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***SHORT PAPER***

# Extinct Endemic Fishes of Turkey: *Alburnus akili* (Gövce) and *Pseudophoxinus handlirschi* (Kavinne) (Pisces: Cyprinidae)

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**Abstract**

The extinction process of the endemic inland fishes of Turkey, *Alburnus akili* (gövce) and *Pseudophoxinus handlirschi* (kavinne) is studied. The assessment is based on the field studies and observations during the last two decades (1990-2010), along with a survey of the literature. The piscivorous effect of *Sander lucioperca* introduced into lakes Eğirdir and Beyşehir has been concluded to be the major factor in the disappearance of *Pseudophoxinus handlirschi* in the early 1970s and of *Alburnus akili* after 1985.

*Keywords*: *Alburnus akili, Pseudophoxinus handlirschi,* Lake Beyşehir, Lake Eğirdir, extinct.

**Türkiye'nin Yok Olan Endemik Balıkları: *Alburnus akili* (Gövce) ve *Pseudophoxinus handlirschi* (Kavinne) (Pisces: Cyprinidae)**

**Özet**

Bu çalışmada Türkiye'nin endemik içsu balıklarından *Alburnus akili* (gövce) ve *Pseudophoxinus handlirschi* (kavinne)'nin yok oluş süreçleri irdelenmiştir. Veriler son 20 yıllık (1990–2010) arazi çalışması, gözlemler ve kaynak araştırmasına dayanmaktadır. Türlerin yok olmasına, Eğirdir ve Beyşehir göllerinin yabancı türlerinden *Sander lucioperca*'nın pisivor etkisinin en önemli etken olduğu, bu etki sonucu *P.handlirschi*'nin 1970'li yılların başında, *Alburnus akili*'nin ise 1985 yılından sonra neslinin tükendiği kanısına varılmıştır.

*Anahtar Kelimeler*: *Alburnus akili, Pseudophoxinus handlirschi,* Beyşehir Gölü, Eğirdir Gölü, nesli tükenmiş.

## Introduction

Today, catastrophic deteriorations in the natural environment cause a continuous decline in the populations of inland water fish species that can reach critical levels and, in the case of local endemics, even lead to their extinction. Major causes of environmental deterioration in Turkey include drainage of wetlands for agricultural purposes (as in the Avlan and Söğüt lakes in Southwestern Anatolia, the Eşmekaya swamp in Central Anatolia), introduction or invasion of alien and predatory fish species (Lakes Eğirdir and Beyşehir), construction of hydroelectric power plants and irrigation systems without fish passage, habitat alteration due to manipulation of river beds and increase of industrial, domestic, and agricultural pollutants.

The exact number of Turkish endemic inland water fishes is not known. In a previous study (Küçük, 2006) a total of 74 endemic taxa was listed for Turkey of which two species were reported as being extinct. It was suggested to consider 18 species as Critically Endangered (CR), 5 species as Endangered (EN), 14 species as Vulnerable (VU), 2 species as Near Threatened (NT), 21 species as Data Deficient (DD), 3 species as Least Concern (LC), while only 2 species were Not Evaluated (NT). In the present study, the extinction process of the two species mentioned by Küçük (2006) is dealt with in more detail.

The study is based on field studies and observations carried out during the last two decades (1990–2010), along with interviews with the elder fishermen and local people. To meet the requirements of IUCN Red List Categories and Criteria (version 2010.4), sampling was carried out in suspected and known habitats of *P. handlirschi* and *A. akili* with electric fishing equipment and seine nets with 2 mm

mesh size in each season of the last 5 years.

*Alburnus akili*, described by Battalgil (Battalgazi) in 1942, was originally restricted to Lake Beyşehir (Figure 1), but apparently later colonized Lake Suğla (Seydişehir) through the Çarşamba channel that opened in the early 1900s. Subsequent records from Lake Beyşehir were given by Numann (1958), Balık (1980) and Erdemli (1982). Balık (1980) reported 28 specimens with total lengths between 14 and 25 cm, sampled from Lake Beyşehir in the 1976–1978 periods. Erdemli (1982) examined 300 specimens caught in the same period. None of the authors gave data about the population structure of the species. According to the annual report of the Republic of Turkey Ministry of Agriculture and Rural Affairs, Isparta Directorate of Agriculture (Anonymous, 1986), economical fish species from Lake Beyşehir and their percentages in 1985 were: *Sander lucioperca* (37.6%), *Cyprinus carpio* (31.2%), *Leuciscus lepidus* (now *Squalius anatolicus*) (20%), *Chondrostoma regium* (now *C. beysehirense*) (7.6%) and *Alburnus akili* (3.5%). *S. lucioperca*, introduced from Lake Eğirdir in 1978 and 1980 according to official records of the Isparta Provincial Directorate of Agriculture, was stated to have destructive effects on the native fish taxa already in the late 1980s (Balık, 1997). Analyses of pike-perch stomach contents (Balık, 1999) suggest that *Capoeta mauricii* (mentioned as *C. pestai*) and *A. akili* disappeared from Lake Beyşehir since the middle of 1990s. In the 1990–2010 period, several fishing campaigns and observations were carried out in the Lake Beyşehir area, amongst others by Van Neer *et al*. (2000, 2008). These surveys covered Lake Beyşehir and connected waters such as the Sarıöz Stream, Eflatunpınarı, the Çarşamba channel, Lake Suğla and connected channels, the Soğuk and İli streams, the Kuğupark and Deliktaş brooks. Despite all efforts, not a single individual of *A. akili* could be found. Also, frequent confusion of *Pseudophoxinus battalgilae* with the species has been observed among professional and amateur fishermen in Lake Suğla. Additionally, from the outlet of Çarşamba channel (Beyşehir), a population of introduced *Alburnus escherischii* were reported (Freyhof and Özuluğ, 2009). The species is considered to be brought unofficially.

Early records for *Pseudophoxinus handlirschi* were from Kosswig and Geldiay (1952), Numann (1958) and Akşıray (1961) from Lake Eğirdir (Figure 2). According to the records of the Isparta Provincial Directorate of Agriculture (1985), 175 tons of *P. handlirschi* were harvested in Lake Eğirdir in the 1958–1961 period, constituting 20.5% of the total landings consisting *C. carpio, V. vimba, C. pestai* and *P. handlirschi*. In the 1990–2010 period, several fishing campaigns and observations were carried out in Lake Eğirdir and connected waters such as the Kayaağzı, Karaot and Mücevre brooks, the Yalvaç, Gelendost and Çayköy streams. Despite all the fishing efforts (e.g., Van Neer *et al*., 2000, 2008), not a single individual of *P. handlirschi* could be found. The species was also lacking from the stomach contents of pike-perch investigated by Campbell (1992). Until recently, the species has been erroneously reported from the upper Köprüçay River (Küçük, 1998; Küçük and İkiz, 2004; Yeğen *et al*., 2006). It is in fact a closely related species, as suspected by Van Neer *et al*. (2008: 309-310, Köprüçay specimens labeled in table as *Pseudophoxinus* cf. *handlirschi*) and first explicitly mentioned by Küçük *et al*. (2009). Afterwards, Freyhof and Özuluğ (2009) described the Köprüçay population as a new species, *Pseudophoxinus fahrettini*. These findings suggest that *P. handlirschi* lived only in Lake Eğirdir.

Field studies and observations from the last 20 years, as well as interviews with elder fishermen and

**Figure 1.** *Alburnus akili* (gövce) ESFM-PISI/ 1978-06, 150 mm SL, Lake Beyşehir.

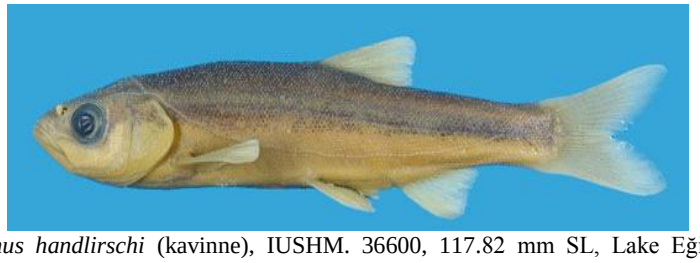

**Figure 2.** *Pseudophoxinus handlirschi* (kavinne), IUSHM. 36600, 117.82 mm SL, Lake Eğirdir (from Freyhof and Özuluğ, 2009).

local people were evaluated. Although no official record or publication exist, it seems that *P. handlirschi* became extinct in the early 1970s for the same reason as *A. akili* namely the predatory effect of *S. lucioperca* that was introduced in Lake Eğirdir in 1955 (Numann 1960: 40, 1961: 788). The extinction process of *P. handlirschi* took approximately 25 years, that of *A. akili* nearly 15 years.

The reasons behind the higher susceptibility to predation pressure of these two species, as compared to sympatric cyprinid species, are thought to be their pelagic life styles and inability to pass some stages of their lives (like the reproductive stage) in streams, rivers and channels, thus being preyed upon by the pike-perch in all developmental stages. In conclusion, the status of *P. handlirschi*, labelled as Critically Endangered (CR, A2ae) in the latest IUCN assessment (IUCN 2010.4), should be changed into EX (extinct).

### Abbreviations

ESFM-PISI; the Museum of Ege University Fisheries Faculty Inland Water Fish Collection, İzmir, IUSHM; Istanbul University, Science Faculty, Hydrobiology Museum, Istanbul.

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## References

Anonymous, 1986. Beyşehir Gölü'nün Limnolojik Özelliklerinin Araştırılması Projesi Sonuç Raporu, T.O.K.B. Isparta İl Müdürlüğü, Isparta.

Akşıray, F. 1961. Bazı Türkiye göllerine aşılanan sudak (*Luciopeca lucioperca*) balıkları hakkında. İ. Ü. Fen Fak. Hidrobiyoloji Enst. Yayınları, IV:104–113.

Balık, S. 1980. Güney Anadolu Bölgesi içsularında yaşayan tatlısu balıklarının sistematik ve zoocoğrafik yönden araştırılması. Doçentlik tezi, Ege Üniv. Fen Fak., İzmir, 139s.

Balık, İ. 1997. Beyşehir Gölü su ürünlerini geliştirme projesi, balık populasyonlarının araştırılması ve sudak populasyonunun göl balıkçılığı üzerine etkileri. Tarım ve Köyişleri Bakanlığı, Eğirdir Arş. Enst. Müd., Eğirdir, Isparta, 93 pp.

Balık, İ. 1999. The feeding features of the pike-perch (*Stizostedion lucioperca*) population in Lake Beyşehir. Turk. J. Zool., 23: 189-194.

Battalgil, F. 1942. Contribution a la connaissance des poissons des eaux douces de la Turquie. Revue de la Faculte des Sciences de l'Üniversite d'İstanbul, 7: 287-306.

Freyhof, J. and Özuluğ, M. 2009. *Pseudophoxinus fahrettini*, a new species of spring minnow from Central Anatolia (Teleostei: Cyprinidae). Ichthyol. Explor. Fresh, 20 (4): 325–332.

Campbell, R.N.B. 1992. Food of an introduced population of pikeperch, *Stizostedion lucioperca* L. in Lake Egirdir, Turkey. Aquac. Fish. Manag., 23: 71-85.

Erdemli, A.Ü. 1982. Beyşehir Gölü Balıkları. Selçuk Üniv. Fen Fak. Dergisi, 2:131-142.

IUCN, 2010. Iucn Red List of Threatened Species (version 2010.4).www.iucnredlist.org (17.03.2011).

Kosswig, C. and Geldiay, R. 1952. Eğirdir Gölü balıkları. balık ve balıkçılık, İst Üniv. Fen Fak. Hidrobiyoloji Arş. Enst. Yayınları, 3(1): 3–14.

Küçük, F. 1998. Isparta ili içsularında yayılış gösteren tatlısu balıklarının sistematik ve ekolojik özellikleri üzerine araştırmalar. Isparta'nın Dünü, Bugünü, Yarını Semp., 16-17 Mayıs, Isparta.

Küçük, F. and İkiz, R. 2004. Fish fauna of streams discharging to Antalya Bay. E.U. J. Fish. Aquat. Sci., 21: 287–294.

Küçük, F. 2006. Appreciation according to scale IUCN of Türkiye endemic freshwater fish. I.proceedings of the national conference on stocking and reservoir management symposium, Antalya-Turkey: 151-159. (in Turkish).

Küçük, F., Sarı, H.M., Demir, O. and Gülle, İ. 2009. Review of the ichthyofaunal changes in Lake Eğirdir between 1915 and 2007. Turk. J. Zool., 33:277-286.

Numann, W. 1958. Anadolu göllerinde limnolojik ve balıkçılık ilmi bakımından araştırmalar ve bu göllerde yaşayan sazanlar hakkında özel bir etüd. İst. Üniv. Fen Fak. Monografi, İstanbul, 7: 114 pp.

Numann, W. 1960. Limnologische untersuchungen einiger Anatolischer seen, Internationale Revue der Gesamte Hydrobiologie, 45: 11-54.
doi: 10.1002/iroh.19600450103

Numann, W. 1961. Die Anatolischen seen und ihre fischereiliche bewirtschaftung, zeitschrift für fischerei und deren hilfswissenschaftung, 10(8-10): 773-799.

Van Neer, W., Wildekamp, R.H., Küçük, F., Ünlüsayin, M., Waelkens, M. and Paulissen, E. 2000. Results of the 1996 survey of the fish fauna of the Aksu River and some lakes in Southwestern Anatolia, and the implications for trade at Sagalassos, In: M. Waelkens and L. Loots (Eds.) Sagalassos V. Report on the survey and excavation campaigns of 1996 and 1997, Leuven: 828-842.

Van Neer, W., Wildekamp, R.H., Küçük, F. and Ünlüsayın, M. 2008. The 1997-1999 surveys of the Anatolian fish fauna and their relevance to the interpretation of trade at Sagalassos, In: P. Degryse and M. Waelkens (Eds.), Geo-and Bio-Archeology at Sagalassos and in its Territory, Leuven: 299-323.

Yeğen, V., Balık, S., Bostan, H., Uysal, R. and Bilçen, E. 2006. Recent status of fish fauna in some lakes and dams in lakes region, In: I. proceedings of the national conference on stocking and reservoir management symposium, Antalya-Turkey: 129-139. (in Turkish).