

FRESHWATER FISH IN ISTRIAN PENINSULA

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ABSTRACT

In the ichthyological research carried out from 1981 to 1993, twenty-two taxa (species, subspecies) and one hybrid (*Salmo trutta m. fario* x *S. marmoratus*) from 10 families (*Siluridae*, *Anguillidae*, *Esocidae*, *Salmonidae*, *Cyprinidae*, *Cyprinodontidae*, *Poeciliidae*, *Gasterosteidae*, *Cottidae*, *Gobiidae*) were recorded in fresh waters of the Istrian Peninsula. Twelve of them were native, and 10 introduced. Results differ in comparison with literature data, in which 27 taxa and one hybrid from 11 families were listed, as well as one lamprey species (*Petromyzontidae*). We failed to repeat the records of five species listed in the literature, i.e. *Barbus barbus*, *B. meridionalis*, *B. caninus*, *Leuciscus cephalus*, and *L. leuciscus*. The mentioned data were related to *Barbus plebejus*, and *Leuciscus cephalus albus* and *L. svallize* respectively. The taxa *Gobio gobio obtusirostris*, *Knipowitschia panizzai*, *Leuciscus svallize*, *Carasius auratus auratus*, and *Carassius auratus gibelio* represent the first records for Istrian waters. For the first time, *Alburnus albidus alborella* was caught in the Mirna river and in Butoniga reservoir. Old data were related exclusively to Lake Čepić, drained out in 1932/33. The presence of *Leuciscus svallize* in Istrian waters is the most northernmost record of its occurrence in the Adriatic Basin. The present study has expanded the distribution data on *Phoxinus phoxinus*, *Rutilus rubilio*, and *Gambusia affinis* in Istrian waters. The northernmost occurrence of *Rutilus rubilio* in Croatia was registered in the Boljunčica stream and the Raša river.

Key words: Freshwater fish, distribution, Istria, Adriatic catchment area

Ključne besede: Sladkovodne ribe, razširjenost, Istra, Jadransko povodje

INTRODUCTION

The fish fauna of the Istrian Peninsula (the Adriatic catchment area) has not been systematically investigated in the past. The first data about Istrian freshwater fish from the second half of the 19th century to the beginning of the 20th century were published by Italian authors (Largaiolli 1904, Marchesetti 1920, Parenzan 1929, Gridelli 1936).

The data published after the Second World War

were scarce, cited localities were not precise (Faler 1953, Tortonese 1970, Žikić & Bertosa 1980, Žikić *et al.* 1982).

STUDY AREA

The results of our research carried out from 1981 to 1993, were based on investigations of 23 sites located on Croatian streams watercourses (the Mirna, the Bracan, the Boljunčica, the Butoniga, the Fojba

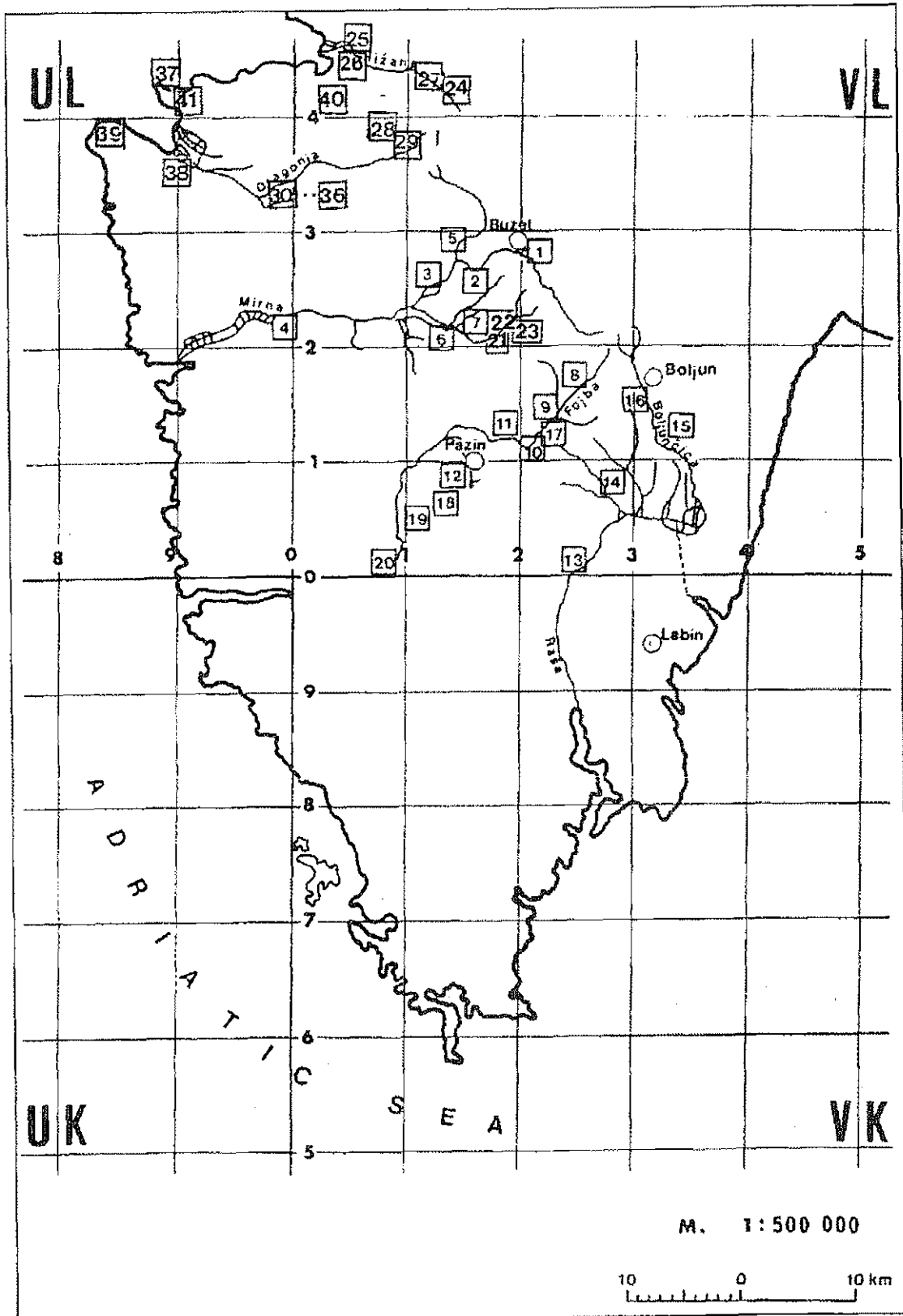


Figure 1: Istrian Peninsula study site locations in Croatia and Slovenia during 1982-1993.
 Slika 1: Zemljevid polotoka Istre z vzorčevalnimi postajami v hrvaškem in slovenskem delu.

Localities in Croatian area of Istrian Peninsula

1. The Mirna River, 600 m upstream of the Buzet brewery,
2. the Mirna River, at Sovinjak,
3. the Mirna River - old river flow at Istarske Toplice,
4. the Mirna River - channeled river flow at Istarske Toplice,
5. the Bracan River, a right tributary of the Mirna River,
6. the Butoniga River - 4 km upstream from the outlet,
7. the Butoniga River - a side channel,
8. the Butoniga reservoir,
9. the Račica stream (a tributary of Butoniga reservoir),
10. the Podmerišče stream (a tributary of Butoniga reservoir),
11. the Fojba (syn: Pazinčica) River; 3 km upstream of Cerovlje,
12. the Fojba River at Cerovlje,
13. the Fojba River at Pazinski Novaki,
14. the Fojba River at Zarečki Krov waterfalls, upstream from Pazin,
15. the Fojba River at Pazin,
16. the Raša River at Pičan,
17. the Tupljak Brook, right tributary of the Raša River,
18. the Boljunčica River at Jasenovik,
19. Letaj reservoir,
20. Rakov Potok reservoir at Cerovlje,
21. pond at Brtoši,
22. pond at Žbrlini,
23. pond at St. Petar u Šumi,

Localities in Slovene area of Istrian Peninsula

24. the Rižana River near the fishfarm,
25. the Rižana River - a side channel at Ankaran,
26. the Rižana River - a side channel at Valdoltra,
27. the Rižana River - by the Rižana village,
28. the Pinjevec River - 2 km upstream from the mouth of the Dragonja River,
29. the Pinjevec River - 200 m upstream from the mouth of the Dragonja River,
30. the Dragonja River - 200 m upstream from the Pinjevec mouth,
31. the Dragonja River - between Koštabona and Planjave,
32. the Dragonja River by Planjave,
33. the Dragonja River by Jamnjek,
34. the Dragonja River, 2.5 km downstream from Jamnjek,
35. the Dragonja River at Mlini,
36. the Dragonja River, 800 m upstream from the outlet,
37. the Strunjan saltworks,
38. the Sečovlje saltworks,
39. Fiesa Lake by Piran town,

40. Vanganel Lake,
41. the Strunjanski potok stream.

(=Pazinčica) and the Raša rivers, the Račica, Podmerišče, the Tupljak streams, the reservoirs Butoniga, Letaj and Rakov Potok, and some smaller water bodies in the neighbourhood of Pazin town) and of 18 sites on Slovene waters (the Rižana, the Pinjevec and the Dragonja rivers, the Strunjanski potok stream, the Fiesa pond at Piran, lake Vanganel and the Strunjan and Sečovlje salt-pans) (See Figure 1).

MATERIAL AND METHODS

Fish were captured by electrofishing. Sampled stream sections were blocked at the upper and lower ends with 6-mm seines. Reservoirs, lakes and ponds were sampled by electrofishing too along the banks as well as by ordinary fishing gear and 30 m long floating nets. Captured fish were identified and then released. Some specimens were kept for further analysis. The material was stored in the Croatian Natural History Museum, the Centre for Fisheries in Zagreb and the Fisheries Research Institute in Ljubljana.

New data collected in 1981-1993 period, were numbered and numbers correspond to the localities recorded in figure 1. Systematic arrangement and taxonomy follow Banareescu (1971), Hureau and Monod (1973) and Lelek (1987).

RESULTS AND DISCUSSION**PETROMYZONTIDAE****I. LETHENTERON** Creaser and Hubbs, 1922

1. *L. /Lampetra/ zanandreai* (Vladykov, 1955)
Origin: Native
Literature: Porečnik (1958b) - streams around Koper.
New data: None.

ANGUILLIDAE**II. ANGUILLA** Shaw, 1803

2. *A. anguilla* (Linnaeus) 1758
Origin: Native
Literature: Largaiolli (1904) - the Čepić Lake; Gridelli (1936) - the Rižana, the Mirna, and the Raša Rivers, and the Čepić Lake; Porečnik (1958b) - the Badaševica and its tributaries; the stream Strunjanski potok - 1973 (Brancelj - personal communication); Žikić & Bertoša (1980) - the Fojba River; Žikić *et al.* (1982) - the Mirna and the Boljunčica Rivers.
New data: 1-8, 10, 18, 24-36 (Figure 2).

ESOCIDAE

III. *ESOX* Linnaeus, 17583. *E. lucius* Linnaeus, 1758

Origin: Introduced

Literature: Gridelli (1936) - /according to Marchesetti 1920/ the Mirna River; Taler (1953) - some waters in Istria; Vuković and Ivanović (1971), Vuković *et al.* (1982) - Istria; Žikić *et al.* (1982) - the Mirna River.

New data: 20, 40 (Figure 2).

THYMALLIDAE

IV. *THYMALLUS* Cuvier, 18294. *T. thymallus* (Linnaeus, 1758)

Literature: Canestrini (1866, 1870), Seeley (1886), and Taler (1944) - Istria.

New data: None.

SALMONIDAE

V. *SALMO* Linnaeus, 17585. *S. trutta m. fario* Linnaeus, 1758

Origin: Introduced

Literature: Žikić *et al.* (1982) - the Mirna River

New data: 24, 27 (Figure 2).

6. *S. marmoratus* Cuvier, 1817

Origin: Native and endemic to the Adriatic Basin

Literature: Gridelli (1936), Porečnik (1958a) - the Rižana, the Raša and the Mirna Rivers; Skorkovsky (1935) - the Rižana River;

New data: 24, 27 (Figure 2).

7. *S. trutta m. fario* x *S. marmoratus*

Literature: Gridelli (1936) - the rivers and streams of the Istrian Peninsula; Porečnik (1958a) - the Rižana River .

New data: 24, 27 (Figure 2).

VI. *ONCORHYNCHUS* Suckley, 18628. *O. mykiss* Walbaum, 1792

Origin: Introduced

Literature: Gridelli (1936) - the Mirna River

New data: 24, 27 (Figure 2).

CYPRINIDAE

VII. *CYPRINUS* Linnaeus, 17589. *C. carpio* Linnaeus, 1758

Origin: Introduced

Literature: Largaiolli (1904), Gridelli (1936) - the Čepić

Lake, the Mirna River, and the ponds around Rovinj; Žikić & Bertoša (1980) - the Fojba River at Pazin town; Žikić *et al.* (1982) - the Mirna and Boljunčica Rivers.
New data: 20, 23, 40 (Figure 2).VIII. *ALBURNUS* Heckel, 184310. *A. albidus alborella* (de Filippi, 1844)

Origin: Native

Literature: Largaiolli (1904), Gridelli (1936) - the Čepić Lake
New data: 1-4, 8 (Figure 2).IX. *BARBUS* Cuvier, 181711. *B. plebejus* Valenciennes, 1842

Origin: Native

Literature: Largaiolli (1904) - the Čepić Lake; Karaman (1928) - Istria; Gridelli (1936) - the Mirna River, the Fojba River and the Čepić Lake.

New data: 1-16, 18, 28, 29, 30-34 (Figure 2).

12. *B. barbus* (Linnaeus, 1758)Literature: Žikić & Bertoša (1980) - the Fojba River; Žikić *et al.* (1982) - the Mirna and the Boljunčica Rivers.

New data: None.

13. *B. caninus* Valenciennes, 1842

Literature: Canestrini (1866, 1870) - Istria.

New data: None.

14. *B. meridionalis petenyi* Heckel, 1847Literature: Žikić *et al.* (1982) - the Mirna River.

New data: None.

X. *CARASSIUS* Jarocki, 182215. *C. carassius* (Linnaeus, 1758)Literature: Gridelli (1936) - the northern Istrian Peninsula.
New data: None.16. *C. auratus gibelio* (Bloch, 1783)

Origin: Introduced

Literature: None.

New data: 3, 4, 20-22 (Figure 2).

17. *C. auratus auratus* (Linnaeus, 1758)

Origin: Introduced

Literature: None.

New data: 22 (Figure 2).

XI. *GOBIO* Cuvier, 181718. *G. gobio obtusirostris* Valenciennes, 1844
Origin: Introduced

Literature: None.

New data: 1-7 (Figure 2).

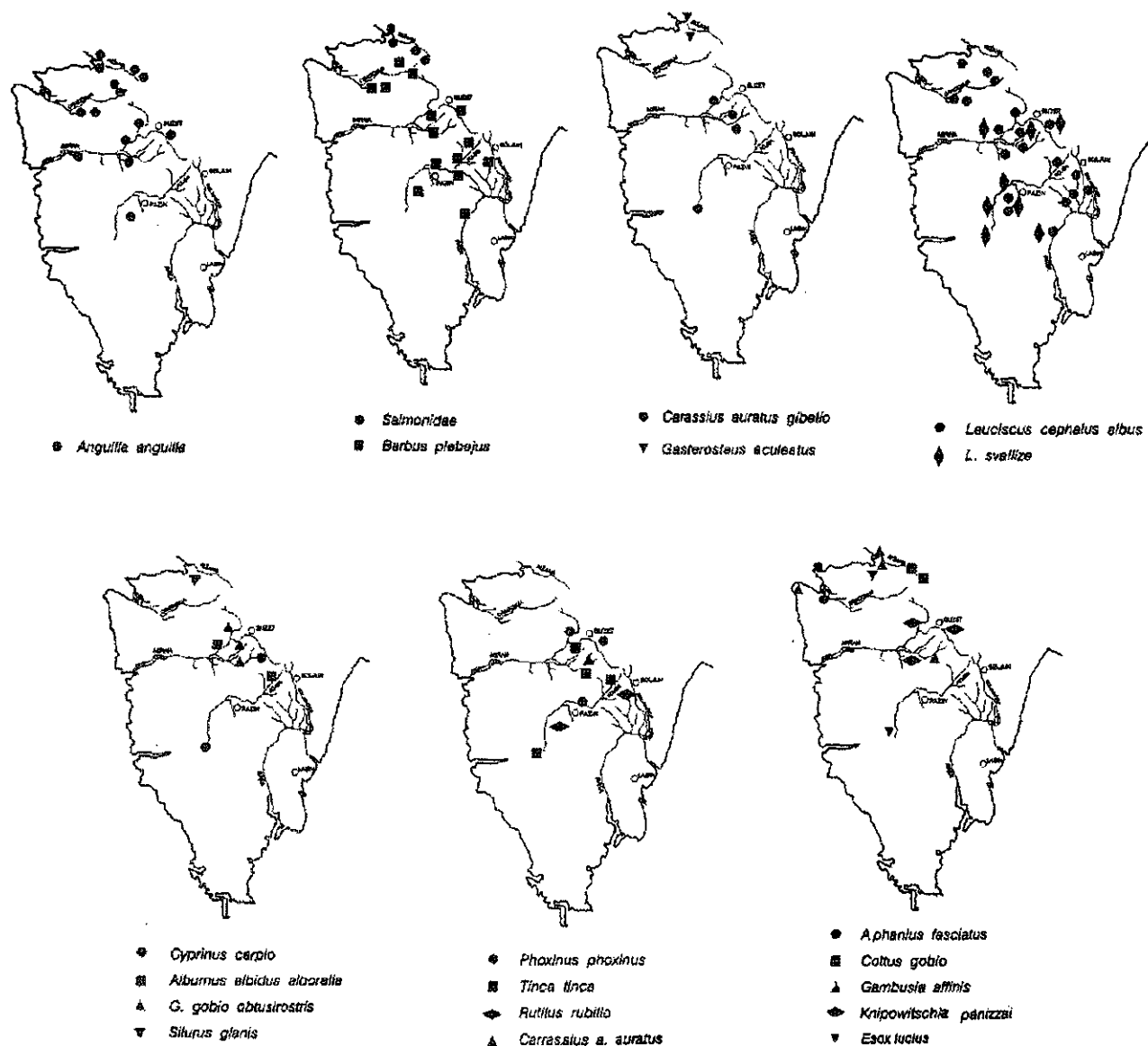


Figure 2: Distribution area of freshwater fish in the Istrian Peninsula.
Slika 2: Razširjenost sladkovodnih rib na istrskem polotoku.

XII. *LEUCISCUS* Linnaeus, 1758

19. *L. cephalus albus* Bonaparte, 1838

Origin: Native

Literature: Gridelli (1936) - the Čepić Lake, the Fojba River near Pazin;

New data: 1-8, 11-16, 18, 19, 28-35, 40 (Figure 2).

20. *L. cephalus cabeda* Risso, 1826

Literature: Heckel & Kner (1858) - the Rižana River; Gridelli (1936) - the Fojba River, the Mirna River; Porečnik (1958a, b) - the Rižana River, the Badaševica

River with tributaries.

New data: None.

21. *L. cephalus* (Linnaeus, 1758)

Literature: Žikić *et al.* (1982) - the Mirna and the Boljunčica Rivers;

New data: None.

22. *L. leuciscus* (Linnaeus, 1758)

Literature: Žikić & Bertoša (1980) - the Fojba River; Žikić *et al.* (1982) - the Mirna River.

New data: None.

23. *L. svallize* (Heckel & Kner, 1858)

Origin: Native

Literature: None.

New data: 1-4, 11-16, 18-20 (Figure 2).

XIII. *PHOXINUS* Rafinesque, 1820

24. *P. phoxinus* (Linnaeus, 1758)

Origin: Native

Literature: Gridelli (1936) - small ponds around the Čepić Lake; the Rižana River, the Mirna River, the Fojba River; Porečnik (1958a, b) - the Rižana River, the Badaševica by Vanganel village.

New data: 1, 5, 11, 24 (Figure 2).

XIV. *RUTILUS* Rafinesque, 1820

25. *R. rubilio* (Bonaparte, 1837)

Origin: Native

Literature: Heckel & Kner (1858), Seeley (1886) - Istria; Gridelli (1936) - the Čepić Lake.

New data: 16, 18 (Figure 2).

XV. *SCARDINIUS* Bonaparte, 1837

26. *S. erythrophthalmus* (L., 1758)

Literature: Bonaparte (1832-1841), Karaman (1928) - Istria; New data: None.

XVI. *TINCA* Cuvier, 1817

27. *T. tinca* (Linnaeus, 1758)

Origin: Introduced

Literature: Largaiolli (1904), Gridelli (1936) - the Čepić Lake; Karaman (1928) - Istria; Žikić *et al.* (1982) - the Mirna River.

New data: 1-4, 8, 20, 21 (Figure 2).

SILURIDAE

XVII. *SILURUS* Linnaeus 1758

28. *Silurus glanis* Linnaeus, 1758 Origin: Introduced

Literature: None

New data: 40 (Figure 2).

COBITIDAE

XVIII. *COBITIS* Linnaeus, 1758

29. *C. taenia* Linnaeus, 1758

Literature: Heckel & Kner (1858) - Istria and Dalmatia; Porečnik (1958a, b) - the Rižana and the Badaševica Rivers. New data: None.

CYPRINODONTIDAE

XIX. *APHANIUS* Nardo, 1827

30. *A. fasciatus* Cuvier & Valenciennes, 1821

Origin: Native

Literature: Gridelli (1936) - saltworks in northern Istria.

New data: 37, 38 (Figure 2).

POECILIDAE

XX. *GAMBUSIA* Poey, 1855

31. *G. affinis* Baird & Girard, 1853

Origin: Introduced

Literature: Gridelli (1936) - central and southern Istria; Porečnik (1958a, b) - the Badaševica River with tributaries, the Rižana River.

New data: 21, 25, 26, 39 (Figure 2).

GASTEROSTEIDAE

XXI. *GASTEROSTEUS* Linnaeus, 1758

32. *G. aculeatus* Linnaeus, 1758

Origin: Native

Literature: Canestrini (1866), Seeley (1886), Taler (1953) - Istria; Gridelli (1936) - the Mirna River; Porečnik (1958a, b) - the Rižana River, the stream Markovski potok (a tributary of the Badaševica River).

New data: 25, 26 (Figure 2).

COTTIDAE

XXII. *COTTUS* Linnaeus, 1758

33. *C. gobio* Linnaeus, 1758

Origin: Native

Literature: Porečnik (1958a) - the Rižana River; New data: 24, 27 (Figure 2).

GOBIIDAE

XXIII. *KNIPOWITSCHIA* Iljin, 1927

34. *K. panizzai* (Verga, 1841)

Origin: Native

Literature: None.

New data: 1-7 (Figure 2).

XXIV. *NEOGOBIUS* Iljin, 1927

35. *N. fluviatilis* (Pallas, 1811)

Literature: Porečnik (1958a) - the mouth of the Rižana River; New data: None

Comparisons of the literature data with our study indicate many discrepancies. Of the 35 species (and subspecies) recorded in literature and registered in our ichthyological research, eleven allochthonous species were registered; one of them, *C. carassius*, was mentioned only in literature. In the research, carried out from 1981 to 1993, 22 species and subspecies as well as 1 hybrid from 10 families were established; 12 species were confirmed as native and 10 as introduced. In literature, 27 species (eleven introduced), 1 hybrid, and 1 lamprey are stated for the same area.

The pike *Esox lucius* occurs in Rakov Potok reservoir (Pazin Angler Society - personal communication), although we did not catch any specimen.

The carp *Cyprinus carpio* is common and abundant in many Istrian waters. Although the carp was reported to be present in Istrian waters already at the beginning of the century, the statement of Žikić *et al.* (1982) that the carp is a native fish species in Istria is not acceptable.

Barbus plebejus is native to the Adriatic Basin and we assumed that the data concerning *B. barbus* by Žikić *et al.* (1982) were related to *B. plebejus*. It is present in most of the Istrian streams, as well as in Butoniga reservoir, while for *B. caninus* and *B. m. petenyi* we did not obtain any data.

We have not information about *C. a. gibelio* being introduced to Istrian waters.

Concerning the genus *Leuciscus* in Istria, Žikić & Bertoša (1980) and Žikić *et al.* (1982) stated that *L. cephalus* and *L. leuciscus* were native to these waters. These species are native to the Danube River basin. We suppose that the mentioned data were related to *L. c. albus* and *L. svallize*, although Bianco (1987) states that *L. c. albus* lives in central Italy only.

We agree with Gridelli (1936) that reports on *L. c. cabeda* from the Mirna and Fojba rivers referred to the subspecies *albus*.

The tench *Tinca tinca*, introduced to the carp fish farms around the Lake Čepić at the beginning of the 20th century, is now abundant in reservoirs and in streams.

The present study has expanded the distribution data of *P. phoxinus*, *R. rubilio*, and *G. affinis* in Istrian waters. The northernmost occurrence of *R. rubilio* in Croatia

was registered in the Boljuniča stream and the Raša river.

Forty years ago, *Gambusia affinis* was a common species in the waters around Koper, but land-reclamation activities led to its almost complete disappearances (Porečnik 1958a).

Bonaparte (1832-1841) and Karaman (1928) reported on the presence of *Scardinius erythrophthalmus* and *Cobitis taenia* in this area, but we did not confirm these data.

Gasterosteus aculeatus used to be widely distributed in Istrian waters. Today its presence was confirmed only in the Rižana river.

Information by Porečnik (1958b) about *Gobius fluviatilis* living in the Rižana river, and lamprey species *Lethenteron zanandreai* in the waters around Koper were not confirmed during this research.

The taxa *Gobio g. obtusirostris*, *K. panizzai*, *L. svallize*, *C. a. auratus*, and *C. a. gibelio* represent the first record of occurrence for Istrian waters. The presence of *Leuciscus svallize* caught for the first time in fresh waters of Istria in the years 1983-1984, is northernmost record of its occurrence in the Adriatic Basin (Leiner 1983, Leiner & Popović 1984).

The presence of allochthonous species *Gobio g. obtusirostris* was recorded for the first time in 1984.

For the very first we caught *Alburnus albidus alborella* in the Mirna river and in the Butoniga reservoir. Old data are related exclusively to the Lake Čepić, drained out in 1932/33.

We did not find any old or new data on the presence of sturgeons (Acipenseridae), and *Petromyzon marinus* occurred in the Adriatic Basin, in the waters of the Istrian Peninsula.

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POVZETEK

V obdobju 1981-1993 so potekale ihtiološke raziskave o razširjenosti sladkovodnih rib istrskega polotoka. Popisanih je bilo 22 vrst in podvrst iz 10 družin in 1 križanec *Salmo trutta m. fario* x *S. marmoratus*. Dvanajst vrst je avtohtonih in 10 naseljenih. Ti podatki se bistveno razlikujejo od literaturnih, ki navajajo, da živi na istrskem polotoku 27 vrst in 1 križanec iz 11 družin ter ena vrsta piškurja.

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