

Identification Key to Fishes in Fresh Waters of Greece

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ABSTRACT

The European Environmental Agency formulated a biodiversity initiative in 1996 specifying a freshwater stream-monitoring program to inventory, identify and describe aquatic and terrestrial species in European Union countries. With one of the richest freshwater ichthyofaunas in Europe (126 fish taxa: 97 species and 29 subspecies of primary or secondary freshwater fishes), Greece has two extinct fish species, five listed as critically endangered, and 29 considered endangered and/or vulnerable. There are, however, no published identification guides that are available for identifying fish specimens from fresh waters in Greece. We present an English translation of the only available identification key (in Greek) to 97 fish species (20 families) in fresh waters of Greece. Our intent is to create an illustrated identification guide in the future as new species are identified and ranges of all lotic and lentic species are clarified. In the interim, we believe that the current guide can be used effectively in the field to reduce the number of voucher specimens required to authenticate inventories of the freshwater ichthyofauna of Greece as repeated heavy sampling has the potential to decimate local populations that are already vulnerable.

Keywords: Identification key, freshwater fishes, Greece

INTRODUCTION

Identification keys are one of the fundamental tools of ichthyologists, fisheries biologists, ecologists, systematists, environmental biologists, and environmental policy makers and enforcers. For example, knowing what species live in which aquatic systems is requisite in creating management plans for fisheries in inland waters and formulating protective strategies and recovery plans for endangered, threatened or vulnerable species (Nixon et al., 1996).

Recently, the European Environmental Agency (EEA) formulated a biodiversity initiative specifying a freshwater stream-monitoring program to inventory, identify and describe aquatic and terrestrial species in European Union (EU) countries (Nixon et al., 1996). Baseline distributional data derived from monitoring programs are essential elements of biodiversity inventories, biogeographic studies, systematic and phylogenetic investigations, water quality assessment, environmental impact statements, and a host of other ecological studies. For example, Maurakis et al. (2001) and Maurakis and Economidis (2001) used current distributions of native freshwater fishes to delineate relationships of river drainages in Greece relative to historical geological and tectonic events. They noted that there is much confusion in the identification of freshwater fishes in Greece, and that many river systems in the country have been sampled inadequately (Maurakis et al., 2003).

With one of the richest freshwater ichthyofaunas in Europe (126 fish taxa: 97 species and 29 subspecies of primary or secondary freshwater fishes), Greece has two extinct fish species, five listed as critically endangered, and 29 considered endangered and/or vulnerable (Bobori et al., 2001; Economidis, 1995). With 37 % of the native fish fauna in Greece imperiled and/or extirpated by damming, stream channelization, canalization, pollution, habitat alteration, and stream dessication (a result of water abstraction for crop irrigation and potable water supplies) (Bobori, et al., 2001; Maurakis and Grimes, 2003), it is crucial for researchers conducting studies in Greece to be able to recognize and return native freshwater fishes in the field, and to collect only those species requiring further taxonomic and ecological assessment.

As fieldwork in freshwater ecosystems in Greece by Greek researchers and those from other countries continues to increase (Bobori et al., 2001; Economidis 1991; Economidis and Burescu, 1991; Gretes and Maurakis, 2001; Maurakis et al., 2003; Maurakis and Grimes, 2004) in response to the EEA's initiative, there is a need for an English version of a identification key to fishes in fresh waters of Greece to facilitate accurate identifications. Except for the unpublished, periodically updated identification keys (in Greek) to freshwater fishes by the second author, there are no published identification guides that are available for identifying specimens from freshwaters to complete inventories of biodiversity in Greece. Yet, new species (e.g. one species of *Economidichthys* and four species of *Cobitis*), have been described in Greece in recent years (Economidis and Miller, 1990; Economidis and Nalbant, 1996), and populations of other species continue to warrant ecological and taxonomic study. Our intent is to create an illustrated identification guide in the future as new species are identified and ranges of all species are clarified further. In the interim, we believe the current guide can be used effectively in the field to reduce the number of voucher specimens required to authenticate inventories of the freshwater ichthyofauna of Greece as repeated heavy sampling has the potential to decimate local populations that are already vulnerable.

METHODS

Descriptions of each of 97 species are annotated with current information of species distributions in fresh waters of Greece (Fig. 1) and notes on exotic fishes introduced in the country since 1995 as discussed in Economidis (2000). Nomenclature conforms to that in Kottelat (1997). Definitions of meristic counts and morphological measurements follow those in Cailliet et al. (1986) except where noted. Standard length is the distance from the anterior tip of snout to posterior end of hypural plate. Total length is the distance from anterior tip of snout to posterior margin of caudal fin. Head length is the distance from the anterior point of head to posterior bony margin of operculum. Eye diameter is the horizontal diameter of the eye. Snout length is the length from the anterior tip of snout to the anterior tip of eye. Body depth is the vertical distance from anterior base of dorsal fin to belly of fish. Lateral line count includes all pore-bearing scales from behind head to end of the caudal peduncle. Abbreviations: Standard length, SL; total length, TL; lateral line, LL; dorsal fin, D (D1, 1st D and D2, 2nd D); anal fin, A; caudal fin, C; pectoral fin, P1; pelvic fin, P2; number of unbranched rays (some may be embedded in flesh requiring dissection) in D and A are represented by Roman numerals; branched rays by Arabic numerals (Fig. 2). Clarity and use of the identification key was tested by local university and high school students, and Greek university students and colleagues involved in various aspects of our studies in Greece.