Distribution, habitats, abundance and problems of conservation of the European pond turtle (*Emys orbicularis*) in the Crimea (Ukraine): first results

Tatiana KOTENKO

Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Vul. B. Khmelnyts'kogo 15, Kyiv–30, 01601 MSP, Ukraine; tel.: +380 44 2521717, e-mail: kotenko@iz.freenet.kiev.ua


Data on distribution and ecology of *Emys orbicularis* in the Crimea were summarized in a monograph of SHCHERBAK, published in 1966. Since that time this information was virtually not updated. By the end of the 20th century, *E. orbicularis* was known in the Crimean lowland from only eight localities. The remaining records (about 70%) were from the Crimean mountains. In 2000–2003, new data on distribution, habitats and abundance were obtained mainly for the lowland. *E. orbicularis* is recorded from about 40 new localities. New findings indicate that the pond turtle is widely distributed in the Sivash region along the North Crimean Canal. In this region, its abundance and distribution obviously increased after the construction of the canal. In the past, *E. orbicularis* was abundant in some ponds in the Crimean mountains, but by the beginning of the current century it became there very rare. The dramatic decline in population density is mainly due to illegal commercial collecting during the last 7–10 years. The mountain populations of *E. orbicularis* are threatened; they differ in morphology and genetics from the lowland populations and need strict protection.

Key words: *Emys orbicularis*, distribution, habitat, abundance, population, conservation, Crimea, Ukraine.

**Introduction**

The Crimea is a peninsula in the south of Ukraine (Figs 1–2), inhabited by 14 reptile species, including the European pond turtle, *Emys orbicularis* (L., 1758). It is the only chelonian species both in the Crimea and Ukraine. Data on distribution and ecology of this turtle were summarized for the Crimea in a monograph by NIKOLAI N. SHCHERBAK (1966), devoted to the Crimean herpetofauna. Since that time, this information has been neither expanded nor updated considerably. Handbooks on the herpetofauna of the former USSR (BANNIKOV et al., 1977; ANAN'EVA et al., 1998) and an article on *E. orbicularis* in Ukraine (SHCHERBAK, 1998) were based, regarding the Crimea, entirely on the data of SHCHERBAK (1966). SHCHERBAK's investigations demonstrated that *E. orbicularis* occurs both in the steppe and in the mountains of the peninsula. About 70% of records were situated in the Crimean mountains. For the Crimean lowland, *E. orbicularis* was known only for seven localities (records from the 19th century and the first
half of the 20th century; Shcherbak, 1966). Only three new localities were published in the second half of the 20th century, two for the mountains (Shcherbak, 1989) and one for the Crimean lowland (Treshchëv, 1991). Later, Karmyshev (2002) discovered three new localities during his investigation of the Crimean lowland herpetofauna.

Since 2000 I travelled widely in the Crimea and collected new data. Partially, records of 2000 and 2001 have been published already (Kotenko, 2001a, 2002a, b; K. Kotenko, 2002). The present paper includes new data from 2002–2003 and summarizes and analyzes all available information.

Study area

The Crimean peninsula is bordered by the Black Sea, the Azov Sea and the Sivash – a shallow and very saline bay of the Azov Sea. The Sivash is separated from the Azov Sea by a long (120 km) narrow peninsula, the sand sea spit Arabats’ka Strilka. The Crimea extends for 324 km from west to east and for 207 km from north to south, its area being 25,500 km². Administratively the territory of the Crimean peninsula belongs to the Autonomous Republic of Crimea (AR Crimea), the only autonomous republic in Ukraine. It covers 27,000 km². The territory of the Crimean peninsula consists of two quite different parts (Fig. 2): lowland (steppe) and the Crimean mountains. Highlands cover only 20% of the peninsula’s area. This region is 180 km long and up to 50 km wide, the highest peak is at 1,545 m a.s.l. The southern coastal part of the mountainous part of the Crimea belongs to the subtropical physiogeographical belt (namely, to its Submediterranean zone), the rest of the Crimean peninsula to the temperate belt. The Crimean lowland belongs to the steppe physiogeographical zone, while mountains demonstrate altitudinal belts of forest-steppe, forests and mountain meadows and steppes. The Crimean lowland, in general being attributed to the steppe physiogeographical zone, while mountains demonstrate altitudinal belts of forest-steppe, forests and mountain meadows and steppes. The Crimean lowland, in general being attributed to the steppe zone, houses in fact a narrow strip of semidesert zone, mainly associated with the Sivash. The Crimean lowland can be divided into four main parts: the northern (Sivash region), central, western (Tarkhankut peninsula), and eastern part (Kerch peninsula).

Several main habitat zones are recognized in the Crimea (Anonymous, 1999; Fig. 2):

(1) The zone of semidesert steppes and saline lands (solonchaks): Semidesert steppe and halophytic vegetation occupy a large area in the Sivash region (Fig. 2: 1b). Such vegetation is also characteristic for the southern and northwestern parts of the Kerch re-
region (Fig. 2: 1a) and is common along the west coast of the Crimea.

(2) True steppes, dominated by *Stipa* and *Festuca* grass species: This vegetation is typical for the central Crimean and Tarkhankut regions (Fig. 2: 2b, 2c) as well as for the central and northeastern parts of the Kerch region (Fig. 2: 2a).

(3) Premontane forest steppe.

(4) Forests of the northern slope of the Crimean mountains.

(5) Mountain meadows and yaila steppes (for explanation of this term see “Results and discussion”).

(6) Forests of the southern slope of the Crimean mountain ridge.

(7) Light forests and shrubs (Submediterranean vegetation) of the south coast.

The climate of the Crimean steppe is characterized by hot summers, relatively cold winters and low precipitation; strong winds are frequent. The warmest month is July (average temperature about 23°C, absolute maximum 38 to 40°C). The coldest month is January (average temperature 0 to −2°C, absolute minimum −38°C). Precipitation varies from 300–350 mm per year (Tarkhankut, northwest coast, Sivash region) to 450 mm (central part). In the mountains, the summer is cooler (average July temperature varies from 22°C at foothills to 14°C on yailas), and the winter is milder (average January temperature varies from +1 at foothills to −4°C on yailas, with absolute minima of −20 to −32°C); precipitation varies from 500 mm per year at the foothills to 1000 to 1200 mm on yailas. The south coast has the warmest climate (subtropical; average July temperature 23 to 24°C, absolute maximum 38 to 40°C, average January temperature +1.5 to +4.5°C, absolute minimum −14 to −18°C; precipitation varies from 300 mm for the Cape Meganom region to 600 mm for the Yalta region; Veidt, 1999).

The Crimean lowland is poor in natural water bodies with freshwater. The hydrographic net density varies from 0.04–0.05 km/km² in the Sivash region to 0.15–0.28 km/km² on the Kerch peninsula. In the mountains it reaches 0.70–1.00 km/km². Most rivers of the Crimea are very small, less than 10 km long; the biggest is the Salgyr (204 km). As the discharge of the Crimean rivers is very irregular within the year, more than 20 large artificial reservoirs with the total volume of 400 million m³ have been created for supplying towns with drinking water and for irrigation (Oliiferov, 1999). Small and medium-sized ponds are very common, especially along small rivers and creeks in the mountains and on the Kerch peninsula. A lot of lakes and limans (certain sea bays) of various sizes are

Fig. 2. Main habitat zones of the Crimean peninsula (modified from Anonymous, 1999). Explanations in the text.
distributed along the seashore and the Sivash coast. Most of them are salt bays and salt lakes, brackish, not suitable for *Emys orbicularis*, but some of them have freshwater (mainly in their upper reaches) owing to the discharge of creeks and underwater springs.

In addition to the natural Crimean water bodies there exists an extensive irrigation network. The main North Crimean Canal (402.6 km long and up to 100–150 m wide) delivers Dnieper river water to the dry Crimean steppe and allows intensive rice production in the northern part of the peninsula. The first Dnieper water was delivered to the Crimea in 1963, and the canal reached Kerch in 1975. Its eastern half on the Kerch peninsula is a pipe. The water flows by gravity as far as Dzhankoy, further on it is pumped. The canal runs mainly in the ground bed, and only some small sections have a concrete or crushed stone cover. The total amount of water flowing through the North Crimean Canal exceeds by 2.5 times the discharge volume of all natural Crimean rivers (Romanenko, 1987; Oliferov, 1999). This vast irrigation system has significantly modified landscapes and habitats, partly because of developing large reed wetlands which appeared where discharge and drainage canals enter the Sivash or Karkinits’ka bay of the Black Sea.

The Crimea had a complicated history, dramatically impacting economy, social and cultural life as well as fauna, flora, and nature conservation. Moreover due to its history, the Crimea is the most difficult region of Ukraine regarding geographic names. Due to the Crimean War (1944–1948), the original old Tatar names for settlements and even for some rivers were replaced by Russian names. After 1954, when the Crimean oblast was transferred from Russia to Ukraine, some Ukrainian names appeared. Since 1991, when Ukraine became an independent country, all Russian names are given in official documents and maps in the distinct Ukrainian spelling. In recent years, after the return of Tatars to the Crimea, some old names of villages have been restored. The evolution of the name of a village on the Kerch peninsula may serve as an example: Ertigen (Tatar name) – Geroyivs’ke (Ukrainian spelling of Russian name) – El’tigen (Ukrainian spelling of Tatar name, now used again). As modifications of administrative districts (raions) and city borders continue and many villages were abandoned during the last 60 years, it became very difficult to identify some localities.

Material and methods

This paper is based on my fieldwork, observations of local people, a literature review, and on voucher specimens in the following museums: ZMNMNH – Zoological Museum of the National Museum of Natural History of the National Academy of Sciences of Ukraine (Kyiv), ZMSMU – Zoological Museum of the Moscow State University (Moscow), ZIRAS – herpetological collection of the Zoological Institute of the Russian Academy of Sciences (Saint Petersburg), CLLM – Crimean Local Lore Museum (Simferopol’).

Most information was gathered during my 2000–2003 field trips to different regions of the Crimean lowland and to selected localities in the Crimean mountains. All Crimean administrative districts (raions) were visited. Records by local people were considered only if they personally observed or caught turtles and were able to report observation locality and dates precisely. Reliable information was obtained mainly from fishermen (anglers), biology school teachers, or zoologists of the Taurida National University (Simferopol’) or nature reserves. Personal observations and discussions with local people and authorities helped moreover to clarify some conservation problems of *Emys orbicularis*. Most turtles recorded by local people were caught by fishing rods or nets, few individuals were observed on land, and most records date from 1999–2002, some from 1995–1998. I visited most localities personally and assessed the presence of suitable habitats, and *E. orbicularis* surely exists in the majority of localities up to now. No longer existing localities are asterisked and detailed descriptions are provided in the list below.

Most of my personal data on the distribution and habitats of *Emys orbicularis* in the Crimea have been obtained during fieldwork for a survey of steppe habitats, an investigation on the biodiversity of the Sivash region, or research on Crimean snakes. Thus, on abundance are mostly only anecdotal data available. Pond turtle populations near Luchyste, El’tigen, and Koktebel’ (between Koktebel’ and Pidgirne) were investigated more thoroughly (2000–2001, 2003), but only for very short periods (usually two days). At these localities, basic data on external morphology were recorded and blood samples for mtDNA sequencing were taken. Turtles were caught here by fishstraps with fixed bait; the best result was obtained using strong smelling sausage. Sometimes it was very difficult or impossible to take blood from the caudal vessel (when turtles had low body temperatures). In such cases the heating of turtles in warm water was very efficient. After examination, all animals were released in their ponds. DNA analysis (sequencing the mitochondrial cytochrome b gene) was carried out at Heidelberg University by H. Sauer-Guertin and D. Gucking under the supervision of Prof. M. Wink. First results were reported during the SEH meeting in Saint Petersburg (Kotenko et al., 2003) and will be more detailed in a forthcoming publication. Genetic data will be used here only for highlighting the need of conservation measures for some populations.

Geographic names in the text, on the maps (Figs 1–3), and in the list of localities are given in English transliteration based on Ukrainian spelling (British Standard 2979). In previous publications of different authors, including Schierbak, the Russian spelling was used. All data taken from the literature or museum vouchers are supplied with relevant references below. Identification of old localities has been made using a reference book on names of Crimean settlements for the period 1783–1998 (Gurbova, 1999).
Results and discussion

Distribution

The distribution of *Emys orbicularis* in the Crimea is summarized in Figure 3. It has to be pointed out that the identity of some localities mentioned by Shcherbak (1966) is unclear. A schematic map in his book (Shcherbak, 1966: Fig. 19) was lacking numbers for all localities, and at least three localities were not plotted (numbers 10, 11, and 53 in Fig. 3 of this paper). Moreover, the text was sometimes not understandable or contradictory. For example, “environs of Sovets’kyi settlement (Nizhnegorski raion), 12 km to the northeast, and to the northeast of Kerch’ city” (Shcherbak, 1966: p. 70) is difficult to interpret because “12 km to the northeast” can either refer to Sovets’kyi or to Kerch. In the case of Sovets’kyi, it could be a narrow sand spit or the salt waters of the Sivash (probably the distance was estimated by Shcherbak incorrectly, because good maps at that time were not accessible). On p. 72, Shcherbak wrote that turtles were caught near Sovets’kyi in two lakes in 2 km distance. According to the topographic map, these “lakes” could be either ponds to the southwest of Sovets’kyi or east of the settlement the wetlands of the lower reaches of the Eastern Bulganak river. In the case of Kerch, it should be the well known village Osyovnya, and if so, it would be strange that Shcherbak (1966) did not give the name Osyovnya for the locality. As there was no mark on the schematic map for Osyovnya (Shcherbak, 1966: Fig. 19), it is more likely that the environs of Sovets’kyi were meant. Thus, I included in my list only the environs of Sovets’kyi and northeast of Kerch.

A locality “10 km southeast Izobilnoe village near the confluence of Biyuk-Karasu and Salgyr rivers” (Shcherbak, 1966: p. 70) is actually 14 km southwest of the village (Fig. 3: locality 11). Krasnosil’lya (= Krasnosel’e) village at the upper course of the Biyuk-Karasu river (Shcherbak, 1966: p. 70) is obviously Krasnoselivka (locality 33 on my Fig. 3). Krasnosil’lya exists in Crimea, but far from the Biyuk-Karasu. A locality “Pioners’ke village near st. Alma” (Shcherbak, 1966: p. 70) is probably Pioners’ke at the Salgyr river – this site is at least marked on Shcherbak’s map. Along the Alma river, there is no village named Pioners’ke. “Environs of the settlement of Mykolaivka” (= Nikolaevka; Shcherbak, 1966: p. 70;
In addition, there are some imprecise locality data: (i) Salgyr river (NIKOL'SKIĬ, 1891; BRAUNER, 1903); (ii) Chorna river (BRAUNER, 1903); (iii) rivers in the foothills of the Crimean mountains and on the south coast (BRAUNER, 1905); (iv) Crimean peninsula (ZIRAS collection and some old literature; see NIKOL'SKIĬ, 1891, 1915); and (v) temporary wetlands in the Krymsky (= Crimean) reserve (KOSTIN & TKACHENKO, 1963). The Crimean reserve is very big. In 1925, it covered an area of about 23,000 ha. After the Second World War, it became 30,200 ha, and now it is 34,563 ha. The reserve extends for 30 km from the environs of Yalta in the south to the environs of Krasnoliissya village in the north. That is why I put a mark in the centre of the reserve on my schematic map (Fig. 3: locality 47).

In the ZIRAS collection, there is a specimen (ZIRAS 9648) with a label “Chorna river near Bián-Muskoľ'ya village, 5 August 1900, Aggeenko”. As this village was not identified, NIKOL'SKIĬ (1915) gave in his list of E. orbicularis localities: “d. Tschemnaja in Tauria” (= Chorna river in Crimea). A reference book on Crimean settlements (GURBOVA, 1999) helped to find out that it was Byuyuk-Myuskomyav village. It bears now the name Shyroke (Fig. 3: locality 39). According to an old entry in the ZIRAS catalogue, a lost specimen (ZIRAS 13842) had the locality data “Crimea, Korbekly village, June 1909, Lindgol’m [= Lindholm]”. This locality is now known as Izobil'ne, near Alushta (Fig. 3: locality 37).

The numbers in the locality list for E. orbicularis below correspond to Figure 3. Abbreviations: v. – village, s. – larger settlement (intermediate between village and town), c. – city or town.

**Krasnoperekops'kyĭ raion (Krasnoperekops’kyi district):** (1) Chatyrlyk river, downstream near v. Novopavlivka; (2) Chatyrlyk river near v. Dolynka; (3) pond and reed marsh 6 km E v. Magazynka, close to North Crimean Canal.

**Dzhankoi’skyĭ raion (Dzhankoi district):** (4) North Crimean Canal SW v. Martynivka (KOTENKO, 2001a); (5) pond 3 km SE v. Yasnopolyans’ke (KOTENKO, 2001a); (6) wetlands of small river mouth S v. Milkovodne; (6a) small canal and wetland 4 km N v. Nyzynne; (7) small marsh in floodplain of the canalized Myrniv’s’ka river, at N edge of c. Dzhankoi (KOTENKO, 2001a); (8) pond near Stepna river, S c. Dzhankoi; (9) Stal’na river near v. Stal’ne (KOTENKO, 2001a).

**Nyzhnojirsk’skyĭ raion (Nyzhnojirsk’kyi district):** (10) Salgyr river near v. Izobil’ne (SHCHERBAK, 1966); (11) confluence of Biyuk-Karasu and Salgyr rivers (SHCHERBAK, 1966).

**Soyevets’kyĭ raion (Soyevets’kyi district):** (12) v. Nekrasivka (KARYMSHEV, 2002); (13) lakes (ponds? – T. K.) near s. Soyevets’kyi (SHCHERBAK, 1966) and surroundings of s. Soyevets’kyi (ZMN-MNH); (14) crossing of North Crimean Canal and Indol river (KARYMSHEV, 2002).

**Kirovs’kyĭ raion (Kirovs’ke district):** (15) v. Sofiyivka (SHCHERBAK, 1966); (16) Starokrym’s’ke reservoir, near s. Staryı Krym (SHCHERBAK, 1966).

**Lenins’kyĭ raion (Lenine district):** (17) Ostanińs’ki Plavni, near v. Ostanie (KARYMSHEV, 2002); (18) small canal near v. Piscohne; (19) big pond (water reservoir) near v. Zelenyıı Yar (KOTENKO, 2001a); (20) ponds along tributary of Samari river, near v. Fontan (KOTENKO, 2001a); (21) lower reaches of small river and ponds along Samari river in the site Artezian, E coast of Kazantyp’s’ka bay of Azov Sea (KOTENKO, 2001a); (22) big pond at Babchyns’ka river, between S bank of Chokraks’ke lake and s. Bagerovo (KOTENKO, 2001a); (23) pond S v. Glazivka (KOTENKO, 2001a).

**Territory subordinated to Kerch town council:** (24) small water bodies (ponds? – T. K.) NE c. Kerch (SHCHERBAK, 1966) and near Kerch (ZMN-MNH); (25) c. Kerch (ZMN-MNH); (26) freshwater canal, ponds and reed marshes S s. Arshyntseve (included to Kerch city line). These wetlands occupy the lower part of the formerly Churbashs’ke salt lake (KOTENKO, 2001a); (27) canal and pit in v. El’tigen (= Geroyivs’ke) (included to Kerch city line), near Cape Kannysh-Burun (KOTENKO, 2001a; K. KOTENKO, 2002).


Territory subordinated to Alushta town council: (34) 10 km along road from c. Alushta to v. Rybache, in valley (ZMNMIH): according to the topographic map and a reference book on rivers of Ukraine (ZHELEZNYAK et al., 1979), these data could refer to the valley of the Alaka (= Biyuk-Dere) river; (35) lakes (mostly ponds – T. K.) near v. Luchyste (KOTENKO, 2001a); (36) Cherepashka (= turtle) pond of the Ulu-Uzen' river basin, 3 km NW c. Alushta; (37*) v. Izobil'ne (ZIRAS), a no longer existing pond near Izobil'nens'kereservoir near v. Izobil'ne.


Territory subordinated to Sevastopol' town council: (39) Chornariver near v. Skyroke (ZIRAS); (40) near c. Balaklava; (41) Strelets'ka bay and Kulikovo pole (SCHERBAK, 1966) and c. Sevastopol' (ZMMSU); (42) Chorna river mouth (KESSLER, 1860) and Chorna river near c. Sevastopol' (KULAGIN, 1890; BRAUNER, 1905); (43) Kacha river mouth and drainage canal near v. Orlivka; (44) Kacha river, v. Vysheve.

Bakhchysarais'kyi raion (Bakhchysara island): (45) upper reaches of Kachariver (SCHERBAK, 1966); (46) Bel'bek river in v. Kubyshev (SCHERBAK, 1966); (47*) small forest swamps in Karakashyn'ska area of Kryms'kyi (= Crimean) reserve (PUZANOV, 1931), temporary wetlands of the reserve (KOSTIN & TKACHENKO, 1963). This reserve is situated mainly in Bakhchysaraiais'kyi raion, but also involves Simferopol's'kyi raion and territories subordinated to Alushta and Yalta town councils; (48) Alma river mouth (SCHERBAK, 1966) and Alma river near v. Pishchane.

Simferopol's'kyi raion (Simferopol district): (49) Ayans'ke reservoir, S v. Zariche; (50) Tavelt'ske reservoir (pond) on Tavel'chuk river, 1 km S v. Krasnolissya; (51) v. Fersmanove near Salgry river (NIKOL'SKI, 1891; CLLM) and near v. Pioners'ke (SCHERBAK, 1966); (52) ponds near cemetery in surroundings of c. Simferopol' (SCHERBAK, 1966) and c. Simferopol' and environs (CLLM); (53) pond on bank of Salgry river, between s. Gresivs'kyi and v. Biloglynska; (54) Mizhgorne reservior, 4 km SW v. Skvortsove; (55) near s. Mykolayivka (= Nikolaevka; SCHERBAK, 1966).

Saks'kyi raion (Saky district): (56) upper reaches of Kyzyl-Yar lake, reed wetlands near v. Ivanivka (KOTENKO, 2002a); (57) ponds near v. Chervone (KOTENKO, POPOV, KUKUSHKIN, pers. comm.); (58) freshwater lakes (ponds? – T. K.) near c. Saky (SCHERBAK, 1966 according to TROITSKII & KISELEV, 1952); (59) wetlands near v. Okhotnykove; upper part of Donuzlav lake (TRESHCHEV, 1991; KOTENKO, 2002a); part of this area belongs to Saks'kyi and to Chornomors'kyi raions, respectively – see (60, 61).

Chornomors'kyi raion (Chornomors'ke district): (60) two ponds (consecutive dammed parts of Donuzlav lake) 1.5–3 km SW v. Krasnoyars'ke; (61) pond (dammed part of Donuzlav lake) 5 km SE v. Khmel'ove; (62) dammed mouth of small Donuzlav river flowing into Donuzlav lake, v. Krasnoyars'ke; (63*) small pond in gully near v. Dozorne (locality destroyed); (64*) pond near dammed mouth of small Dzharylgach river and upper part (freshwater!) of Dzharylgach salt lake, 1 km E v. Vodopiše.

Rozdol'nens'kyi raion (Rozdol'ne district): (65) canal 2 km S v. Portove; (66) ponds between v. Kumove and v. Komyshe near (Rozdol'nens'kyi canal, 1.5 km W Samarchyk river); (67) oxbow and reed wetlands in lower reaches of Samarchyk river, 2 km N v. Komyshe.

Kalanchaks'kyi raion (Kalanchak district) of Khersons'ka oblast (Kherson province): (68) North Crimean Canal near v. Stavky (environs of v. Chervonyi Chaban).

As evident from the presented data, the European pond turtle is widely distributed over the Crimean peninsula. With the exception of the yailas, it is occurring in all habitat zones. In the Crimean lowland, the species is wider distributed than thought before. Within the lowland, three main regions can be distinguished: the Sivash region (Krasnoperekops'k, Dzhankoi, Nyzhn’ogirskyi, Sovjets’kyi, and Kiros’ke dis-
tricts as well as the northeastern Rozdol’ne district, the Kerch peninsula (Lenine district) and the west (Chornomors’ke and Saky districts, as well as the western Simferopol’ district).

In the Sivash region, its occurrence and abundance have obviously much increased after the construction of the North Crimean Canal. *E. orbicularis* has been found in this canal near Chervonyi Chaban (Kherson province on the Ukrainian mainland, close to the Crimea) and Martynyivka (Dzhankoi district), in a pond close to the canal near Magazynka (Krasnoperes’koi’ district) at the crossing of the canal and the Indol river (Sovets’kyi district), and in a small canal close to the Sivash (Fig. 3: localities 68, 4, 3, 14, and 6a). This suggests that *E. orbicularis* is now widely distributed along the North Crimean Canal and adjacent small canals and reed wetlands in the Sivash region. The spreading of the European pond turtle in this area was surely facilitated by its ability to migrate for long distances over land (Kotenko, 2000).

On the Kerch peninsula, *E. orbicularis* was probably always common. Its formerly supposed restriction to Kerch city and its environs (Schcherbak, 1966; ZMN MNH) is likely the result of lacking previous fieldwork in other regions. In the west of the Crimean lowland, *E. orbicularis* is mainly associated with the mouths of small rivers flowing into salt lakes (Kyzyl-Yar, Saks’ke, Sasyk-Sivash, Donuzlav, Dzharylgach; Fig. 3: localities 56–62, 64). In the central Crimean lowland (Krasnogvardiis’ke and Pervomais’ke districts, and west of Saky district), where natural water bodies are nearly lacking, *E. orbicularis* is unknown. However, this does not necessarily mean that no turtles occur there. The species should be present in the middle Salgyn river as it inhabits its upper and the lower courses. It may also occur in the Krasnogvardiis’kyi and Chornomors’kyi canals.

*E. orbicularis* is distributed all over the Crimean mountains and occupies there all habitats except for the yaias, forestless plateaus on the mountaintops within the highest Crimean mountain ridge. There are 10 separate yaias along the ridge, covered by petrophytic and mountain-meadow steppes, with small tree-shrub vegetation patches in depressions. The climate of the yaias is characterized by the lowest temperatures, highest precipitation and cloud cover. Permanent water bodies are absent there.

*Subspecific allocation of Crimean turtles*

In the past, all Ukrainian turtles were attributed to the nominotypical subspecies *E. orbicularis* (L., 1758), although Schcherbak (1966) pointed out that individuals from the Crimean peninsula are smaller than those from other parts of Ukraine. Schcherbak (1966: p. 68 and Fig. 18) explicitly mentioned that turtles from the Crimean mountains and the steppe do not differ. Later, using the same data base, Schcherbak (1998) emphasized that only the Crimean mountain population is distinct. Fritz (1992, 1994) suggested that turtles from the Crimea or its southern part might belong to *Emys orbicularis hellenica* (Valenciennes, 1832), according to their small size and coloration. The range of this subspecies occupies otherwise the western coastal part of the Balkan peninsula and the coast of the Po plain in North Italy (Fritz, 1992, 1994, 1996, 1998, 2001; Lenk et al., 1999). Fritz’s (1992, 1994) morphological investigations were based on a very small number of Crimean turtles (neither the Kyiv Museum collection nor blood samples were available at that time). Schcherbak (1998), following Fritz (1992, 1994), attributed the Crimean turtles to *E. o. hellenica*. Also Anan’eva et al. (1998) adopted this subspecific allocation in their handbook on the herpetofauna of the former USSR and this was acknowledged by Ukrainian herpetologists. Based on new morphological investigations, Karmyshev & Paisnets (2003) attributed pond turtles of the Crimean steppe and the mountains again to *E. o. hellenica*. However, allogene variation of Ukrainian turtles led Morozov-Leonov et al. (2003) to believe that pond turtles from the Crimean steppe deserve the status of a distinct species.

However, first data of mtDNA variation (cytochrome b gene) for three Crimean populations (Luchyste, El’tigen, Dzhankoi) and Dnieper delta turtles revealed that turtles from the Dnieper delta are characterized by the typical Ukrainian mtDNA haplotype Ia, corresponding to *E. o. orbicularis*, while the three Crimean populations bear three different haplotypes of mtDNA lineage I. The only specimen from Dzhankoi examined has haplotype Ie (very close to Ia, differing only in one mutation step). In the Crimean mountains and on the Crimean Kerch peninsula the most differentiated haplotypes were detected (Ie, Ii). They differ by three to five mutation steps from the haplotypes found in the northern steppe part of the Crimea and on the Ukrainian mainland. Remarkably, turtles from the Crimean mountains (Luchyste) bear not haplotypes of an mtDNA lineage (IV) corresponding to *E. o. hellenica*, as it should be expected if they belong to this subspecies. Instead, they bear quite differentiated haplotypes.
of lineage I, arguing for some differentiation of the populations of the Crimean mountains and on the Kerch peninsula, but not for a subspecific allocation to *E. o. hellenica* (KOTENKO et al., 2003; in press). The occurrence of turtles with the same haplotype in the Crimean mountains and on the Kerch peninsula (in the El’tigen population) is not surprising, because the Kerch steppe region bears also other traces of montane flora and fauna. The contradictory results of morphological investigations, allozyme electrophoresis and mitochondrial haplotyping call for further investigations. Anyway, it is evident that genetically different populations of *E. orbicularis* inhabit the Crimean peninsula, and that the haplotype diversity of this relatively small region is remarkably high.

When SHCHERBAK’s investigations were carried out before the North Crimean Canal was constructed, localities 10, 11, 13, and 15 (Fig. 3) housed undoubtedly autochthonous populations. Later, the North Crimean Canal opened a gateway, allowing the immigration of turtles from the Ukrainian mainland. It is unclear which turtles inhabit today the Sivash region and the western Kerch peninsula (KOTENKO et al., in press): native Crimean populations, nominotypical *E. o. orbicularis* (which could have immigrated along the North Crimean Canal from the Dnieper and perhaps outcompeted or replaced the smaller native turtles), or hybrids. In the Chattyryk river (Fig. 3: localities 1, 2), turtles could represent an old native Crimean population or immigrants from the North Crimean Canal and its Rozdol’ens’kyi branch (the last one crosses over the river). The same situation could be true for turtles from the Samarchyk river and its environs (Rozdol’ne district; Fig. 3: localities 65–67). Turtles in the western Crimean lowland (Fig. 3: localities 56-64) and the Crimean mountains (Fig. 3: localities 16, 28–53) should still represent old autochthonous populations as they are far from the North Crimean Canal and its branches.

**Habitats**

The identified habitats of the European pond turtle in the Crimea are listed below, with references to localities shown on Fig. 3:

(a) Small rivers in the steppe zone with reeds, meadows and some willow-trees along banks, with slow current and silty bottom (Fig. 3: localities 1, 2, 9).

(b) Wetlands, usually densely overgrown by reed and other marsh vegetation (so called “plavni”) – in the lower reaches and mouths of steppe rivers, flowing into the Sivash or the seas (Fig. 3: localities 6, 21, 67).

(c) Big reed wetlands (plavni) with mosaic structure, when reed beds alternate with open water (Fig. 3: locality 17).

(d) Small shallow marshes in river floodplains (Fig. 3: locality 7).

(e) Reed wetlands along canals and at outlets of discharge and drainage canals along the coast of the Sivash and Karkinits’ka bay of the Black Sea (Fig. 3: localities 3, 5, 6a).

(f) Small mountain rivers or upper reaches of bigger rivers in mountains characterized by fast current, rifts, waterfalls, gravel bottom, but with some stillwater zones and oxbows (Fig. 3: localities 33, 38, 39, 45, 46).

(g) Lower reaches and mouths of rivers, which rise in the mountains, with relatively slow current (beyond the flood period), usually with reeds and willow trees and silty or sandy bottom (Fig. 3: localities 10, 11, 42–44, 48).

(h) Mouths of small rivers (usually dammed), flowing into salt lakes (Fig. 3: localities 62, 64). Such rivers are dry during most of the year, only their lower reaches have some water and reeds.

(i) Upper parts (often dammed, usually with plavni) of salt lakes with freshwater (Fig. 3: localities 56, 59–61, 64 and, probably, 58).

(j) Apices of sea bights (inlets) in Sevastopol’ area, with some reeds and freshwater springs (Fig. 3: locality 41).

(k) Wide, open main irrigation canals with some current, often with reeds along the dikes (Fig. 3: localities 4, 68). When there is no need for irrigation, such canals are drained; however, some pools remain.

(l) Narrow canals and ditches (for irrigation, drainage, fishponds, etc.), usually with slow current, overgrown with emerged aquatic weeds (Fig. 3: localities 6a, 18, 26, 27, 43, 65 and, probably, 12).

(m) Big water reservoirs, usually with small areas covered with reed or cattails (Fig. 3: localities 16, 19, 49, 54).

(n) Big and medium-sized ponds along small (usually temporary) rivers or arranged in gullies and depressions, with big areas of open water and developed emerged and aquatic vegetation (Fig. 3: localities 3, 5, 8, 20–23, 26, 31, 50, 52, 53, 57, 66).

(o) Small and tiny ponds, usually overgrown with emerged and aquatic vegetation (Fig. 3: localities 28, 35–37, 63 and, probably, 13, 24).

(p) Small and tiny lakes, overgrown with emerged and aquatic vegetation (Fig. 3: locality 35).
(q) Pits in sandy soil, with reed and cattail vegetation (Fig. 3: locality 27).

(r) Temporary water bodies (small lakes, swamps) which fall dry during summer or in arid years (Fig. 3: localities 30, 47).

Turtles inhabit small temporary wetlands when water is present, and when they dry up, the turtles migrate to the nearest permanent water bodies. For example, Puzanov (1931) observed *E. orbicularis* in a small swamp in the forest (Karakashyns’ka) in the Crimean nature reserve. In 1925–1926, this swamp dried up and turtles disappeared. In 1927, the swamp was filled again and turtles returned, but in smaller numbers. In the Karadags’kyi nature reserve, the presence of turtles also depends on the presence of small temporary wetlands. That is why this species does not occur in the reserve every year (Kukushkin, unpubl.) and has been considered to be absent in the reserve (Schcherbak, 1989). Not only small temporary lakes and swamps fall dry in summer. In the drought year 2002 some permanent small lakes near Luchyste were without water from June onwards. Arid climate in combination with water mismanagement leads to the drying out of some ponds (see below). In all such cases turtles migrate to other water bodies or die. Such a migrating individual was found by Schcherbak (1966) in the region of Alushta in a dry valley, 3–4 km from the nearest water bodies.

Actually, *E. orbicularis* inhabits in the Crimea all kinds of freshwater bodies except short-lived rain pools, and small streamlets without holes and backwaters. Up to now I am not aware of turtle records for rice polders, which occupy large areas in Krasnoperekops’k, Rozdol’ne, Dzhanoki, Nyzhn’ogirs’kyi, and Sovyts’kyi districts. Theoretically, rice polders could be used as feeding grounds, and when they are drained, the turtles could move to the nearest canals or ponds.

Obviously, most turtle records refer to ponds. Schcherbak (1966) did not distinguish between lakes and ponds. In the Crimea, man-made ponds are very common, while natural freshwater lakes are rare. “Lakes” in the orchard near Luchyste are ponds, “lakes” in the environs of Sovyts’kyi and “small water bodies” in the environs of Kerch (Schcherbak, 1966: p. 72) are, very likely, ponds as well (Fig. 3: localities 13, 24, 35). For localities 15, 25, 29, and 32, habitats are unknown, but according to the topographic map, they are most probably also ponds. If dammed mouths of small rivers flowing into salt lakes, dammed upper parts of salt lakes with freshwater, pits (actually small ponds) and water reservoirs (big ponds made for water supply) are considered as ponds, about 50% of all *E. orbicularis* records in the Crimea refer to ponds. Man-made water bodies (ponds, canals, wetlands resulting from irrigation) comprise more than 60% of all records. Thus, pond construction and the North Crimean Canal with its irrigation and drainage systems obviously favour the European pond turtle in the Crimea. The possible negative consequences of opening an immigration route for allochthonous turtles, threatening native *E. orbicularis*, was already addressed earlier in this paper.

According to our observations, *E. orbicularis* prefers in the Crimea water bodies with stagnant water or slow current with rich emersed and submersed vegetation, like reeds (*Phragmites australis*), cattails (*Typha angustifolia, T. latifolia*), pondweeds (*Potamogeton natans, P. crispus, P. pectinatus*), hornworts (*Ceratophyllum sp.*), bladderwort (*Utricularia vulgaris*), and duckweeds (*Lemna minor, L. trisulca*). Turtles were abundant in water bodies with such vegetation near Luchyste and are still abundant in El’tigen, between Koktebel’ and Pidgirne and in some other localities (see below). Ponds usually have very swampy bottoms because of a thick layer of silt.

The upper parts of salt lakes (Donuzlav, Sasyk-Sivash etc.) have numerous freshwater springs. These springs prevent water bodies from freezing in winter and provide a preferred habitat for hibernating turtles. Springs are common in many ponds in the Crimean mountains (e. g. near Luchyste), and owing to these cold springs, pond water is cool even during hot periods in July and August. In such ponds, turtles use shallow places away from the springs for basking. However, in winter the deepest parts of the ponds are used for hibernation.

**Abundance**

It turned out that the European pond turtle is more widely distributed in the Crimea as it was thought before. However, only few data are available on the abundance, but they demonstrate that *E. orbicularis* is a common, sometimes very common species. In a pond situated between Koktebel’ and Pidgirne with an area of about 0.25 ha, we caught 28 turtles in two days (29–30 July 2003, nine hours of trapping by two fishtraps). The population density was somewhat more than 112 individuals per hectare. In El’tigen, in an artificial water body along the sandy coast of the Kerch strait (connecting the Azov Sea with the Black Sea), 19 turtles were caught during two days (14–15 June 2001, nine hours of trapping by two fish-
traps). The total area of this pit was about 0.5 ha, most of it was very shallow and covered with dense reed, and only a 500 m² part was comparatively deep and with open water. I estimate the density in this water body to 38 to 380 individuals per hectare for high and low water levels, respectively.

In a pond, which is a dammed section of the upper part of Donuzlav lake, a local fisherman saw “hundreds of turtles” in February 2003. They were swimming along the bank near spring outlets. About 12–14 years ago, a fisherman often caught turtles by fishing rod in the upper reaches of Kyzyl-Yar lake, sometimes up to eight specimens during one outing. In recent years only single turtles have been recorded there. Several years ago, up to eight turtles were caught during one day by hooks with fishing tackle in a pond near Zelenyi Yar (Kerch peninsula; KOTENKO, 2001a). In the Ostaninski Plavni (Kerch peninsula), KARMYSHEV (2002) observed on 25 June 1997 three to five turtles along 10 m of vegetation free coastline.

In the past, a relatively high turtle population density was mentioned by SHCHERBAK (1966) for the environs of Kerch and Sovyets’kyi: during one day, five turtles were collected in 11 small water bodies near Kerch and 11 turtles in two lakes near Sovyets’kyi. According to SHCHERBAK (1966), the highest population density was found near Luchyste (surroundings of Alushta): in five small water bodies from 5 to 20 m diameter, 65 turtles were observed during six days in May 1961, and up to 14 individuals were caught per day (SHCHERBAK, 1966; ZMN MNH). From 14–15 June 2000, we found only three individuals in a lake of about 0.11 ha near Luchyste, corresponding to a density of about 27 individuals per hectare. Two of these turtles were caught during a trapping session with two fishtraps for 24 hours and four fishtraps for six hours.

Conservational Problems

Emys orbicularis is endangered and protected in many European countries; it is for example included in the Red Data Books of Armenia, Byelorussia, Latvia, and Lithuania. It is protected by the Bern Convention (Appendix II) and included in the category Lower Risk/Near Threatened in the IUCN Red List of Threatened Animals. This species is distributed all over Ukraine and abundant in many Ukrainian water bodies, mainly in the large wetlands of river deltas (SHCHERBAK, 1998; KOTENKO, 2000). It is also widely distributed and sometimes abundant in the Crimea. However, local abundance differs much, and the state of some native and endemic Crimean populations causes serious concern.

Although many turtles have been collected for the ZMN MNH in 1960–1961 near Luchyste, E. orbicularis was still abundant there in the 1980s and early 1990s according to local people. In June 2000 we were looking for five days for turtles near Luchyste and Alushta. Fishtraps were placed in eight water bodies. Only three individuals were captured in one small pond near Luchyste (KOTENKO, 2001a). The causes of this obvious decline are probably: (i) some ponds were completely drained; (ii) changes in the ecosystems of some ponds due to water loss for irrigation of orchards and vineyards; (iii) increased recreational use of water bodies and their banks (increased number of people and dogs, soil trampling, fishing and swimming, capture of turtles, egg collecting); and (iv) harvesting turtles for commercial purposes.

The former numbers of turtles and the extent of their exploitation may be illustrated by the following example: Around 1996 two persons caught by hand 18 turtles during half an hour in Komyshevyi (= Gnilyi) pond near Luchyste. The turtles were sold for export to businessmen from Simferopol’ (KOTENKO, 2001a). In 2000–2001, we failed to find any turtles in Komyshevyi pond. In Cherepashka pond (cherepashka means turtle), which is between Alushta and Izobil’ne, E. orbicularis was always common. On 11 June 2000, we could not catch any turtle there, even using five baited fishtraps. But on 21 May 2000 a dead juvenile, possibly the last turtle there, was found by a dog in the water (VOYEVODA, pers. comm.). In a pond near Dzhanko, where turtles were periodically collected by local people, we failed to catch any individual during six hours of trapping with two fishtraps on 26 July 2003.

In the past, the European pond turtle was not actively harvested in the Crimea; only occasionally people caught turtles by hand or fishing rod and released them or kept them as pets. In the last decade this situation changed radically and increasing numbers of turtles are now caught mainly for commercial purposes. This proliferating animal trade is facilitated by the economic crisis in Ukraine, creating many poor people. Usually turtles are collected: (i) for food, because Tatars who returned to the Crimea during last 10–15 years like to consume turtles; (ii) to make ashrays of the shells; (iii) to sell turtles as pets in local markets or to middlemen for further illegal export. Now, turtles are regularly caught for the demands of the international pet trade. In addition, amateur angling and fish poaching by different kinds of
nets endanger turtles. Often children are engaged in catching and selling animals. The situation of some populations is very critical. They can become extinct before being investigated and some genetically unique populations might be lost forever. The Crimean mountain populations of *E. orbicularis* are genetically and morphologically distinct. Therefore, they have been proposed to be included to the 3rd edition of the Red Data Book of Ukraine (KOTENKO, 2003).

It should be pointed out once more that in the last decade the illegal commercial exploitation of pond turtles and of rare snakes has considerably increased in the Crimea and in the southern Ukrainian mainland. Without the implementation of effective conservation measures, the rich herpetofauna of the Crimea will suffer irreparable damage.

An important aspect is habitat protection. Although many parts of the Crimea are rich in water bodies, the populations in the lowland and eastern part of the mountains may suffer under an arid climate due to the comparatively rare water bodies there. This restricts there the spatial distribution and abundance of *E. orbicularis*, as well as of *Triturus karelinii* and *Pelobates fuscus* (KOTENKO, 2001b). Some ponds were drained and turtles died or were forced to migrate to other water bodies. Some examples: VÖYEVODA (pers. comm.) observed in the 1990s many turtles in a pond near the Ulu-Uzen’ river (environs of Izobil’ne village). We found this pond completely dry in 2000 — all water was used for irrigation during a drought period and later the pond was not maintained. A small pond near Dozorne village, where PLYUSHCH (pers. comm.) observed turtles in the 1960s, was destroyed. Two ponds near the mouth of the Dzharylgach river were mainly fed by springs. In the upper pond, turtles were observed in 1989–1992. Later, both ponds were completely dry for several years, because springs were silted up. Then, the bottom and spring outlets were cleaned and the ponds restored (KURTADZHIYEV, pers. comm.). The upper pond, with reeds and open water, is again a good habitat for *E. orbicularis*, but it is unclear whether the species still exists there. In some sites, for example near Dzhankol and between Koktebel’ and Pidginne, some water bodies are used now as rubbish dumps.

The most valuable protected areas for Crimean *E. orbicularis* should be nature reserves (zapovidnyks), biosphere reserves, and national nature parks. These areas are strictly protected (nature reserves) or have strictly protected zones (the other two categories), where the turtles can thrive without human impact. Other categories of protected areas, landscape and zoological reserves (zakaznyks) and regional landscape parks are less valuable, because they are only nominally protected. At present there are six nature reserves in the Crimea: the Opuks’kyi (Opuk), Kazantyps’kyi (Kazantyp), Karadags’kyi (Karadag), Yaltyns’kyi (Yalta) mountain forest, “Mys Mart’yan” (“Cape Mart’yan”), and Kryms’kyi (Crimean) nature reserves. The latter consists of a mountain forest part and the Lebednyi Ostrovy (Swan islands). *E. orbicularis* does not occur in the Opuk, Kazantyp, and Cape Mart’yan reserves. In the Karadag and Yalta nature reserves it is rare as these sanctuaries comprise mainly mountain forests (KOTENKO, 1987), and on the Swan islands it does not occur on the strictly protected islands, but on the coast in canals and fishponds along the border of the buffer zone. Thus, the existing nature reserves do not play an important role for the conservation of turtles. Therefore, it is necessary to protect some water bodies strictly, especially in the Crimean mountains, where an endemic form of *E. orbicularis* occurs. Moreover, some native steppe populations should be included in the 3rd edition of the Red Data Book of Ukraine and in the planned Red Data Book of the Crimea. In order to improve the situation of *E. orbicularis* and other reptiles outside the reserves, it is necessary to raise public awareness, launch programmes on ecological education (first of all at schools and in mass media), and to control the pet trade in Ukraine.

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