



# Search for gravid mussels in Torpe Kanal

Technical report UC LIFE Denmark  
(LIFE15NAT/DK/000948)

Lea D. Schneider & Valentina Zülsdorff - June 2017



## Contents

Background.....	3
Study area.....	3
Methods .....	4
Results .....	5
Concluding summary.....	7
References.....	8

## Background

During a mussel inventory in Torpe Kanal conducted in the year 2014, a number of 14 living individuals of the thick-shelled river mussel *Unio crassus* (Order: Unionoida) was found, together with mussel shells of the same species (Ringsted – Femern Banen, 2014). Based on the aims of the European LIFE project *UC LIFE Denmark* (LIFE15NAT/DK/000948), a second mussel inventory was conducted the 13<sup>th</sup> of June 2017 to ensure the presence of living mussels in Torpe Kanal and to investigate whether mussels are taking part in reproduction. This knowledge is essential for the development of conservation strategies for *Unio crassus*, such as mussel propagation by means of artificial infestation of host fish rendering possible re-introduction of mussels in the River Suså.

## Study area

Torpe Kanal is located in the community of Næstved, Denmark, and represents a shortcut of the upper and lower part of the River Suså. Similar to the mussel investigation from Ringsted – Femern Banen (2014), the investigated stream stretch reaches from Ravnstrupvej no. 75 (bridge no. 99902) to 30 meter upstream of the closest railway bridge of the Ringsted-Vordingborg connection (Fig. 1).

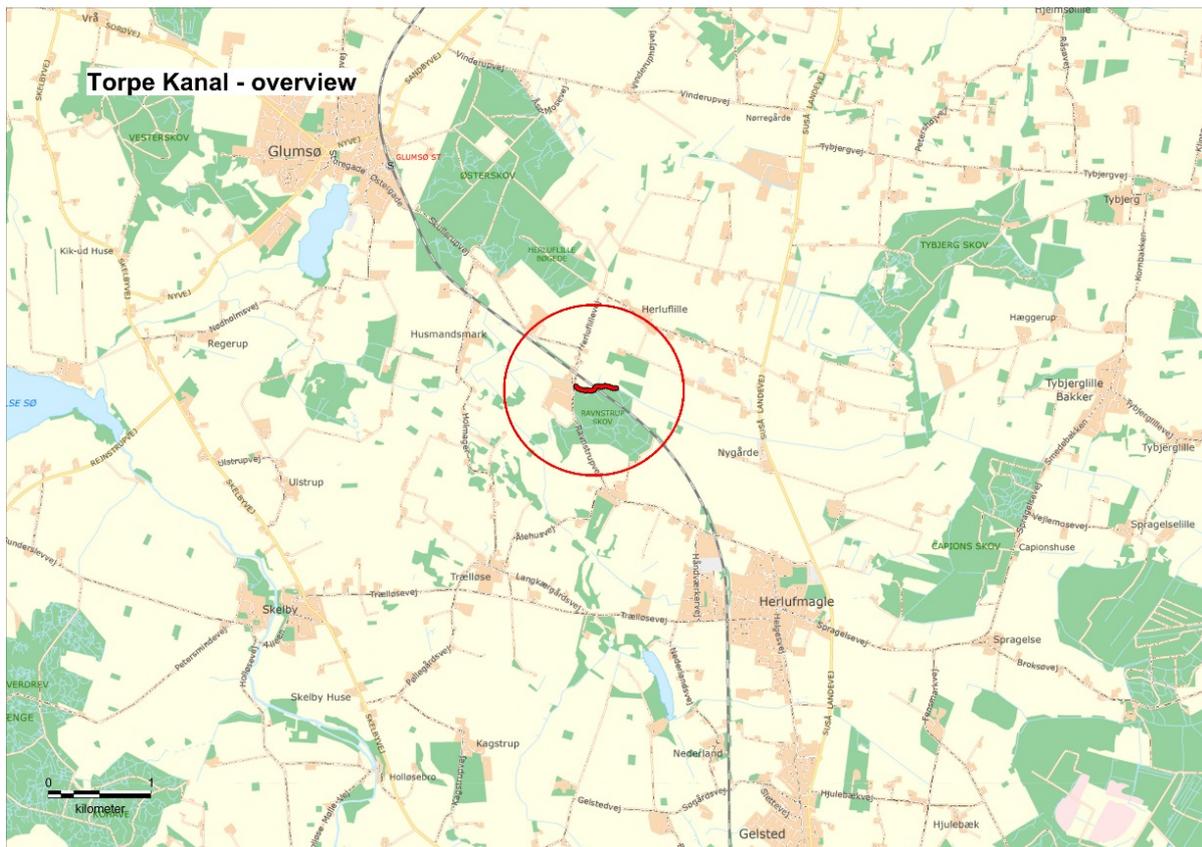


Figure 1. Map with indication of Torpe Kanal (red line) - 3 km of watercourse.

## Methods

The mussel investigation was carried out by wading through the river using an aquascope for thorough visual and manual screening of the bottom substrate for living mussels and mussel shells (Fig. 2). Particular attention was given to locations in Torpe Kanal where living mussels were found in the previous investigation of Ringsted – Femern Banen (2014). Living mussels were carefully picked from the sediment and transferred to aerated buckets filled with stream water until further investigations took place. These encompassed morphological measurements (length, height, width, nearest  $\pm$  mm), photographing and examination of gills for brood using special tongs to slightly open the mussel shell (Fig. 2). In gravid mussels, the outer gill arches are partly swollen and orange or white in colour, in contrast to usually flat and transparent gills in mussel individuals that are not gravid (Bednarczuk, 1986). A sample of the mussel brood was collected in one mussel individual to investigate whether the brood has been fertilized, i.e. if a development from egg to mussel larvae (glochidia) has been taken place.

Moreover, living mussels were tagged with an individual Passive Integrated Transponder (PIT, 12 mm, Oregon), which were glued on the mussel shell near the umbo using superglue (Locite) and marine epoxy (Pattex). Individual PIT tag numbers were scanned and noted, together with a paper-tag number glued besides the PIT tag. Mussel shells were randomly collected for morphological measurements (length, height, width, nearest  $\pm$  mm) and were photographed.

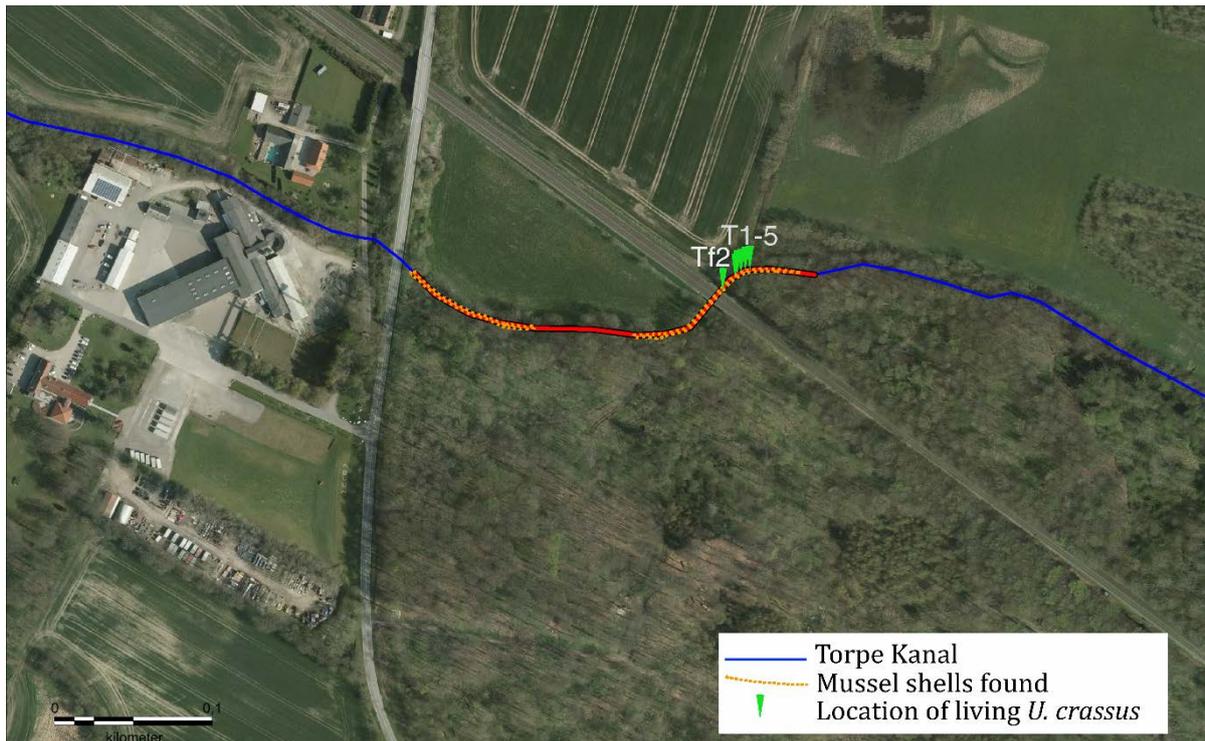
Chemical parameters, which are temperature ( $^{\circ}$ C), oxygen content (mg/L), oxygen saturation (%), pH and conductivity ( $\mu$ S/cm), were measured in Topre Kanal.



**Figure 2. Search for mussels in Torpe Kanal using an aquascope (left) and examination of brood in living mussel individuals using special opening tongs (right).**

**Results**

A number of six living mussels was found and PIT tagged during the investigation on 13<sup>th</sup> of June 2017 (Fig. 3). All individuals were located upstream of the railway bridge where they were sitting in the middle of the watercourse of Torpe Kanal, in sediment dominated by sand and gravel. All mussels but one, which stretched out its white food on top of the sediment, were partly buried in the sediment with the syphons clearly visible (Fig. 4). The average shell length of living mussels was 63 mm. The shortest mussel individual was 52 mm in length and carried brood in its gills (Table 1). Examination of a brood sample using a microscope binocular showed that eggs were not developed to glochidia (Fig. 6).



**Figure 3.** Map of the inventory stretch in Torpe Kanal with indication of locations where living mussels and mussel shells were found.



**Figure 4.** Adult mussel (*Unio crassus*) partly buried in the sediment (left) and PIT tagged (right).

Table 1 Summary of mussel identifiers, morphology, present brood and colour of soft tissue.

Tag Nr.	PIT-tag ID	Length (mm)	Width (mm)	Height (mm)	Brood	Colour of soft tissue
T1	22600808974	62	23	37	no	orange
T2	226000785340	65	28	39.5	no	orange
T3	226000529755	69	29	44.5	no	white
T4	226000733575	59	25	39.5	no	orange
T5	22600733529	67	29	42	no	orange
Tf2	226000125809	52	24.5	34	yes	white

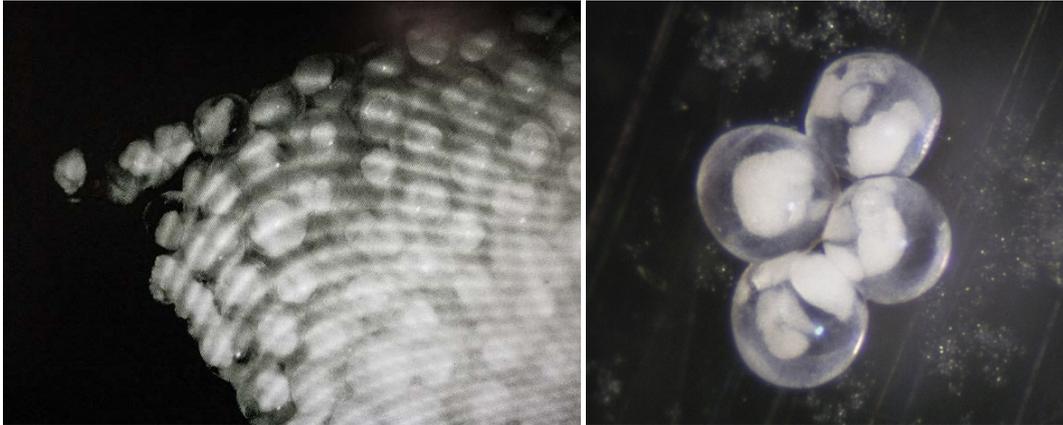


Figure 5. Brood sample from mussel individual coded Tf2.

Among a variety of *U. crassus* mussel shells found in Torpe Kanal, five shells were *Anodonta* sp (Fig. 6). The mussel shells of *U. crassus* showed differences in morphology. In particular, a round morph stood out in comparison to the typical shape of *U. crassus* (Fig. 7). The smallest *U. crassus* shell was 34 mm in length (Fig. 8).



Figure 6. Shells of *U. crassus* (left) and *Anodonta* sp. (right) from Torpe Kanal



Figure 7. Different morphologies of *U. crassus* in Torpe Kanal

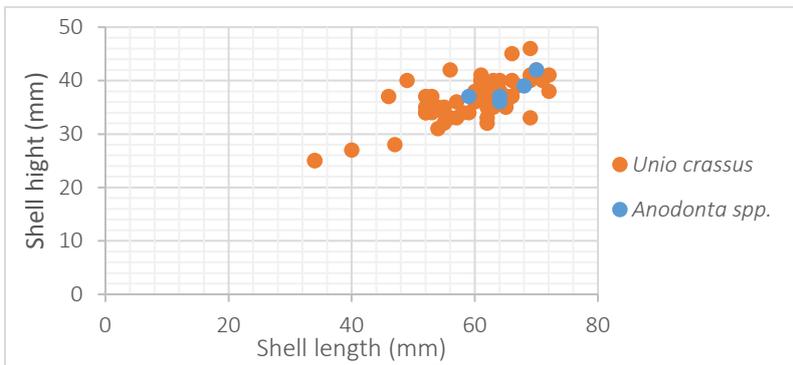


Figure 8. Size of *U. crassus* and *Anodonta sp.* mussel shells

The results of chemical parameter measurements in Torpe Kanal are given in table 2.

Table 2 Temperature, pH, conductivity, oxygen (O<sub>2</sub>) concentration (mg/L) and saturation (%) measured the 13<sup>th</sup> of June 2017 in Torpe Kanal.

Temperature	pH	Conductivity (μS/cm)	O <sub>2</sub> (mg/L)	O <sub>2</sub> (%)
15.8	7.33	555	8.42	85.7

### Concluding summary

The search for *U. crassus* in Torpe Kanal resulted in six living individuals of *U. crassus* and a variety of shells, including five shells from *Anodonta sp.*. All living mussels were PIT tagged. Findings of mussel shells somewhat corroded, however, hint at the recent death of at least two individuals of *U. crassus*. Possibly, this explains why the number of living individuals of *U. crassus* was reduced compared to the inventory made in 2014. However, reduced light conditions complicated the search on the 13<sup>th</sup> of June in 2017 and more mussels may be found when more sunlight is given.

Investigation of brood samples taken from one gravid mussel individual showed that brood was not fertilized and may hint at a limitation of mussel sperms in the river. Aggregation of mussels found in Torpe Kanal hence may improve reproduction success in the future. However, further investigation of PIT tagged mussels for gravidity is recommended for the year 2018, and should take place at several occasions between May and July – the period of mussel reproduction season. Moreover, further search for living mussels in Torpe Kanal at improved light conditions may result in a higher number of adults. Mussel aggregation with the tagged mussels from the recent

investigation potentially increases the chance for successful reproduction. With brood developed to glochidia, mussel propagation via infestation of host fish can be carried out in the future.

## References

- Bednarczuk, J. (1986). Untersuchungen zu Wirtsfischspektrum und Entwicklung der Bachmuschel *Unio crassus* (Dissertation). Tierärztliche Hochschule Hanover, Hanover, Deutschland.
- Ringsted – Femern Banen (2014). Kortlægning af tykskallet malermusling i Torpe Kanal: RFB\_02\_03\_05\_Nr2053. København, Denmark.



Figure 9. From left to right: Palle P. Myssen, Malene Callesen Dall, Valentina Zülsdorff & Lea. D. Schneider

Contact:

lea.schneider@kau.se

Department of Environmental and Life Sciences | Biology | Faculty of Health, Science and Technology | Karlstad University | 651 88 Karlstad | Sweden