Καιαδική μενίδα
<i>Squalius moreoticus</i>	(Stephanidis, 1971)	listed as subspecies <i>Leuciscus cephalus peloponnensis</i>	Stymphalia chub	Ποταμοκέφαλος του Μωριά
<i>Squalius orpheus</i>	Kottelat & Economidis, 2006	listed as subspecies <i>Leuciscus cephalus macedonicus</i>	Maritza chub	Ποταμοκέφαλος Θράκης
<i>Squalius pamvoticus</i>	(Stephanidis, 1939)	listed as subspecies <i>Leuciscus cephalus albus</i>	Pamvotis chub	Ποταμοκέφαλος Παμβώτιδας
<i>Squalius peloponnensis</i>	(Valenciennes, 1844)	listed as subspecies <i>Leuciscus cephalus peloponnensis</i>	Peloponnese chub	Ποταμοκέφαλος Πελοποννήσου
<i>Squalius prespensis</i>	(Fowler, 1977)	<i>Leuciscus</i> species not mentioned in Prespa Lakes	Prespa chub	Ποταμοκέφαλος Πρέσπας
<i>Squalius vardarensis</i>	Karaman, 1928	listed as subspecies <i>Leuciscus cephalus vardarensis</i>	Vardar chub	Ποταμοκέφαλος Μακεδονίας

Current Species Names	Authority	Species Names in Economidis, 1991	English Names	Greek Names
<i>Squalius cf. cii</i>	(Richardson, 1856)	not listed	Lesbos chub	Ποταμοκέφαλος Ανατολίας
<i>Squalius</i> sp. Aaos		listed as subspecies <i>Leuciscus cephalus vardarensis</i>	Aaos chub	Ποταμοκέφαλος Αίωου
<i>Squalius</i> sp. Evia		not listed	Evia chub	Ποταμοκέφαλος Εύβοιας
<i>Telestes beoticus</i>	(Stephanidis, 1939)	<i>Pseudophoxinus beoticus</i>	Beotian riffle dace	Πασκοβίζα
<i>Telestes pleurobipunctatus</i>	(Stephanidis, 1939)	<i>Phoxinellus pleurobipunctatus</i>	Epiros riffle dace	Λιάρρα
<i>Tinca tinca</i>	(Linnaeus, 1758)	same	Tench	Γλήνι
<i>Tropidophoxinellus hellenicus</i>	(Stephanidis, 1971)	same	Hellenic minnowroach	Γουρνάρα
<i>Tropidophoxinellus spartiaticus</i>	(Schmidt-Ries, 1943)	same	Spartian minnowroach	Χρυσή μενίδα
<i>Vimba melanops</i>	(Heckel, 1837)	same	Dark vimba	Μαλαμίδα
<b>Cobitidae</b>				
<i>Cobitis arachthosensis</i>	Economidis & Nalbant, 1996	listed as subspecies <i>C. hellenica arachthosensis</i>	Arachthos spined loach	Αραχθοβελονίτσα
<i>Cobitis hellenica</i>	Economidis & Nalbant, 1996	listed as subspecies <i>C. hellenica arachthosensis</i>	Louros spined loach	Λουροβελονίτσα
<i>Cobitis meridionalis</i>	Karaman, 1924	same	Prespa spined loach	Βρυγοβελονίτσα
<i>Cobitis ohridana</i>	Karaman, 1928	not listed	Ohrid spined loach	Αχριδοβελονίτσα
<i>Cobitis punctulata</i>	Erk'akan, Atalay-Ekmekçi & Nalbant, 1998	not listed	Brown spined loach	Στικτοβελονίτσα
<i>Cobitis punctilineata</i>	Economidis & Nalbant, 1996	same	Aggitis spined loach	Γραμμοβελονίτσα
<i>Cobitis stephanidisi</i>	Economidis, 1992	same	Velestino spined loach	Φεροβελονίτσα
<i>Cobitis strumicae</i>	Karaman, 1955	same	Struma spined loach	Θρακοβελονίτσα
<i>Cobitis trichonica</i>	Stephanidis, 1974	same	Trichonis spined loach	Τριχωνοβελονίτσα
<i>Cobitis vardarensis</i>	Karaman, 1928	same	Vardar spined loach	Μακεδονική Βελονίτσα
<i>Sabanejewia balcanica</i>	(Karaman, 1922)	listed as subspecies <i>S. aurata balcanica</i>	Balkan golden loach	Χρυσοβελονίτσα
<b>Nemacheilidae</b>				
<i>Barbatula barbatula</i>	(Linnaeus, 1758)	listed as subspecies <i>Orthrias barbatulus vardarensis</i>	Stone loach	Βίνος
<i>Oxyoemacheilus bureschi</i>	(Drensky, 1928)	listed as subspecies <i>Orthrias brandti bureschi</i>	Struma stone loach	Πετροχείλι
<i>Oxyoemacheilus pindus</i>	(Economidis, 2005)	<i>Orthrias pindus</i>	Pindus stone loach	Πινδοβίνος
<i>Oxyoemacheilus theophilii</i>	Stoumboudi, Kottelat & Barbieri, 2006	not listed	Lesbos stone loach	Λεσβοβίνος
<b>Ictaluridae</b>				
<i>Ameiurus cf. nebulosus</i> *	(Lesueur, 1819)	not listed	Brown bullhead	Καφέ Γατόψαρο
<b>Siluridae</b>				
<i>Silurus aristotelis</i>	Garman, 1890	same	Aristotle's catfish	Γλανίδι
<i>Silurus glanis</i>	Linnaeus, 1758	same	Wels catfish	Γουλιανός
<b>Esocidae</b>				
<i>Esox lucius</i>	Linnaeus, 1758	same	Northern Pike	Τούρνα

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<b>Coregonidae</b>				
<i>Coregonus</i> sp. *	(Linnaeus, 1758)	listed as <i>Coregonus lavaretus</i>	Whitefish	Κορήγωνος
<b>Salmonidae</b>				
<i>Oncorhynchus kisutch</i> *	(Walbaum, 1792)	same	Coho salmon	Σολομός Κόχο
<i>Oncorhynchus mykiss</i> *	(Walbaum, 1792)	same	Rainbow trout	Ιριδίζουσα πέστροφα
<i>Salmo farioides</i>	Karaman, 1938	listed as subspecies <i>S. trutta macrostigma</i>	West Balkan trout	Ιονική πέστροφα
<i>Salmo letnica</i> *	(Karaman, 1924)	not listed	Ohrid trout	Πέστροφα Οχρίδας
<i>Salmo lourosensis</i>	Delling, 2011	listed as subspecies <i>S. trutta macrostigma</i>	Louros trout	Πέστροφα Λούρου
<i>Salmo macedonicus</i>	(Karaman, 1924)	listed as subspecies <i>S. trutta macedonicus</i>	Macedonian trout	Πέστροφα Μακεδονίας
<i>Salmo pelagonicus</i>	Karaman, 1938	listed as subspecies <i>S. trutta pelagonicus</i>	Pelagonian trout	Πέστροφα Πελαγονίας
<i>Salmo peristericus</i>	Karaman, 1938	listed as subspecies <i>S. trutta peristericus</i>	Prespa trout	Πέστροφα των Πρεσπών
<i>Salmo trutta</i> *	Linnaeus, 1758	not listed	Brown trout	Καφετιά πέστροφα
<i>Salvelinus fontinalis</i> *	(Mitchill, 1814)	same	Brook charr	Σαλβελίνος
<b>Mugilidae</b>				
<i>Chelon aurata</i>	(Risso, 1810)	<i>Liza aurata</i>	Golden grey mullet	Μυζινάρι
<i>Chelon haematocheilus</i> *	(Temminck & Schlegel, 1845)	not listed	Redlips mullet	Σαζανοκέφαλος
<i>Chelon labrosus</i>	(Risso, 1827)	same	Thicklip grey mullet	Χειλονάρι
<i>Chelon ramada</i>	(Risso, 1827)	<i>Liza ramada</i>	Thinlipped grey mullet	Μαυράκι
<i>Chelon saliens</i>	(Risso, 1810)	<i>Liza saliens</i>	Sharpnose grey mullet	Γάστρος
<i>Mugil cephalus</i>	Linnaeus, 1758	same	Striped grey mullet	Κέφαλος
<i>Oedalechilus labeo</i>	(Cuvier, 1829)	same	Boxlip grey mullet	Γρέντζος
<b>Atherinidae</b>				
<i>Atherina boyeri</i>	Risso, 1810	same	Big-scaled sand smelt	Αθερίνα
<b>Valenciidae</b>				
<i>Valencia letourneuxi</i>	(Sauvage, 1880)	same	Corfu valencia	Ιονικός ζουρνάς
<i>Valencia robertae</i>	Freyhof, Kärst & Geiger 2014	<i>Valencia letourneuxi</i>	Peloponnese valencia	Πελοποννησιακός ζουρνάς
<b>Poeciliidae</b>				
<i>Gambusia holbrooki</i> *	Girard, 1859	<i>Gambusia affinis</i>	Eastern mosquitofish	Κουνουπόψαρο
<i>Poecilia latipinna</i> *	(Lesueur, 1821)	not listed	Sailfin molly	Μόλυ
<b>Cyprinodontidae</b>				
<i>Aphanius almiriensis</i>	Kottelat, Barbieri & Stoumboudi, 2007	<i>Aphanius fasciatus</i>	Almiri toothcarp	Ζαχαριάς Αλμυρής
<i>Aphanius fasciatus</i>	(Valenciennes, 1821)	same	Mediterranean toothcarp	Ζαχαριάς
<b>Gasterosteidae</b>				
<i>Gasterosteus gymnurus</i>	Cuvier, 1829	<i>Gasterosteus aculeatus</i>	Western three-spine stickleback	Αγκαθερό
<i>Pungitius hellenicus</i>	Stephanidis, 1971	same	Greek stickleback	Ελληνοπυγόστεος
<i>Pungitius platygaster</i>	(Kessler, 1859)	same	Ukrainian stickleback	Ποντοπυγόστεος

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<b>Syngnathidae</b>				
<i>Syngnathus abaster</i>	Risso, 1827	same	Black-striped pipefish	Ταινιοσακοράφα
<b>Moronidae</b>				
<i>Dicentrarchus labrax</i>	(Linnaeus, 1758)	same	European sea bass	Λαβράκι
<i>Dicentrarchus punctatus</i>	(Bloch, 1792)	same	Spotted sea bass	Στικτό λαυράκι
<b>Centrarchidae</b>				
<i>Lepomis gibbosus</i> *	(Linnaeus, 1758)	same	Pumpkinseed	Ηλιόψαρο
<i>Micropterus salmoides</i>	(La Cépède, 1802)	not listed	Largemouth bass	Μεγαλόστομο λαυράκι
<b>Percidae</b>				
<i>Gymnocephalus cernua</i> *	(Linnaeus, 1758)	not listed	Eurasian ruffe	Ευρωπαϊκός Γυμνοκέφαλος
<i>Perca fluviatilis</i>	Linnaeus, 1758	same	European perch	Περκί
<i>Sander lucioperca</i>	(Linnaeus, 1758)	<i>Stizostedion lucioperca</i>	Pikeperch	Ποταμολαύρακο
<b>Cichlidae</b>				
<i>Oreochromis niloticus</i> *	(Linnaeus, 1758)	not listed	Nile Tilapia	Τιλάπια Νείλου
<b>Blennidae</b>				
<i>Salaria economidisi</i>	Kottelat, 2004	<i>Salaria fluviatilis</i>	Trichonis blenny	Τριχωνοσαλιέρα
<i>Salaria fluviatilis</i>	(Asso, 1801)	same	Freshwater blenny	Ποταμοσαλιέρα
<b>Gobiidae</b>				
<i>Economidichthys pygmaeus</i>	(Holly, 1929)	same	Western Greece goby	Λουρογωβιός
<i>Economidichthys trichonis</i>	Economidis & Miller, 1990	same	Trichonis dwarf goby	Νανογωβιός
<i>Knipowitschia caucasica</i>	(Berg, 1916)	same	Caucasian dwarf goby	Ποντογωβιός
<i>Knipowitschia goeneri</i>	Ahnelt, 1991	not listed	Corfu dwarf goby	Κερκυρογωβιός
<i>Knipowitschia milleri</i>	(Ahnelt & Bianco, 1990)	same	Acheron spring goby	Αχερωνογωβιός
<i>Knipowitschia thessala</i>	(Vinciguerra, 1921)	same	Thessaly goby	Θεσσαλογωβιός
<i>Millerigobius macrocephalus</i>	(Kolombatovic, 1891)	not listed	Large-headed goby	Μακροκέφαλος γωβιός
<i>Neogobius fluviatilis</i> *	(Pallas, 1814)	not listed	Pontian monkey goby	Ποντιακός νεογωβιός
<i>Proterorhinus semilunaris</i>	(Heckel, 1837)	<i>Proterorhinus marmoratus</i>	Western tubenose goby	Ρινογωβιός
<b>Pleuronectidae</b>				
<i>Platichthys flesus</i>	(Linnaeus, 1758)	listed as subspecies <i>Platichthys flesus luscus</i>	Atlantic flounder	Φασί



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