

Huchen in the Czech Republic: A review

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Abstract. This paper focuses on the historical and present occurrence of huchen, *Hucho hucho* (L.), in the Czech Republic. The last autochthonous huchen specimens caught in Moravia at the end of the nineteenth century are discussed, as are huchen stocking and and success rates in the Czech Republic from the late nineteenth century to the present, catches of trophy-sized recreational angling catches of huchen, and the results of measures taken to re-introduce the species to traditional areas of occurrence and to introduce it to new ones. The occurrence of huchen at present is confirmed in some sections of the Labe, Oder, and Morava river basins within the Czech Republic, and all of these populations are sustained through stocking material obtained through artificial reproduction. No self-sustaining huchen populations have been identified anywhere in this region.

Keywords: *Hucho hucho*, occurrence, stocking, recreational fishing, Czech Republic

Introduction

Huchen, or Danube salmon, *Hucho hucho* (L.), originally occurred in the Danube River basin in Europe. Huchen was introduced locally in some other European headwaters (Holčík et al. 1988, Kottelat and Freyhof 2007). Its current distribution in the Danube drainage basin is highly fragmented, and natural huchen reproduction has been heavily restricted by habitat alterations. Human impact, including water pollution, waterway redirection, overfishing, and poorly designed or non-existent fish passes in valley reservoirs, has resulted in the rapid shrinking of huchen natural spawning grounds over the past century. The historical autochthonous occurrence of huchen in the Czech Republic was restricted to the Morava drainage area of the Danube basin (see Hanel and Lusk 2005). Historically, as well as at present, huchen has usually only been stocked randomly at various locations by the members of local chapters of anglers unions or by regional chapters of the Czech or Moravian anglers unions. Releasing huchen into the waters of the Morava drainage basin is classified as an attempt to re-introduce this species, while stocking the Labe or Oder drainage basins is classified as introducing or translocating this species (see Lusk et al. 2008). The authors recognize that the analysis of fishing statistics is prone to being loaded with certain types of error, such as catches not being registered officially.

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Natural populations of huchen are listed in Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats, which was ratified by the Czech Republic in 1998. These huchen populations are also included in appendixes II and V of Directive no. 92/43/EEC, and this species was subsequently listed in Public Notice no. 166/2005 Coll. and mentioned in Appendix no. 2(A). Huchen is not included in Law no. 114/1992 Coll. on the conservation of nature and landscapes (amended in no. 460/2004 Coll.) in the Czech Republic at present, but it is listed in Public Notice no. 395/1992 Coll. which, among other things, includes a list of specially protected native species according to the degree to which they are endangered. According to the most recent Red List of Lampreys and Fishes of the Czech Republic – Version 2010 (Lusk et al. 2011), huchen is classified as extinct in the wild.

The main aim of the current paper is to evaluate both historical and present data regarding huchen in the Czech Republic and to make a prognosis of its fate.

Methods

The occurrence and/or absence of huchen in the study area of the Czech Republic was recorded during various ichthyofauna field surveys. Catches were made with electrofishing in running waters and with entangling nets and traps in reservoir waters. The field research focused on drainage areas where huchen was stocked, while further data were obtained from the fishing statistics of Czech or Moravian anglers unions and from historical and current literary sources (see References). The period analyzed was from the late nineteenth century to the present. Unreliable data about caught huchen were omitted. The total length of the fish caught was used, which is the maximum length of the fish from the closed mouth to the end of the tail fin pinched together. The location in which the catches were made is given in river km; the figures for fish caught in reservoirs refer to dam position.

Results

Last occurrence of natural huchen in Moravia

Huchen were known to be native only to the Morava and Dyje rivers in Moravia in the past. Catches of the last Moravian huchen from autochthonous populations were recorded in the late nineteenth century. Two huchen individuals weighing 10.08 kg and 15.68 kg were caught in the Morava River (German: March) in 1870 near the village of Chromeč (river km 307.0) as was noted in a Viennese almanac (Anonymous 1874) and in Janásek (1973). Kašpar (1886) wrote about huchen occurrence near the village Bludov (river km 304.0) in the Morava River, and this species was observed in the short stretch between the villages of Klášterec (river km 311) and Sudkov (river km 302) near the mouth of the Desná River (German: Tess). At this location, huchen was caught primarily with net gear and only sporadically by angling. Since these fish were not observed beyond this section of the river, it was classified by the author as a non-migratory, sedentary species. It is mentioned as a curiosity that huchen was cultured by local manorial lords in special ponds. Kašpar also mentioned an unusual way of catching this fish: shooting it with rifles directly in rivers, which is how the author himself caught a huchen weighing 6.67 kg near Bludov Mill (river km 304.5). A huchen of 16.8 kg was exhibited ceremonially at Bludov Castle. Two huchen of 10 and 15.9 kg, destined for market, were sighted eight years ago in the possession of an angler from the village of Chromeč.

Zbořil and Absolon (1916) mentioned the rare occurrence of huchen in the Morava River in the vicinity of the city of Hodonín between river km 101.8–115.1. These authors also reported huchen in the lower Slovak stretches of the Danube River. Dyk (1956) and Holčík et al. (1988) also reported, without any details, the historical presence of huchen in the vicinity of the city of Olomouc (river km 233.0).

A huchen weighing 14 kg was netted on 2 April 1893 in the Dyje River near the village of Lednice

(river km 37.0; see Zbořil and Absolon 1916). These authors postulated that, because of its size, this fish was not of the local population, but that it had migrated from the Danube River. A life-size painting by the Austrian public servant, photographer, and painter Raimund Stillfried von Rathenitz hangs at the biological station in Lednice (Dyk 1956).

One specimen (115 cm and 15.5 kg) of huchen was caught during the flood in 1900 in the Morava River near the town Kroměříž (in German – Kreamsier; river km 193.0; see Kitt 1905). This is considered to be the last piece of evidence of the autochthonous occurrence of huchen in the Moravian region. The lack of data on huchen abundance in Moravian rivers in the nineteenth century means it is impossible to determine this precisely; however, available information does indicate that it occurred only rarely and sporadically. According to Kitt (1905), huchen was not a permanent inhabitant of Moravian waters, but rather an infrequent stray from the Danube River.

Artificial stocking, catches, and natural spawning of huchen in the Czech Republic

Artificial stocking of huchen in the Czech Republic was rare in the late nineteenth century and sporadic in the twentieth and twenty-first centuries. When stocking was done, it was not restricted to the Moravian and Silesian waters of the Danube and Oder river basins, but was also conducted in the Bohemian waters of the Labe river basin. Hanel (1989, 1990) studied huchen that had been caught by angling in the former Czechoslovakia until 1986. This sample comprised 158 huchen with total lengths ranging from 54 to 150 cm and weights ranging from 2 to 32 kg. Most of these specimens were caught during November and December from 07:30 to 17:30. The exterior diameter of the fishing line used in these catches ranged between 0.28-0.70 mm. The following fish species were used as a bait, and 53% of the sample were caught with them: dace, *Leuciscus leuciscus* (L.); bleak, *Aburnus alburnus* (L.); gudgeon, *Gobio gobio* (L.); stone

loach, *Barbatula barbatula* (L.); perch, *Perca fluviatilis* L.; bullhead, *Cottus gobio* L. Artificial bait lures were successful in 43% of catches, while earthworms or artificial wooden fish were used as bait rarely. The length-weight relationship in this sample without sex differentiation was calculated as follows: $\log_w = 2.74006 \log TL - 4.48442$ (W – body weight in kg, TL – total length in cm, $r = 0.997$). These parameters are similar to data published by Holčík et al. (1988) pertaining to huchen from Czechoslovak waters. According to these authors, there is no demonstrable difference between male and female growth except in the condition coefficient index (K), which is slightly higher in females.

Ivaška (1951) summarized huchen occurrence in the Moravian streams Bečva, Morava, Dyje, and Svratka, while Lusk (1976a) did so for its occurrence in Moravia. Kokeš (1998) also presented summaries of general information about huchen in Czech and Moravian regions. Huchen catches in the Vsetínsko region of southern Moravia at non-salmon fishing grounds, but without naming locations, were reported by Čermák (2000). In the 1979-1985 period, 150,000 eggs were hatched and then 16,400 huchen fry aged one year were released at various fishing grounds of local angling clubs in Třebíč and Stěnovice in the Morava drainage basin, Moravice in the Oder drainage basin, and in Pardubice and Hradec Králové in the Labe drainage basin.

Oder basin

The first documented introduction of huchen was conducted by the former German Fisheries Association in the Silesian town of Český Těšín in the Olše River (German: Olsa; Polish: Olza) in 1888-1891. The Olše River, a right tributary of the Oder River (Polish: Odra), flows from the Silesian Beskids through southern Cieszyn Silesia in Poland and the Frýdek-Místek and Karviná districts of the Czech Republic, and it often forms the border with Poland. It flows into the Oder River to the north of Bohumín. Altogether, 800 huchen fry aged one were stocked in

the river during this period (Ehrler 1935). An unknown number of huchen escaped from the local fish hatchery in 1937 after the Olše River flooded. The next intentional stocking release of huchen was in 1943. Supposedly, natural spawning was observed, but huchen disappeared successively because of the deteriorating aquatic environment. At present, huchen occurrence in the Olše River is unconfirmed.

Dyk (1952) and Lusk (1976a) reported that huchen had become naturalized in 1949 in the Moravice River (German: Mohra), which is a right tributary of the Opava River (German: Oppa; Polish: Opawa). Members of the angling association of fish breeders in the town of Bělá released huchen fingerlings from a Slovakian fish hatchery in the town of Martin. A total of 300 specimens that had been reared to lengths of 9-12 cm were stocked near the now non-existent village of Karlovec (German: Karlsberg, river km 69.0), which was flooded when the Slezská Harta Dam Reservoir was inundated. Huchen were relocated 10-15 km downstream as a consequence of polluted water. Several thousand fingerlings and one- and two-year-old huchen were released in the 1951-1953 period into the Moravice River. Sporadic huchen weighing about 1 kg were captured in 1950 downstream from the village of Karlovec. Huchen weighing about 4 kg were observed there in 1952. Fingerlings from natural reproduction were observed there in 1954, and natural huchen breeding was observed in 1955 near the mouth of Černý Brook, which is a left tributary of the Moravice River. Fish ranging in length from 70-80 cm spawned. Natural huchen breeding was also observed in the Moravice River near Karlova Pláň (German: Neurode, river km 70.0) in 1970-1971, when an angler reported catching one huchen weighing 16 kg; this fish was released back to the river (Holčík et al. 1988).

Huchen was also noted in the Morávka Valley Reservoir (79.4 ha) in the Stonávka River (Polish: Stonawka), which is a left tributary of the Olše River (Lojkásek 1998, Lojkásek et al. 2006). Several thousand specimens measuring about 10 cm in length and reared at the Slovak fish farm in Bytča were stocked into this valley reservoir in 1991 (7.5

specimens per hectare) and 1992 (8 specimens per hectare). The length growth of these fish was tracked up to 1996 when the reservoir was drained. The largest huchen caught measured 91 cm and weighed 5.6 kg. Lojkásek (1998) did not later confirm the occurrence of huchen in the Stonávka River.

Huchen was stocked in 1991-1992 into the Šance Dam Reservoir (river km 45.0, 336 ha) on the Ostravice River (German: Ostrawitz; Polish: Ostrawica), a right tributary of the Oder River. Subsequent data regarding huchen from this dam reservoir are not available (Lojkásek et al. 2006). Lohniský (1973, 1977) reported that huchen eggs were released in 1969 from the fish hatchery in the village of Hynčice near the town of Broumov. Juvenile huchen escaped from this fish hatchery and reached the Stěnava River (German: Steine, Stynau, Steinwasser or Steinau; Polish: Ścinawka), a left tributary of the Kladská Nisa River (Polish: Nysa Kłodzka). Several specimens measuring 25-35 cm in length were caught there in 1973-1974, but huchen was not noted subsequently in the Stěnava River (Halačka et al. 2002). Witkowski did not note huchen in the Polish sections of the Stěnava River (Holčík et al. 1988), but it was confirmed sporadically in the upper drainage area of the Nysa Kłodzka River (Witkowski 1979). Huchen occurrence was not confirmed by the most recent ichthyological research conducted in the Nysa Kłodzka river system (Kotusz et al. 2009). Huchen was not stocked recently into the Oder River drainage basin according to data from the Czech Anglers Union.

Labe basin

In the Czech Republic, huchen was released into the Labe (German: Elbe) drainage basin in 1949 and 1952, when this species was stocked into the Otava River, a left tributary of the Vltava River, in the vicinity of the village of Žichovice (river km 82.0) and into the upper section of the Vltava River (Dyk 1952, Smíšek 1953, 1958). The 300 huchen stocked into the Otava River on 25 October 1949 in the vicinity of Žichovice was the first known stocking into Bohemian rivers.

Several individuals measuring 20-25 cm in total length were caught there in the subsequent year. Another few huchen with total lengths of 60-75 cm and weights of up to 1.8 kg were caught there in 1951. This local huchen population was seriously affected by water contamination from a match factory in the town of Sušice, and several dead specimens weighing about 8 kg were recorded. The occasional occurrence of huchen in the Otava River in the segment between the towns of Písek and Strakonice at river km 25.0-54.0 was reported by Hartvich and Lusk (2000). Huchen caught in the Otava River by anglers have been reported occasionally recently, with a fish weighing 6.2 kg was caught in 2003, while one weighing 9.2 kg was caught in 2004.

Huchen was stocked to the Vltava River (German: Moldau) in 1958, 1961-1962, and 1973 into the segment between Prague and the Vrané Dam Reservoir (river km 71.5). Huchen specimens were subsequently caught by anglers, and dead huchen were also found in this segment of the river (Vostradovský and Novák 1959, Vostradovský et al. 1973, Havelka and Vostradovský 1974, Skácel 1976). Vostradovský and Novák (1959) reported the stocking of 1220 huchen specimens in 1958 into the same segment of the Vltava River, which is also where the Orlik Dam (river km 144.5) was later to be constructed. Viktora (1977) presents a review of the huchen stocked into the three fishing grounds in the vicinity of the Vltava and Berounka river confluence near the village of Štechovice (river km 83.0; 1971 – about 1000 yearlings; 1973 – about 1350 yearlings; 1976 – 15 yearlings). The only specimen caught in the Vltava River in 1973 during experimental electrofishing at this site measured 75 cm in length and weighed 4.7 kg. A dead huchen, which had probably been killed by a propeller and measuring 90 cm in total length, was found in May 1977 on a Vltava embankment in Prague (river km 55). Vostradovský (1975) reported huchen in the river stretch between Vrané Reservoir and the village of Libčice (river km 29.0). Huchen has not been stocked lately in the waters in the vicinity of Prague, and only rarely do individuals appear from the Vltava River upstream from the Czech capital. One living huchen measuring about one meter was observed over the course of several days in the Kocába

rivulet near its confluence with the Vltava River (the video from 2008 is accessible at: http://www.youtube.com/watch?v=_iVK-dWij7s).

Anglers rarely catch huchen in the Lužnice River (German: Lainsitz or Luschnitz), a right tributary of the Vltava River (one specimen weighing 1.8 kg in 2003; one specimen weighing 4.1 kg in 2011). Huchen was also released into several valley reservoirs in the Vltava drainage basin. Viktora (1977) reported on huchen stocking in the Vrané Reservoir (river km 71.5), which is the oldest valley reservoir in the Vltava cascade; it was constructed during the 1930-1936 period and has a surface area of 251 ha. About 1,500 yearlings were stocked here in 1961; however, the fate of this stocking material is unknown. Several years ago huchen was allegedly stocked into the Kamýk Valley Reservoir (river km 134.7; surface area – 137.7 ha). Apparently, no further reports have been made about the huchen from this reservoir. A specimen weighing 4 kg was caught by an angler in 2004 in the Slapy Valley Reservoir (river km 91.5; surface area – 1,392 ha; Hanel 1984). Huchen was also released in the Orlik Valley Reservoir (river km 144.5; surface area – 2392 ha) and was caught there in recent years; for example, a huchen weighing 10 kg was caught in 2003; three fish with an average weight of 6.6 kg were caught by anglers in 2006; and one fish weighing 4.2 kg was caught in 2007. In total, 2,250 huchen were released to the Lipno Valley Reservoir (river km 329.5, 4870 ha), Tichý (1997), and one huchen weighing 4 kg was caught by an angler in 2004. A huchen was caught on 1 October 1985 in the Římov water supply reservoir (river km 22.0; surface area – 210.6 ha) on the Malše River which is a right tributary of the Vltava River in Southern Bohemia (Vostradovský et al. 1990).

Krechler (1963) summarized information about huchen stocking into the Sázava River, a right tributary of the Vltava River. Fingerlings from a Slovak fish hatchery in the town of Martin were released in the river segment between the weir in the village of Nespeky (river km 218.0) and that at the mill in the village of Čerčany (river km 33.5) as follows: 1956 – 11,000 fingerlings; 1959 – 15,000 fingerlings. Two huchen measuring 34 and 40 cm in total length were

caught by angling in this location in 1960, while four huchen (57–64 cm) were caught in 1961. Additionally, seven specimens were observed jumping across the weir, and one of them measuring 72 cm in total length and weighing 3.5 kg was caught. Viktora (1977) summarized huchen stocking in the Sázava River along the segment from the weir in the village of Krhanice (river km 15.7) to that in the village of Pikovice (river km 3.4) in subsequent decades, as follows: 1963 – 200 yearlings; 1966 – 310 yearlings; 1970 – 2,500 yearlings; 1971 – 500 yearlings. A huchen weighing 7.4 kg was caught by angling in 2004. Poupě (1978) reported observations of smaller huchen, and concluded that the species was breeding naturally in the Sázava River. One specimen (4 kg) was caught by an angler in 2011 in the Sedlice Reservoir (river km 63.4, 40.6 ha) on the Želivka River, a left tributary of the Sázava River. Viktora (1977) reported the release of huchen yearlings into the Berounka River (German: Beraun), a left tributary of the Vltava River, and this is also reported by Holčík et al. (1988) and Hanel (1990).

Huchen was stocked into the Ohře River (German: Eger; Polish: Ohrza) near Klášterec nad Ohří (German: Klösterle an der Eger; river km 133.0) and near Kadaň (river km 125.0) in 1963 and 1965, and also downstream from the Nechranice Valley Reservoir (Flasar and Flasarová 1981). The source of this river, which is a left tributary of the Elbe River, is located in Bavaria, Germany. Huchen is not stocked here and is angled at present only very rarely (one specimen weighing 4 kg in 2003; one specimen weighing 1.4 kg in 2008; one specimen weighing 8 kg in 2011). Hanel (1990) reported a huchen caught by an angler (86 cm, 6.3 kg) in the Jizera River (German: Iser; Polish: Izera), a right tributary of the Labe River; this might indicate that huchen from former stocking programs could survive at this location. A specimen weighing 4.5 kg was caught by an angler here in 2009. Holčík (1970) reported that 101 two-year-old huchen with total lengths of about 30 cm were stocked into the Klíčava water supply reservoir (river km 3.1 of Klíčava Brook; surface area – 72.5 ha) that lies in the Berounka River drainage basin. The primary goal of stocking huchen at this

location was the elimination of planktivorous fishes. One dead huchen was noted in 1962, and a second huchen was caught in 1964. Pivnička and Švátora (2001) reported the occurrence of this species in this reservoir in the 1962–1964 period.

Lohniský (1977) reported that huchen fingerlings escaped from a fish hatchery in the village of Mašovice near the town of Hradec Králové into a dead arm of the Bejkovna (river km 2.0), which joins the Orlice River (German: Adler; Polish: Orlica), a left tributary of the Labe River. According to fishing statistics, huchen have been stocked continuously since 2001 into the Pastviny Valley Reservoir (river km 89.0 surface area – 110 ha) in the Divoká Orlice River (German: Wildadler; Polish: Dzika Orlica). Lusk confirmed that huchen occurred locally in this area in 2011–2012 (author's own data). Two specimens of an average weight of 3.25 kg were caught by angling in this area in 2011. Lohniský and Lusk (1998) report the occurrence of huchen in the Divoká Orlice River. Huchen caught by anglers are rare with only one specimen measuring 111 cm and weighing 11.2 kg reported in 2011. In the past, huchen was also stocked into the Labe River below the town of Hradec Králové (German: Königgrätz; river km 157.0) and into the Metuje River (German: Mettau), a left tributary of the Labe River where huchen has been caught sporadically by anglers, as follows: one specimen weighing 4.5 kg in 2003; three specimens with an average weight of 5.97 kg in 2004; one specimen weighing 5.7 kg in 2005; one specimen weighing 8.7 kg in 2008. Huchen was stocked in 1961 into the Ploučnice River, a right tributary of the Labe River, and one specimen weighing 4 kg was caught in 1971.

Morava and Dyje watersheds (Danube basin)

Huchen stocking experiments in the watershed of the Bečva River, a left tributary of the Morava River, were conducted in 1910 and 1911 with a total of 2000 fingerlings released (see Polášek 1936). Huchen eggs were imported from Austria and hatched in a fish

hatchery in the town of Valašské Meziříčí (German: Wallachisch Meseritsch). The fingerlings were subsequently released into Bránecký Potok (Loučka Brook), and from there they migrated to the Bečva River at river km 60.5. At the age of one year these specimens measured approximately 22 cm. One specimen (29 cm, 0.43 kg) was caught at the end of summer, while two specimens (2.75 kg and 3 kg) were caught two years later. Natural spawning was observed in several huchen measuring a total length of approximately 50 cm that were observed on 25 March 1914 in the Bečva River below the weir at the town of Valašské Meziříčí (river km 61.2; see Polášek 1936 and Dyk 1956). Huchen was carried away from this site by extreme flooding in 1914 into the Morava River, and subsequently huchen were confirmed not only in the Bečva River but also in some tributaries. Oliva (1954) mentioned briefly the only multiple huchen stocking into the Bečva River; approximately 400 yearlings were stocked into this stream during the 1950-1953 period. Huchen was also later released in the vicinity of the town of Valašské Meziříčí in 1960-1961 and 1965. Huchen was recorded in the Bečva River until the 1970s, because four dead specimens with a total length of approximately 40 cm were found in 1972 near the confluence of the Vsetínská Bečva (Horní Bečva) and Rožnovská Bečva (Dolní Bečva) rivers. Pavelka and Trezner (2001) reported rare huchen occurrence in the Vsetínská Bečva River (near the village of Jarcová; river km 65.0) during the 1980s and 1990s downstream from the weir in the village of Ohrada, which is south of the town of Vsetín, and one huchen was observed downstream from the weir in the village of Hovězí in summer 1999. In total, 22 huchen were stocked into the Stanovice water supply reservoir (river km 0.7; surface area – 50.8 ha) on Stanovice Brook, which is a left tributary of the Vsetínská Bečva River, at river km 104.7 near the village of Karolinka (German: Karolinenhütte) and 18 km south of the town of Vsetín (German: Wsetin) in 1998.

Čermák (2001) reported huchen stocking into the Bystřička Reservoir (38 ha), which is on the Bystřička Rivulet (river km 5.4; a tributary of the Vsetínská Bečva River at river km 68.8), south of the

town of Valašské Meziříčí as follows: 600 yearlings in 1965; 1,220 yearlings in 1966; 650 yearlings in 1975. Natural spawning was confirmed on 27 April 1979 in the Bystřička Rivulet, when 64 huchen measuring approximately 80 cm in length were observed, and among which the largest male measured 114 cm in total length. Five huchen were caught in 1982 in this reservoir, and the largest weighed 10.3 kg at a total length of 98 cm. This reservoir was later converted from a salmon fishing ground to non-salmon fishing ground, which is why huchen stocking was discontinued.

Ivaška (1951) reported huchen in the Morava River, which was allegedly plentiful upstream from the city of Olomouc (river km 233.0), and the negative impact of wastewaters from factories and refineries. The release of 1,500 fingerlings obtained from broodstock imported from the Slovak Turiec River was unsuccessful. Huchen caught by anglers were recorded in the fishing grounds, including in the flooded Mohelnice sand pit, which is in the Morava drainage basin (Prášil 2001). Peňáz and Jurajda (1995) also reported it occurring in the Morava River. A total of 65 huchen yearlings were imported from Žilina, Slovakia and were stocked during the 1946-1953 period into the Vranov Valley Reservoir (river km 175.5; surface area – 763 ha) on the Dyje River (Bdinka 1956, Hochman and Jirásek 1958); however, huchen was not confirmed at this location later (Lusk et al. 1977).

A total of 1,300 huchen yearlings were stocked into Čtyřdvořský potok in the Svratka River drainage basin at river km 105.7 in 1936. Huchen were observed there several times, and two individuals weighing about 5 kg were caught in 1940 (Lusk 1976a); however, this species was not confirmed in later electrofishing in various segments of the Svratka River (Lusk 1978, 1980, Libosvářský 1989). Some huchen weighing about 10-12 kg were observed in the Svratka River in 2002, while some individuals of a total length of about 50 cm were caught during electrofishing (Lusk, own data). Other specimens were caught in the Svratka River as follows: near the town of Prudká at river km 87.0 measuring 23 cm in 1988; near the village of Koroužná at river km 107.5

Table 1Examples of the biggest specimens of huchen (*Hucho hucho*) captured in the Czech Republic waters

River	River basin	Year of capture	Total length (cm)	Weight (kg)	Reference
Otava	Elbe	2008	122	15	Anonymous (2009)
Svratka	Danube	2001	122	14	own data
Svratka	Danube	2001	111	12	own data
Divoká Orlice	Elbe	2011	111	11.2	own data
Vltava	Elbe	2000	102	12	Prášil (2001)
Svratka	Danube	1998	98	12.5	own data
Svratka	Danube	1996	98	8.7	Prášil (1997)
Bystřice Valašská	Danube	1983	98	7.2	Anonymous (1984)
Bystřice Valašská	Danube	1983	93	6.1	Anonymous (1984)
Otava	Elbe	1999	92	8	Prášil (2000)
Vltava	Elbe	1976	91	9.5	Anonymous (1977)
Jizera	Elbe	1982	85	6.3	Anonymous (1983)
Vltava	Elbe	1997	85	5.35	Prášil (1998)
Otava	Elbe	2002	70	7.5	Anonymous (2003)

weighing 14.5 kg in 1999; in the Švařec at river km 106.0 measuring 58 cm and weighing 1.6 kg with electrofishing in 2000. The trophy fish caught by anglers in this river are presented in Table 1. Huchen fingerlings and yearlings were stocked during restoration measures in the Dyje River (German: Thaya) downstream from the Vranov Reservoir in the past. Further releases were made after 1960. Altogether 13 huchen weighing about 5-6 kg were caught in the Dyje River in the period up to 1970. Yearlings were stocked again after 1970 into the Dyje River in the vicinity of the town of Znojmo (river km 133.0). Huchen weighing about 10 kg were observed during the spawning period in the vicinity of the town of Znojmo (Lusk 1976a). Huchen were caught by anglers in this segment of the Dyje River in subsequent years. A dead huchen weighing 8.2 kg was found near the village of Dobšice at river km 127.3 (Palatka 1976). Lusk (1976a, 1976b) reported huchen occurrence in both the Dyje River (in the vicinity of Znojmo) and in the Znojmo water supply reservoir; these fish measured approximately one meter and weighed around 10 kg. Huchen were noted in the Dyje River during the 1950-60 and 1991-2001 periods. Lusk (1976a, 1976b) considered the fate of the huchen in Moravian streams, and determined that

suitable sections of Moravian rivers were heavily polluted. The segment of the Dyje River in the vicinity of the town of Znojmo is promising as the food supply is plentiful, especially of cyprinids. A dead huchen (94 cm and 8.2 kg) was found on 17 January 1976 in the Dyje River as reported by Hanel (1990). Huchen was also stocked into the Dyje River at Nové Mlýny in 1985-1987, but no subsequent catches were recorded at this location (Lusk et al. 2002). Lusk and Lusková (2001) emphasize that currently huchen occurrence in the Dyje River is wholly dependent on stocking.

Discussion

Huchen is an endangered fish species that is endemic to the Danube drainage basin. It is mostly territorial and inhabits fixed areas of limited territory, which it leaves only during spawning. Although historical data indicates these fish migrate as far as 190 km, it is assumed that spawning migrations are currently restricted to distances of ten to thirty kilometers in the Danube River because of altered physical habitats with long migrations blocked by dams or weirs (Lucas et al. 2001).

The natural occurrence of huchen in the river network of the Czech Republic in terms of its indigenous distribution (Danube basin, see Holčík et al. 1988) is only possible in the Morava River or, alternatively, in its tributaries such as the Dyje River. Jungwirth (1978) published a map illustrating the natural occurrence of huchen in Austria, but only sporadic huchen occurrence is noted in river segments at this time. Nevertheless, it is plausible that up to the nineteenth century huchen penetrated naturally into Moravian territory from many Austrian alpine rivers through the Danube River.

The historical occurrence of huchen in the Dyje River was exceedingly rare with evidence suggesting that just one fish was caught in 1879. Sighting large huchen appears to be implausible in rivers. No records of huchen occurrence in the Morava River are reported by Jetteles (1863, 1864), Heinrich (1856), or Komárek (1948). In this context, Vojtíšek (1928), Schäferna (1932) and Ivaška (1951) issued statements that concluded common huchen occurrence appeared to be dubious. Dyk's (1956) report that huchen had been very abundant in the Morava River, but its past occurrence in the vicinity of the town of Olomouc appears to be a misapprehension.

The present review article indicates that huchen, primarily fingerlings and yearlings, were stocked occasionally into various Czech, Moravian, and Silesian waters within the management framework of fisheries in running waters during the twentieth and twenty-first centuries. The important question posed is why have no self-sustaining huchen populations been established. This answer to this question can be found in several anthropogenic factors (Lusk 1976a,b). In the past, the ichthyofauna of the Czech Republic was impacted negatively by intense water pollution; fortunately, this has improved in recent decades. Modifications to river stream beds, which has entailed straightening them to achieve river courses that are homogeneous in profile and longitudinal slope, has also has a negative impact on these fish. Stream modifications also include the systematic construction of valley reservoirs that are barriers to migration, and the water retained by them alters the natural riverine character of upstream segments.

Cyprinid species such as *Chondrostoma nasus* L.; *Barbus barbus* (L.); *Squalius cephalus* (L.); and other have disappeared in the secondary trout zones, which had shifted to areas downstream from dams as a consequence of changing temperature regimes. In fact, these cyprinids are the basic species found in huchen feeding grounds. Intense recreational angling in all Czech Republic waters has led to a situation in which huchen are caught and erroneously identified as large trout, and this means that this species has no opportunity to form self-sustaining populations in spite of repeated stocking (e.g., Pastviny Reservoir, Orlice River, Labe River in Eastern Bohemia).

Huchen habitat conditions have deteriorated alarmingly over the years; the first fish that was killed by water pollution in the Morava River was recorded in the 1880s. The number of similar incidents increased thereafter culminating in the 1960s, and by the 1980s there was considerable depletion in the ichthyocenoses throughout the river (Lusk and Holčík 1998). However, the greatest environmental change in this river resulted from drastic river channelization and regulation for flood control and water resource exploitation. Stream modifications led to the destruction of natural river morphology and to decreased eco-morphological diversity of stream beds and hydrological diversity (Peňáz and Jurajda 1995).

According to the map published by Hanel and Lusk (2005), huchen was registered in 36 mapping quadrats (for mapping methods see Buchar 1982) in 1949-2005 in the Czech Republic. The main source of stocking material is a fish hatchery in the village of Jablunkov in northeastern Silesia near the Polish and Slovak borders, where huchen fingerling and yearling stocking material are produced. The broodstock originated from Slovakia.

To summarize, it can be concluded that huchen is not an integral part of the fisheries management of fishing grounds in the Czech Republic (Hanel 2001). Stocking it, usually as fingerlings or yearlings, is only performed by private persons or organizations implementing short-term stocking programs which are not continuous. The main reason is the lack of

hydrologically suitable river segments and the complete lack of suitable food sources such as stocks of larger *Chondrostoma nasus*, *Barbus barbus*, and *Squalius cephalus*. *Salmo trutta* L. and *Thymallus thymallus* (L.) are under fisheries management in ecologically appropriate rivers downstream from some water reservoirs, which makes the introduction of huchen to these river segments undesirable.

The introduction of self-sustaining huchen populations with regular natural breeding has not been achieved in the Czech Republic. Huchen stocks are maintained in the Czech Republic only by the frequent release of stocking material. Only 76 larger huchen were caught by anglers in the 2001-2011 period according to fisheries statistics for Bohemian waters in the Labe and Oder river basins. The average huchen weight was 5.2 kg at a range of 0.9-15 kg. No larger huchen were recorded in either Moravian or Silesian waters in this period. Examples of the largest trophy huchen caught in the Czech Republic are presented in Table 1, and a color photograph of the largest huchen measuring 122 cm and weighing 15 kg caught by an angler in the Otava River is accessible at <http://www.mrk.cz/Data/NejNej/4620.jpg>.

Summary

Huchen (*Hucho hucho*) is native to the Danube River basin network. Rare occurrences of this species have been noted in the Czech Republic as was documented in the Morava and Dyje rivers in the Morava drainage basin. The last observed autochthonous huchen was identified in the Morava River near the town of Kroměříž in 1900. Huchen stocking, mostly of hatched fingerlings or fry aged one, has been performed sporadically in the waters of the Czech Republic since the end of the nineteenth century. The rivers stocked have included those in the Labe, Oder, and Morava drainage basins. Stocking material has been released into numerous rivers and streams, and, exceptionally, it also survives in several cold reservoirs. Only very sporadic natural spawning has been observed in the past in the Olše, Moravice, and

Bečva rivers and Bystřička Stream; nevertheless, no self-sustaining huchen populations have been identified. This is primarily because of anthropogenic factors that result in decreased water quality, river bed transformation, disrupted ichthyofauna composition, and obstructions to fish migration. Intense recreational angling has also had a significant impact on stocked huchen. Only 76 larger huchen were reported in the past decade as having been caught by anglers in waters where huchen had been stocked previously. Based on these indicators, it is plausible to assume that huchen occurrence in the Czech Republic at present and in the near future is dependent entirely on regular artificial stocking. Huchen is a rare and highly prized fish for anglers in the Czech Republic.

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