

The Nile Soft-shelled Turtle *Trionyx triunguis* in Turkey, an overview

Prepared by
Markus Keller

on behalf of the
Aktionsgemeinschaft Artenschutz e.V. (AgA), Tulpenstrasse 1, 70825 Korntal-Münchungen,
Germany. (E-mail: buero@aga-international.de)

April, 2005

1 Introduction

Turtles can be considered living fossils. They are known to exist as order Testudines since the Triassic era about 200 million years ago († *Triassocheilus*). Since then, they colonized habitats from deserts, prairies, steppes and rainforests to ponds, wetlands, lakes and rivers, from all tropical and subtropical oceans around the world including the Mediterranean Sea to isolated islands in the middle of the oceans like the Aldabra atoll and the Galapagos Islands. The original lifestyle of the order *Testudines* was probably amphibian. The land-living turtles (*Testudinidae*), the marine turtles (*Cheloniidae*, *Dermochelyidae*) and the soft-shelled turtles (*Trionychidae*) are considered as highly specialised end-forms of the order *Testudines* (Starck 1978). All over the world, 14 different species of soft-shelled turtles are known. In several civilizations and religions, turtles are seen as important sacred animals. In the Indian mythology for example, a giant turtle is carrying the earth on their back while swimming in the endless sea (STPS of Greece 1996).

This overview focuses on the Nile Soft-shelled Turtle *Trionyx triunguis* (Forskål 1775). While tortoises and marine turtles enjoy a high popularity and focus in public and scientific research, little is known about soft-shelled turtles, especially from the *T. triunguis* population in the Mediterranean. Recent estimations expect that the total population seems not to exceed about approximately 500 mature individuals (Kasperek 1994). Habitat destruction, tourism pressure and the fishing industry led to the situation that the Mediterranean population of *T. triunguis* faces extinction in the near future. The Nile Soft-shelled Turtle behaves in several respects like a marine turtle. Although it mainly lives in rivers, it enters the sea on a regular basis and is often caught together with the Loggerhead turtle (*Caretta caretta*) and the Green turtle (*Chelonia mydas*) as by-catch in fisheries (Kasperek 2001).

Currently, 18 places reported a *T. triunguis* population in the Middle-East. A stronger population is known since the 70s from Dalyan/Turkey. The picture 1 on the right side shows three adult medium-sized *T. triunguis* near the Little Thermal Springs in Dalyan.



2 Classification:

Kingdom: Animalia (animals)
Phylum: Chordata (chordates)
Subphylum: Vertebrata (vertebrate)
Class: Reptilia (reptiles)
Subclass: Anapsida
Order: Testudines (turtles)
Suborder: Cryptodira (common-necked turtles)
Superfamily: Trionychoidea (hidden-necked turtles)
Family: Trionychidae (soft-shelled turtles)
Subfamily: Trionychinae (common soft-shelled turtles)
Genus: *Trionyx* (African soft-shelled turtles)
Species: *Trionyx triunguis* (Forskål 1775)

Synonyms used in literature: (Wermuth & Mertens 1977)

1798: *Testudo striata*
1809: *Trionyx aegytiacus*
1831: *Trionyx niloticus*
1837: *Trionyx labiatus*
1844: *Trionyx mortoni*
1860: *Aspidonectes aspilus*
1869: *Fordia africana*
1876: *Trionyx triunguis*
1948: *Trionyx triunguis rudolfianus*
since 1961: *Trionyx triunguis* (Alderton 1988, Cole 2000, Wermuth & Mertens 1961)

English: African Soft-shelled Turtle/Nile Soft-shelled Turtle (Cole 2000)

French: Tortue d'Afrique à carapace molle/Trionyx du Nil

Spanish: Tortuga del Nilo

Turkish: Yumuşak Kabuklu Kaplumbağası

Hebrew: tzav rach matzui

German: Afrikanische Weichschildkröte/Afrikanischer Dreiklauer (Cole 2000)

Taxonomic note: Wermuth & Mertens (1977) listed 11 species of the genus *Trionyx*. Ernst & Barbour (1989) split this genus in many separate genera in the subfamily Trionychinae. Only the genus *Trionyx* with one single species *T. triunguis* has apparently adapted to a maritime existence off the coasts of the Eastern Mediterranean in addition to its normal freshwater habitats.

3 Order and family description: *Testudines*, *Trionychidae*:

Appearance and morphology: All turtles (Testudines) are toothless, anapsid, oviparity reptiles (Romer 1977) with a bony shell, usually covered with epidermal scutes. Ribs, spinous processes, pelvis and thoracic girdle are combined in the carapax. The clavícula and the interclavícula are combined with modified ventral ribs in the plastron. The spinous processes of the neck vertebra are missing by the suborder Cryptodira (Wurmbach 1985). Their neck withdraws vertically. The suborder Pleurodira still has the spinous processes of the neck vertebra so their neck cannot be withdrawn but is laid in a furrow of their shell. All turtles are poikilotherm reptiles.

Trionychidae, with phylogenetic origin in South-East Asia, are carnivorous, night-active freshwater tortoises. They have a flattened, pancake-shaped shell with reduced bony carapax and plastron. The carapax and plastron are lacking epidermal scutes, but are covered with a thick, leathery skin. With the help of their capillary vessel system organised in tufts in the throat mucous membrane and their skin as a supplement cutaneous respiration organ, they can stay up to 15 hours under water in full activity (Deckert et al. 1991). The rowing paws of Trionychidae have each five toes, three of them with massive claws. Their noses are snorkel-like elongated and the eyes are on top of their head. Marginalia as connection between the plastron and carapax are mostly missing. The horn-jaw is covered with skin (Deckert et al. 1991). They also have a lattice-like plastral skeleton but with separate hyoplastral and hypoplastral bones on each side. The plastron lacks femoral flaps (Zug et al. 2001). Soft-shelled turtles (Trionychidae) reach from 25 cm of the Chinese Soft-shelled Turtle *Pelodiscus sinensis* to 130 cm of carapax length of the Asian Giant Soft-shelled Turtle *Pelochelys cantorii* (Stuart et al. 2001). Nearly the same size like *P. cantorii* reaches the Nile Soft-shelled Turtle *T. triunguis*, with a recorded maximum length of 1,2 m (Kasperek 2001). Grzimeck (1971) reported a plastron length of *T. triunguis* up to 0,9 m. Most other genera of Trionychidae reach 40 to 60 cm in carapace length.

4 Species description: *T. triunguis*:

Habitat: The Nile Soft-shelled Turtle (*T. triunguis*) is an aquatic bottom-dweller living in rivers, estuaries and lakes. The most typical habitat is the River Nile in Africa. It is one of the biggest species of the 14 different soft-shelled turtles with a weight up to 100 kg (Stehr 1981). It can live permanently in estuaries and enters regularly the sea (Kasperek 2001). The statement from Stehr (1981) that *T. triunguis* is exclusively found in freshwater is refuted.

Distribution: The Nile Soft-shelled Turtle is mostly found in the palaeatropic region: Most of the African continent except the waterways of southern and North-West Africa: White (below Murchison Falls) and Blue Nile drainages, Lake Rudolf and Lake Albert, the tributaries of the Congo River, Democratic Republic of Congo and most drainages in West Africa,



Picture 2: Head and right flipper of a *T. triunguis*

Egypt but not in the Nile delta (Marx 1968, Nada 2002, Schleich et al. 1996), Eritrea, Ethiopia, Sudan, South Somalia and Kenya (Spawls et al. 2002), Angola, Benin, Chad, Côte d'Ivoire, southwest to north of Namibia and west to Senegal; Mali (Caspary et al. 1998, Joger & Lambert 1996), Gabon, Central African Republic, Gambia (Håkansson 1981), Cameroon, Ghana, Guinea-Bissau, Mauritania, Niger, Nigeria, Rwanda (Hinkel & Fischer 1988), Sierra-Leone, Syrian Arabic Republic, Togo and Uganda. It has not been found in Lake Victoria. Grzimeck (1971) restricted the distribution to the African continent. However, its present distribution range extends as far as the palaeoarctic Mediterranean basin along the coasts of Israel, especially in the river Nahal Alexander (Mendelssohn & Geffen 1983), Lebanon, Liberia and Turkey (UNEP-WCMC 2003). In Greece, only one sighting occurred on the island of Kos (Taskavak et al. 1999). It is not listed by Engelmann (1993). The geographically

isolated *T. triunguis* aggregations in the Middle East can be considered as relict populations with a possibly high genetic divergence to the African main population. The last sighting of a Nile Soft-shelled Turtle in the Nile Delta by fishermen is dated back at least 22 years (Nada 2002).

In Turkey, the *T. triunguis* is found along the Turkish coast between the city Hatay at the border to Syria [36°E/36°N] and the SPA Köyceğiz/Dalyan [28°39'E/36°50'N]. Beach nesting was observed at Erdemli Beach [34°20'E/36°35'N], a private beach from the Middle East Technical University (MEDASSET 2001). A single specimen could be observed in a pond near Tekirova in October 2001. Sightings occur also in the Göksu Delta [34°E / 36°20'N] (van der Winden et al. 1997). It might also live in the marsh behind the antique ruins of Phaselis [30°32'E/36°30'N] (unproven sighting 1993). Their main habitats in Turkey are the SPA Köyceğiz/Dalyan and the Dalaman delta (Council of Europe 1998).

Behaviour: Soft-shelled turtles actively forage and also lie partially hidden in the bottom sand or silt, waiting for passing prey. Their long necks and snorkel-like snouts permit them to stick their noses to the water surface to breathe. The Nile Soft-shelled Turtle may also depend on cutaneous respiration. Trionychinae are actively foraging for prey and are excellent swimmers (Stöcker 1986). While basking on the water surface, the turtles stayed suspended and stationary, although the position was maintained by gently stroking the feet. The turtle moves through the water propelled by its legs. One front leg and the opposite rear leg are pushed back at the same time, followed by a glide. Then, the other front leg and opposite rear leg are pulled forward and pushed back and the sequence is repeated. The turtle can be very agile and quick when it swims, often changing directions rapidly (Burghardt 1996). For the homing behavior of Trionychidae, the possibility of a sun compass orientation based on an internal clock as navigation system is assumed (DeRosa 1980). Some behavior patterns of a relict population can be completely different to the main population due to the imprinting of juveniles (Wilson 1998).

Reproduction: Mature female *T. triunguis* can deposit over 100 ping-pong ball sized eggs on land but usually produce about 50. Gidis (2004) reported an incubation period of 55 to 56 days for the Dalaman region. Most Testudines show a phenotypic sex determination. The incubation temperature of the eggs at a sensitive period of development in the middle trimester triggers the gonad development leading to the sex of the hatchling: temperature (environmental-) dependent sex determination (TSD) after Bull (1980). However, Trionychidae exhibit true genotypic sex determination. So the sex ratio cannot be manipulated using temperature to the benefit of conservation measures (Bride 2004).

Food: The Nile Soft-shelled Turtle is predominantly carnivorous eating worms, molluscs, fish, crabs and dead animals it finds on the river bed, although it may eat plant material if animal prey is not available.

Threats: Sewage, accidents with boats (especially powerboats), fish traps and line fishing, water pollution, human persecution, urban development, stress through permanent disturbance caused by heavy boat traffic, very low reproduction rate and habitat loss put the species at risk (Council of Europe 1998, Kasperek 1994).

Another risk for the Nile Soft-shelled Turtle is marine trawling. The brackish-water turtle can spend considerable parts of its life cycle at sea and behaves therefore in many respects as a marine turtle (Kasperek 2001). For a scientific survey, the region between Mersin and İskenderun was selected for studying trawling by-catch. In the trawling season 1996/97, 5 trawlers took part in the project and reported that not only 306 Green Turtles (*Chelonia mydas*) and 116 Loggerhead Turtles (*Caretta caretta*) were found to be trapped as by-catch in their trawling nets, but also 437 Nile Soft-shelled Turtles (*T. triunguis*). 87% of these turtles were captured by mid-water trawls, the rest by bottom-trawls, mostly at depths between 11 m and

30 m. 95% of all turtles were caught alive and healthy. They were usually released back into the sea immediately after capture by the fishermen (Oruç 2001).

In the mid 80s, the tourism boom in the area of Dalyan/Dalaman brought a high threat for the Nile Soft-shelled Turtle population. Habitat destruction, boat traffic, water pollution and permanent stress led to a critical situation: the reproduction rate of the population is getting so low that a long-term survival of the whole population is in danger.

5 Legal protection status of the *T. triunguis*:

The Nile Soft-shelled Turtle *T. triunguis* was included in the CITES, the Convention on International Trade on Endangered Species of wild Fauna and Flora (Washington Convention, 1973) Appendix III, Ghana 1973, meaning that commercial trade is permitted but regulated: CITES Identification Manual Reference A 301.012.006.015. (UNEP-WCMC 2003). *T. triunguis* has been included in the *Convention on the Conservation of European Wildlife and Natural Habitats* (the Bern Convention of the Council of Europe 1979) Appendix II: "strictly protected fauna species" in 1996 (Kasperek 2001) and the European Commission Regulation 338/97 Annex C in 1997 (UNEP-WCMC 2003).

The Mediterranean subpopulation has been listed 1996 in the IUCN 2000 Red List as critically endangered (Baillie & Groombridge 1996, IUCN 2004). It has been classified in category "CR C2A" which means that the population suffers from a continuing decline in numbers of mature individuals and population structure and that the population does not contain more than 1000 mature individuals (Kasperek 2001). The loss of a subpopulation results in a massive reduction in the genetic dimorphism of the species. But a rich genetic pool highly improves the adaptation to changing environmental and climatic conditions and thus the long-term survival of a species (Wilson 1998).

In Turkey, the Nile Soft-shelled Turtle has been put under strict protection from the Government. The Çukurova Delta Biosphere Reserve with a relatively large population is part of the LIFE project of the EC (Kasperek 2000).

In 2001, MEDASSET classified the Dalyan *T. triunguis* population as Class 2: relatively large population which is in strong need for conservation (MEDASSET 1999).

Urgent actions are necessary as a step towards a better conservation and management of the highly endangered *T. triunguis* population not only in Turkey like sustainable tourism, controlled boating, restoring nesting sites and the protection of important habitats. The vision is a restored and protected healthy turtle population reflecting their intrinsic values, role in ecosystem functioning and benefits to people.

6 Literature

- ALDERTON, D. (1988): Turtles and tortoises of the world. Facts on File, New York.
- BAILLIE, J., B. GROOMBRIDGE (1996): 1996 IUCN Red List of threatened animals. IUCN - The World Conservation Union, Gland, Switzerland and Cambridge, UK.
- BRIDE, I. (2004): Update Report on the Status of the Nile Soft-shelled Turtle, *Trionyx triunguis*, in Dalyan and Dalaman, Turkey. Report of the 24th Meeting of the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg.
- BULL, J.J. (1980): Sex determination in reptiles. Quarterly Review of Biology 55: 3-21.
- BURGHARDT, G.M., B. WARD & R. ROSCCOE (1996): Problem of reptile play: Environmental enrichment and play behaviour in a captive Nile Soft-shelled Turtle, *Trionyx triunguis*. Zoo Biology 15, 223-238.
- CASPARY, H.-U., A.D. MERTENS & B. NIAGATÉ (1998): Possibilités d'une exploitation durable du ressources faunique dans le Réserve de Faune de Bafing, Mali. Deutsche Gesellschaft für Technische Zusammenarbeit, Eschbronn.
- COLE, T.C.H. (2000): Wörterbuch der Tiernamen: Latein, Deutsch, Englisch. Spektrum Akademischer Verlag, Heidelberg, Berlin.
- COUNCIL OF EUROPE (1998): Report of the 18th Meeting of the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg.
- DECKERT, K., G. DECKERT & G. PETERS (1991): Urania-Tierreich: Fische, Lurche, Kriechtiere. 1st edition, Urania-Verlag, Leipzig.

The Nile Soft-shelled Turtle *Trionyx triunguis* in Turkey, an overview

- DE ROSA, C.T. & D.H. TAYLOR (1980): Homeward Orientation mechanisms in three species of turtles (*Trionyx spinifer*, *Chrysemys picta*, *Terrapene carolina*) Behaviour Ecology Socio-biology 7, 15-23.
- ENGELMANN, W.E. (1993): Lurche und Kriechtiere Europas. Neumann Verlag, Radebeul.
- ERNST, C.H., R.W. BARBOUR (1989): Turtles of the World. Smithsonian Institution Press, Washington D.C.
- FORSKÅL, P. (1775): Flora Aegytiaco- Arabica et Descriptiones animalium, avium, amphibiorum, piscium, insectorum, vermium; quae in itinere Orientali observavit Petrus Forskål. ed. C. Niebuhr. Mölleri, Hauniae.
- GIDIS, M. & Y. KAŞKA (2004): Population size, reproductive ecology and heavy metal levels in eggshells of the Nile soft-shell turtle (*Trionyx triunguis*) around thermal lake Kukurtlu (Sulphurous), Mugla-Turkey. – Fresenius Environmental Bulletin 13 (5): 405-412.
- GRZIMECK, B.H.C. (1971): Grzimecks Tierleben, Band VI: Kriechtiere. Kindler Verlag, Zürich.
- HÅKANSSON, N.T. (1981): An annotated checklist of reptiles known to occur in The Gambia. Journal of Herpetology 15 (20): 155-161.
- HINKEL, H. & E. FISCHER (1988): Reptiles et amphibiens du Rwanda et leur environnement. Naturwissenschaftliche Forschungsgruppe Zentral- und Ostafrika, Johannes Gutenberg Universität, Bureau de Coordination, Mainz and Kingali.
- IUCN (2004): 2004 IUCN Red List of Threatened Species. Accessed November 19th, 2004. www.iucnredlist.org.
- JOGER, U. & M.R.K. LAMBERT (1996): Analysis of the herpetofauna of the Republic of Mali. First annotated inventory with a description of a new *Uromastyx* (Sauria: Agamidae). Journal of African Zoology 110 (1): 21-51.
- KASPAREK, M. (1994): Die Nil-Weichschildkröte – eine stark bedrohte Reptilienart im Mittelmeergebiet. herpetofauna, Weinstadt, 16 (89): 8-13.
- KASPAREK, M. (2000): An assessment in the Çukurova Delta with Recommendations for the Conservation Management. Report of the 20th Meeting of the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats. Strasbourg.
- KASPAREK, M. (2001): Towards an action plan for the conservation of the Nile soft-shelled turtle *Trionyx triunguis* in the Mediterranean. Report to the 21st Meeting of the Bern Convention, MEDASSET, Athens.
- MARX, H. (1968): Checklist of the Reptiles and Amphibians of Egypt. Special Publication United States Naval Medical Unit No. 3.
- MEDASSET (1999): Up-date report and review of the status of the Nile Soft-shelled Turtle (*Trionyx triunguis*) in Turkey. The Mediterranean Association to Save the Sea Turtles, Document T-PVS (99) 73.
- MEDASSET (2001): Conservation of the green turtle *Chelonia mydas* in Turkey. Report by the NGO. The Mediterranean Association to Save the Sea Turtles, Document T-PVS (2001) 70.
- MENDELSSOHN, H. & E. GEFFEN (1987): The Egyptian Tortoise in Israel. Israel, Land and Nature 12: 153-157.
- NADA, M. (2002): An Assessment of the Nile Soft-shelled Turtle, *Trionyx triunguis*, in the Nile Delta and its Lagoons, Egypt. MEDASSET, Athens.
- ORUÇ, A. (2001): Trawl fisheries in the eastern Mediterranean and their impact on marine turtles. Zoology in the Middle East, Heidelberg, 24: 119-125.
- ROMER, A.S. (1977): The vertebrate body. 5th edition, W.B. Saunders Company, Philadelphia.
- SCHLEICH, H.H., W. KÄSTLE & K. KABISCH (1996): Amphibians and reptiles of North Africa. Koeltz Scientific Books, Königstein.
- SPAWLS, S., K. HOWELL, R. DREWES & J. ASHE (2002): A Field Guide to the Reptiles of East Africa. Academic Press, London.
- STARK, D. (1978): Vergleichende Anatomie der Wirbeltiere Band 1. Springer Verlag, Berlin.
- STEHR, H. (1981): Das moderne Tierlexikon, Band 12. Bertelsmann Verlag, Gütersloh.
- STÖCKER, F. & G. DIETRICH (1986): Brockhaus Lexikon Biologie. Brockhaus Verlag, Leipzig.
- STPS OF GREECE. (1996): Meeresschildkröten. 2nd edition, the Sea Turtle Protection Society of Greece, Athens.
- STUART, B.L., P.P. VAN DIJK & D.B. HENDRIE (2001): Photographic guide to the turtles of Thailand, Laos, Vietnam and Cambodia. Wildlife Conservation Society, Thailand.
- TASKAVAK, E., M.-J. REIMANN & N. WOUTER (1999): First record of the Nile soft-shelled turtle, *Trionyx triunguis*, from Kos Island, Greece, with comments on its occurrence in the eastern Mediterranean. Chelonian Conservation and Biology, Lunenburg, 3 (3): 510-511.
- UNEP-WCMC (2003): Checklist of herpetofauna listed in the CITES appendices and the EC Regulations 338/97. 9th edition, JNCC Joint Nature Conservation Committee, United Kingdom.
- VAN DER WINDEN, J., S. BOGAERTS & H. STRIJBOOSCH (1997). Herpetofauna des Göksu Deltas und des umliegenden Gebirges, Türkei. Salamandra, Bonn, 33 (1): 9-24.
- WERMUTH, H., R. MERTENS (1961): Schildkröten, Krokodile, Brückenechsen. VEB Gustav Fischer Verlag, Jena.
- WERMUTH, H., R. MERTENS (1977): Liste der rezenten Amphibien und Reptilien: Testudines, Crocodylia, Rhynchocephalia. In: Das Tierreich, Lieferung 100, Walter de Gruyter, Berlin.
- WILSON, E.O., F.M. PETER (1998): Biodiversity. National Academy Press, Washington D.C.
- WURMBACH, H. (1985): Lehrbuch der Zoologie Band 2: Systematik. 3rd edition, Gustav Fischer Verlag, Stuttgart.
- ZUG, G., L. VITT & J. CALDWELL (2001): Herpetology: An Introductory Biology of Amphibians and Reptiles. 2nd edition. Academic Press, New York.