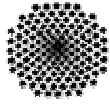
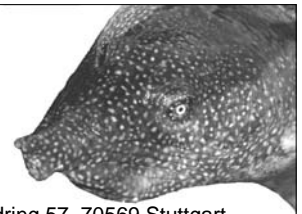




# A general assessment on the status quo of the *Trionyx triunguis* in Dalyan, Turkey



University of Stuttgart

Markus Keller & Franz Brümmer

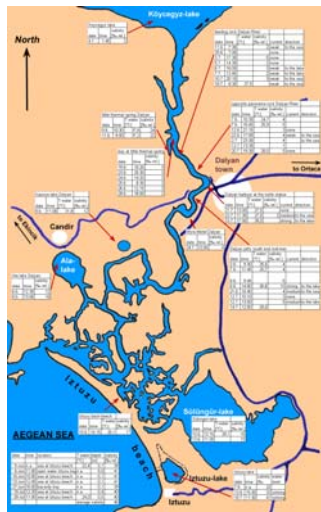
Institute of Biology, Department of Zoology, University of Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart.  
Markus.keller@studserv.uni.stuttgart.de

## Abstract

The Nile Soft-shelled Turtle *T. triunguis* is an aquatic bottom-dweller living in rivers, estuaries and lakes. However, little is known of that turtle species with a critically endangered sub-population in the eastern Mediterranean likely not to exceed about 500 mature individuals (Kasparek 1994). One of the most important habitats is the Special Protected Area Köyceğiz/Dalyan in the south-west of Turkey (Kasparek & Kinzelbach 1992). This population faces several problems: habitat destruction, heavy boat traffic, nest predation and loss of nesting habitats, water pollution and tourism activities (Keller 2005a). From May until July 2004, a general assessment of the *T. triunguis* population in Dalyan was carried out. The major focus was placed on the impact of boat traffic on the surfacing and thermoregulatory behaviour, human feeding activities and nesting of the *T. triunguis*. The results drawn are alarming: The population is over aged and reproduction rate seems to be very low. Nearly 90% of all nests found were destroyed by feral predation. Compared with scientific studies carried out earlier, the population is declining significantly. Thermoregulatory behaviour was seen only sporadic. Surprisingly, regularly passing boats are not longer seen as severe danger.

Due to our results, urgent conservation measures are necessary to ensure a long-term survival of the Mediterranean *T. triunguis* population not only in the Dalyan area.

## Habitat characteristics



The Dalyan River represents a typical brackish estuary featuring a strong vertical difference in salinity with the strongest gradient near the bottom of the river up to 30 ‰. The influence of the tides is noticeable upstream until the outlet of Köyceğiz Lake. Most *T. triunguis* sightings occurred near Dalyan town.

In only four meter depth of the Dalyan River, the turtles are in water with more than 20 ‰ salinity, so the turtles spent the majority of the time in brackish water. The *T. triunguis* nests found show that they migrate in the Sülüngür Lake system with a measured salinity of 16‰. All populations in the Middle East are exclusively found in coastal areas with partly brackish water and so habitats like the Dalyan River can be considered as preferred.

Map 1: Water temperature and salinity on various locations around the SPA Köyceğiz/Dalyan

## Nesting behaviour



Map 2: Location of *T. triunguis* nests at Iztuzu beach. Only nest G was not destroyed from predators during the observation period. The nest of a Loggerhead Turtle (*C. caretta*) is marked. It is known that *C. caretta* migrate regularly into the Dalyan River (Keller 2005b).

Eight nests were recorded from the back side of the sandbar near Sülüngür Lake. Nest A was found on the western shore of the Dalyan River near the village. Most of the time, nesting occurred in sand dunes with an average gradient of 31° in 2,8 m height and 4,9 m distance from the waterline. Nearly 90 % of the unprotected nests are lost to feral nest predators like dogs, wild boars and foxes. The high nest predation plays a major negative role in the population dynamic of all Testudines.

## Population size and reproduction rate



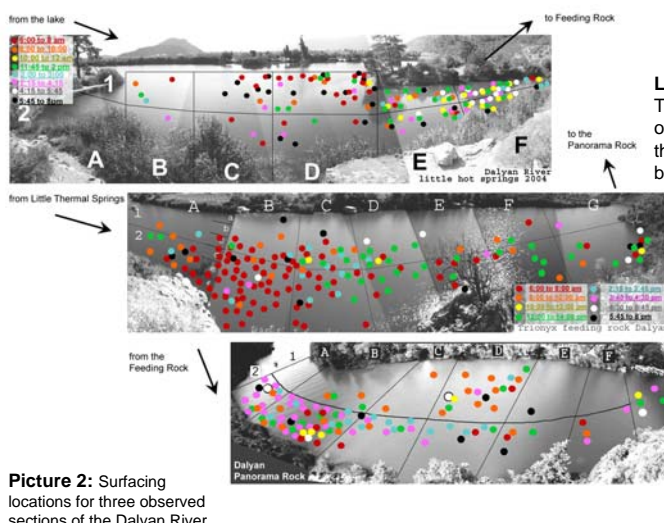
All measured eggs from dug up nests show a very narrow spread in size with an average diameter of 34,4 mm (n = 16; s.d. = 1,8 mm) which is nearly the same as measured by Gramentz 1993 at Kükürüt Gölü. The nutritional condition of the population in Dalyan seems to be good concluded by to the egg size and seen turtles. The maximum of reasonable intact egg shells per nest is with around 20 low.

Picture 1: *T. triunguis* egg-shells

A total population of around 75 animals in the SPA Köyceğiz/Dalyan is estimated. But the average number of seen turtles per hour decreased over 50 % in the past 13 years. Although nesting of the *T. triunguis* population occurs, the reproduction rate seems to be very low. From 515 observed surfacing events, only 13 juvenile turtles (2,5 %) with an estimated carapax diameter of 30 cm or smaller could be observed. The situation is alarming: Already ten years ago, nearly no juvenile *T. triunguis* were seen by Max Kasparek.

## Impact of boat traffic

Three sections of the Dalyan River were observed for surfacing behaviour of the *T. triunguis*: Little hot springs, Feeding Rock and Panorama Rock. Visual inspection was mostly done by scanning the section of river to be examined for about 2 hours by eyesight or with the help of binoculars. For each surfacing event, time, boat traffic, duration, location (coloured dots) and orientation were recorded.



Picture 2: Surfacing locations for three observed sections of the Dalyan River

**Little hot springs:** A total of 143 surfacing events were recorded.

The turtles regularly use the outlet of the springs as retreat from the heavy boat traffic (n = 337 in one day). Sightings in the main river occurred only in the morning and evening hours. If possible, the turtles try to avoid the direct confrontation with the passing boats. But the Pearson correlation between the number of passing boats to the number of seen turtles is with -0,07 not significant.

**Feeding Rock:** A total of 199 surfacing events were recorded.

The feeding activities for tourist purposes took place between 6 and 7:30 am with over 67 sightings per hour. The animals are highly time-conditioned and were hardly scared away from the arriving boats. Even when there was no feeding in the morning, the turtles arrived waiting for the feeding tours. Major problem: no sustainable management of the feeding activities and the turtles learn fast that passing boats equals possible food and not possible danger.

**Panorama Rock:** A total of 173 surfacing events were recorded.

A total of 355 boats per day frequented the river during observation. The turtles prefer the sections A2 and B2 with lower boat traffic. But contrary to our expectations, they enhance their surfacing activity relative to the increased boating levels on the river showing a positive correlation of 0,35 with the surfacing events and 0,44 with the surface duration. The turtles are highly adapted to the heavy boat traffic and passing boats are not seen as severe danger any more. Several *T. triunguis* could be seen with massive injuries from boat propellers.

## Concluding remarks

- The population in the SPA Köyceğiz/Dalyan is highly over aged and extremely threatened from extinction in the near future.
- Several important conservation measures are necessary to ensure a long term survival of this *T. triunguis* population.
- Their speedy implementation will help to keep the natural beauty and high biodiversity in Dalyan as biggest value for all people.

## Acknowledgement

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