

**THE DADIA–LEFKIMI–SOUFLI FOREST NATIONAL PARK, GREECE:
BIODIVERSITY, MANAGEMENT AND CONSERVATION**

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Illustrations by
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A preliminary list of fishes of the Dadia–Lefkimi–Soufli Forest National Park

Stamatis Zogaris, Leonidas Vardakas, Alcibiades N. Economou and Panos S. Economidis

Fishes are among the more poorly studied vertebrates in the area. Through a literature review, incidental sightings and two electrofishing sampling sessions conducted in 2009, seventeen species of fish belonging to seven families, were recorded in the Dadia–Lefkimi–Soufli Forest National Park. Several anthropogenic pressures, such as roads, fords, dams and over-abstraction of water threaten fish populations and disrupt natural distributions within the park. Habitat conservation measures must be taken for the park's streams. Their fish populations are also in need of further ichthyological research and monitoring.

Keywords: Fish species, endemics, electrofishing, threats, River Evros

The Dadia–Lefkimi–Soufli Forest National Park (DNP) is crossed by six small sub-basin streams, all of which flow into the River Evros, which hosts one of the richest ichthyofaunas in the Balkans. Forty-seven freshwater species of fish have been recorded within the entire Evros basin, while 41 have been confirmed within Greek territory (Economou et al. 2007). This report provides a first account of the recorded freshwater fishes of the park.

Methods

A literature review revealed scant information on the area's fishes. In the early 1970's Economidis (1974) was probably the first to survey several sites on the lower parts of some of the park's streams. More recently, the Institute of Inland Waters (Hellenic Centre for Marine Research) surveyed the park's running waters on two short visits in April and July 2009. Incidental sightings at 14 stream locations were added to the results of electrofishing at two sites on the July visit: Lyra (Mavrorema) and on the lower part of the Mangazi stream (2 km west of the park boundary). Only 50 m of stream were sampled

at both sites but nearly all representative habitats at these lowland sites were investigated. The electrofisher used was a Hans-Grassel GmbH battery-powered backpack, model IG200-2 (1.5 kW output power, 35-100 Hz, max. 850 V, DC (pulsed)). Additional information and photographic documentation of fish species occurrence was provided by experienced observers in the area.

Results

The occurrence of 17 fish species representing seven families were confirmed within the DNP (Table 1). This preliminary list is certainly incomplete since many surface water types have not been surveyed. Taxonomy follows Kottelat and Freyhoff (2007) where no subspecies are recognized, although some distinctive local fish populations of the Evros basin were assigned subspecies status in the recent past (Economidis 1991, Economou et al. 2007). Some of the park's fish species are rather range-restricted endemics (e.g. *Barbus cyclolepis*, *Squalius orpheus*, *Cobitis strumicae*). These species are confined to the Freshwater Ecoregion of Thrace, a distinctive part of the eastern Balkans, east of the Vardar–Strymon

Table 1. Preliminary list of fishes in the Dadia–Lefkimi–Soufli Forest National Park. Nearly all species on the list were documented in the park in 2009. Species whose presence was documented within the extent of the current park area in the early 1970s by Economidis (1974) are marked with an asterisk.

Anguillidae

1. *Anguilla anguilla* (Linnaeus, 1758) *

Cyprinidae

2. *Rhodeus amarus* (Bloch, 1782) *
3. *Gobio bulgaricus* Drensky, 1926 *
4. *Barbus cyclolepis* Heckel, 1837 *
5. *Carassius gibelio* (Bloch, 1782)
6. *Cyprinus carpio* Linnaeus, 1758
7. *Alburnus alburnus* (Linnaeus, 1758) *
8. *Chondrostoma vardareense* Karaman, 1928
9. *Rutilus rutilus* (Linnaeus, 1758) *
10. *Squalius orpheus* Kottelat & Economidis, 2006
11. *Vimba melanops* (Heckel, 1837)

Cobitidae

12. *Cobitis strumicae* Karaman, 1955 *
13. *Cobitis punctulata* Erk'akan, Atalay-Ekmekçi & Nalbant, 1998

Siluridae

14. *Silurus glanis* Linnaeus, 1758

Esocidae

15. *Esox lucius* Linnaeus, 1758

Percidae

16. *Perca fluviatilis* Linnaeus, 1758

Gobiidae

17. *Proterorhinus semilunaris* (Heckel, 1837) *
-

watershed boundary (Abel et al. 2008). Several other species are confined to the southern Balkans (e.g. *Vimba melanops*, *Chondrostoma vardareense*) and are also of biogeographic and conservation interest. One recently described stagnophilous loach, *Cobitis punctulata*, is especially notable since its reported world distribution is confined to the lower Evros and NW Anatolia (Freyhof et al. 2008). Nearly all species recorded in the DNP are native to the area; although one is considered an alien that has long become naturalized (*Carassius gibelio*) (Kottelat and Freyhoff 2007) and another has an ambiguous distributional origin (*Cyprinus carpio*). In fact the Common Carp *Cyprinus carpio* has long been considered as native to the Evros Basin by several authors (Economidis 1991, Economou et al. 2007) yet recent opinions confine native European populations

primarily to the river basins of the Black Sea (Kottelat and Freyhoff 2007).

Several of the area's rheophilic fishes make upstream migrations and some are known to migrate tens of kilometres from lowland source-pool areas (most notably species in the genera *Chondrostoma*, *Squalius*, *Barbus* and *Vimba*). Initial observations show that the park's uplands and its intermittent streams hold relatively few species, primarily rheophilic cyprinids. Summer drought creates distinctive surface water drying and produces shallow river-bed pools which support remarkable densities of migrant fish; these sites provide food resources for many species of terrestrial wildlife and waterbirds in late spring and summer (G. Catsadorakis pers. comm.). The lowland's perennial reaches are in contrast relatively species-rich (e.g. nine species were collected along the 50 m of the Mangazi stream sampled and seven at Mavrorema (Lyra), giving a total of 13 species). Distinctive stagnophil assemblages were observed at slow-flowing marsh-fringed lowland reaches that exist in several areas near the park's eastern boundary (a typical stagnophil community of the Lyra stream, for instance, included *Esox lucius*, *Rutilus rutilus*, *Silurus glanis* and *Cobitis punctulata*, while widespread rheophilic species were rare or missing).

Discussion

Fishes are among the more poorly studied vertebrates in the protected area. Baseline data on species assemblages and distributions are poor for the entire Greek part of the Evros basin (Economou et al. 2004). Freshwater fish are of high ecological interest, since the park's fish fauna is relatively rich and due to the area's lowland and low-sloping upland landscapes, several species are able to migrate far into the park from their lowland source-pools. The trunk of the lower Evros River is one of the richest areas for freshwater fishes in the Balkans and is located only a few kilometres from the park's eastern boundary. In this way the Evros presumably functions both as a source and a refugium for species that have permanent populations and/or periodically migrate into the streams of the park.

Several anthropogenic pressures harm fish populations or restrict species' natural distributions within the park area. During the last few decades new roads and bridges as well as small dams have created obstacles to natural fish movements within the park. In some lowland areas river channels have been straightened and riparian wetlands and woodlands have been degraded;

signs of increased eutrophication in these canalized areas have been observed at localized sites (e.g. near Provatonas, Lefkimi and Lyra). Locally, water abstraction for agriculture has also impacted summer surface water flows but stream ecology has been poorly studied in the park (Argyroudi et al. 2009). The park's streams need immediate monitoring and habitat conservation measures as well as further ichthyological research based on a monitoring scheme since fish may act as indicators of stream ecosystem integrity.

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