

MAMMALS OF MORICSALA STRICT NATURE RESERVE WITH SPECIAL FOCUS ON BATS

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This report is aimed to summarize data on mammal fauna in Moricsala Strict Nature Reserve - the oldest protected area of Latvia. Most of the data were collected during the studies of bats in 1980 and 2008 as well as in studies of shrews and mouse-like rodents in 1959/1960 and in 1989. Data on other mammal species come mainly from episodic observations. Up to now altogether 32 mammal species have been recorded in the Reserve. Nine of them are bat species, 3 represent shrews and moles, 8 – rodents (including 6 mice and voles), 6 – carnivores, 4 - ungulates and one hare species. Among the carnivores two are alien species. The survey data demonstrate high species richness of bats in the relatively small territory of the Reserve. Of nine bat species eight species were recorded inhabiting the Moricsala Island, one species on the Lielalksnīte Island and six species flying over the Usma Lake. Additionally the calls of unidentified *Myotis* sp. were recorded on both islands. Reproduction in the territory of the Reserve was proved for two bat species. Only one bat roost with a colony of Daubenton's bat *Myotis daubentonii* Kuhl, 1819 was found.

Key words: Latvia, protected area, mammal fauna, bats.

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INTRODUCTION

The Moricsala Strict Nature Reserve (further in the text - Moricsala SNR or Reserve) is located in the very western part of Latvia. It includes two islands: Moricsala (82,31 ha) and Lielalksnīte (31,11 ha), and part of Usma Lake aquatorium (704,71 ha). Usually, during the winter the lake is covered by ice for 3-4 months. For the most

part both of the islands are overgrown by mixed broad-leaved and boreal forests. Only very small areas are covered by grassland. The Moricsala Island is famous for its old-growth oak forest.

Although established a hundred years ago Moricsala SNR missed complete mammal species list up to now. Only episodic mammal studies covering mainly bats as well as shrews

and mouse-like rodents have been carried out.

The purpose of this paper is to summarize our data and all other published and unpublished data on mammal fauna of the Moricsala SNR.

MATERIAL AND METHODS

Bats

The bat fauna of the Moricsala Island was surveyed in July 1980 and of both islands in June/July 2008 when data on mammals were collected for elaboration of the management plan for the Reserve (Reihmanis 2009). In 1980 only the search for bat roosts in trees were carried out. The rest of the data were collected by five bat-workers in 28/29 June and 20/21 - 21/22 July 2008. Altogether four survey methods were used: 1) inventory of bat species with ultrasound detectors, 2) capturing of bats with mist nets, 3) survey for bat roosts and 4) inspection of bird boxes. Study sites are shown on Fig.1.

Survey with ultrasound detectors

We used ultrasound detectors Pettersson Elektronik D-240x and D-980 to recognize flying bats. The bat calls were recorded with hand-held detectors and by three automatic unattended recording systems each of which included a D-240x ultrasound detector in connection with mp3 recorder iAudioU2. We identified bat species either directly on the field or subsequently analysing the recorded bat calls with BatSound 3.30 software. The automatic registration of bat calls was done at four spots on the Moricsala Island and at two spots on the Lielalksnīte Island – one night at each spot. The recording was started shortly after sunset and was continued throughout the night. On 20/21 and 21/22 July we did visual and detector surveys from a rowing boat. On the first night the route Lielalksnīte Island - mouth of the river Engure – Moricsala Island was covered. On the second night we did a complete route around the Moricsala Island.

Netting of bats

We conducted mist netting of bats on the Moricsala Island during all three survey nights in 2008. Ecotone nylon mist nets of different size were used. The total length of nets varied between 50 and 86 meters each night. Mist nets were erected stationary in most promising habitats or handled by two persons keeping the net in hands.

Survey for bat roosts

In 1980 the bat roosts in trees were searched by walking around the Moricsala Island during the day and listening to possible bat sounds.

Inspection of bird boxes

On 20th July 2008 we inspected 15 bird boxes erected on the Moricsala Island on 13th June 2008.

Small mammals

Shrews and mouse-like rodents *Myomorpha* have been studied only on the Moricsala Island in June 1959 and October 1960 (Гринбергс 1983) as well as in 1989 during May 19-22 and October 2-5. Trap-line census method has been used in mixed forest (to E from the narrowing of island) and in bushes along the coastline (at the Cape Viesuļrags – NW tip of island) (Fig.2).

Additionally 15 bird boxes were put up (Fig.2) in June 13, 2008 to check the presence of dormice on the Moricsala Island. For the same purpose gnawed hazel nutshells with the signs of tooth marks were collected. A search for hazel nuts characteristically chewed by dormice is a reliable method of determining the presence of dormice in areas where hazel is present (e.g. Bright et al. 1996).

Other mammal species

For this study we use the published and unpublished data of all mammal species recorded either by different researchers or by administration staff inspecting Moricsala SNR. Most of data have

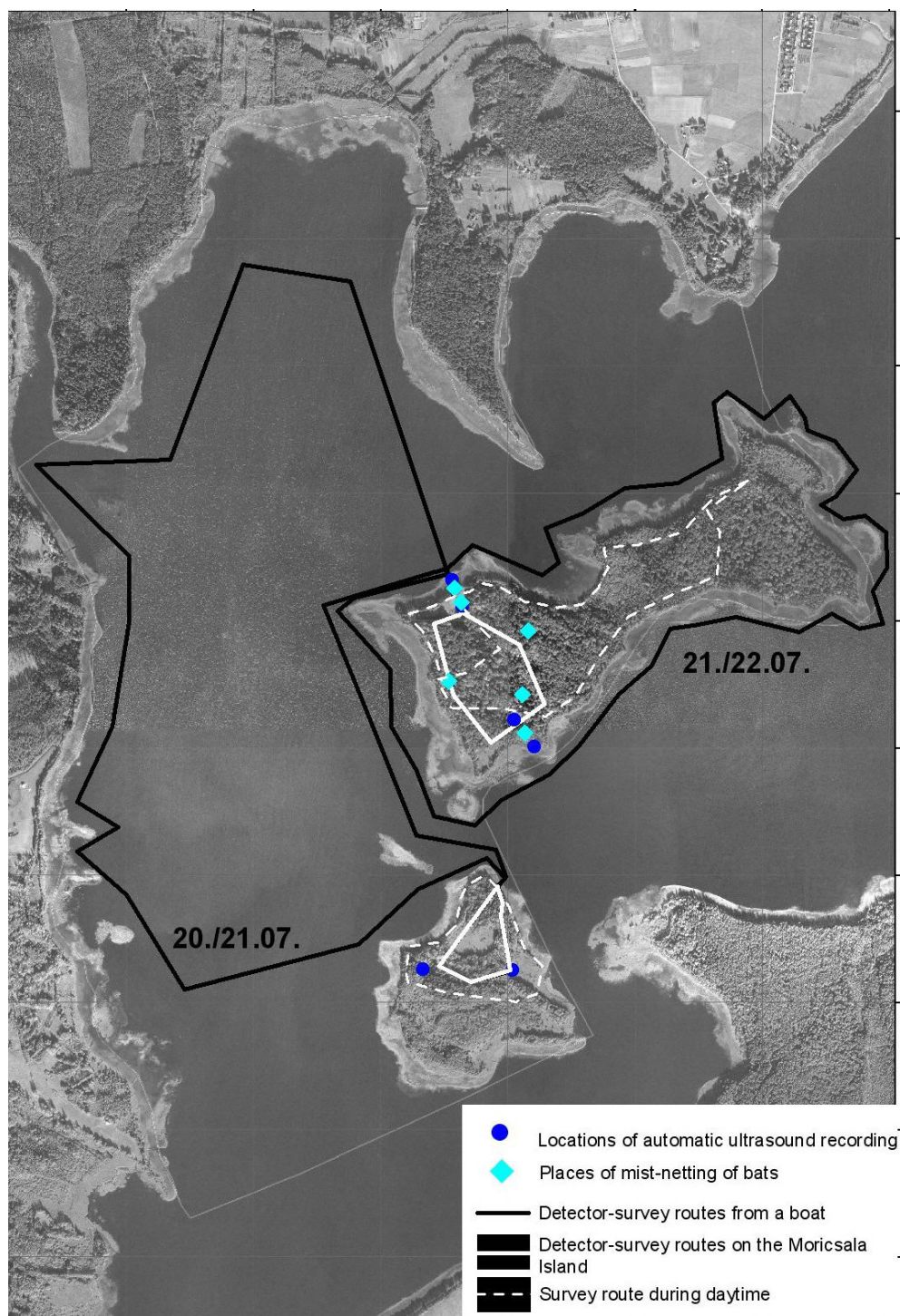


Fig.1. Bat survey routes, places of mist-netting and automatic ultrasound recording spots in Moricsala Reserve", summer 2008.



Fig. 2. Distribution of transects with traps and bird nest-boxes.

been obtained on the Moricsala Island, less – on the Lielālsknīte Island which was added to the Reserve only in 1977.

RESULTS (CHECK LIST)

Up to now the presence of 32 mammal species have been recorded in the Moricsala SNR. It comprises more than half of all (61) mammal terrestrial species of Latvia. All mammal orders (except Pinnipedia) found in Latvia are represented also there. Below is annotated list of recorded species.

Myotis daubentonii Kuhl, 1817

A nursery colony of this species was found on 23 July, 1980 in a hole of a linden tree consisting of 9 adult females, 8 subadult males and 4 subadult females (Петерсонс 1984). Daubenton's bats were observed flying near the coast of Moricsala in 20/21-21/22 July 2008 (see also Table 1).

Myotis dasycneme Boie, 1825

The pond bat was observed foraging over the water near the coast of Moricsala in July 2008. At least one individual was observed also on the Moricsala Island in July 2008. There was no evidence on the existence of a nursery colony in the island.

Nyctalus noctula Schreber, 1774

Species was observed both on the Moricsala Island and foraging over the lake Usma. Observations of noctule bats in the forest indicate on the presence of a nursery colony or colonies in trees because this species avoid foraging in the forest itself.

Pipistrellus pipistrellus Schreber, 1774

Few recordings were found by analysing sound records from automatic recording devices on the Moricsala Island in July 2008. Probably a rare species in Moricsala Island.

Table 1. Records of bats in the Moricsala Strict Nature Reserve

No.	species	Moricsala Island	Lielalsksnīte Island	aquatorium of Usma Lake
1.	<i>Myotis daubentoni</i>	x*		x
2.	<i>Myotis dasycneme</i>	x		x
3.	<i>Myotis sp.</i>	x	x	
4.	<i>Nyctalus noctula</i>	x*		x
5.	<i>Pipistrellus nathusii</i>	x		x
6.	<i>Pipistrellus pipistrellus</i>	x		
7.	<i>Pipistrellus pygmaeus</i>	x		
8.	<i>Eptesicus nilssonii</i>	x	x	x
9.	<i>Vespertilio murinus</i>			x
10.	<i>Plecotus auritus</i>	x		

x – species recorded; x* - breeding proved

***Pipistrellus pygmaeus* Leach, 1825**

Found in recordings from Moricsala Island and from its surroundings. Probably a relatively rare species.

***Pipistrellus nathusii* Keyserling et Blasius, 1839**

The most common bat species on the island Moricsala according to the frequency of calls recorded by automatic recording devices – 58.9 % of the total number of bat calls. The *Nathusius*' bat was the only bat species captured by mist nets on the Moricsala Island – 7 subadult individuals. This indicate on a possible reproduction of this species on the island.

***Vespertilio murinus* Linnaeus, 1758**

This species was recorded flying over the Usma Lake in several recordings but was not found on the islands. Relatively rare species in the society of hunting bats in Usma Lake.

***Eptesicus nilssonii* Keyserling et Blasius, 1839**

A common species both on the islands and over the Usma Lake. The second commonest species in automatic recordings following the *Nathusius*' bat – 33.1% of all bat calls.

***Plecotus auritus* Linnaeus, 1758**

Few detector observations in the Moricsala Island forest habitats in July 2008. The long-eared bats produce the quietest ultrasound calls among European bat species and are detectable only from very short distances. Therefore it is probably underestimated due to limitations of the survey methods.

***Talpa europea* Linnaeus, 1758**

Laiviņa & Laiviņš (1980) have recorded it mainly in opened habitats of the Moricsala Island. During fieldworks of 2008 species was recorded also on the Lielaksnīte Island.

***Sorex araneus* Linnaeus, 1758**

Species was recorded in the forest during all small mammal trappings. In Latvia this species can be found widely in different habitats. Therefore it should be one of the most common small mammals on ground level of both islands.

***Neomys fodiens* Pennant, 1771**

On Moricsala Island the species was first recorded by M.Šternbergs (1986) in 1976. It was trapped also in 1989. Water shrew should be a relatively common species in the Reserve as it is a typical

dweller of the coastal habitats in Latvia.

***Microtus arvalis* Linnaeus, 1778**

The common vole was first recorded on Moricsala Island by K.Kupffer (Laiviņa & Laiviņš 1980). Found also during the trapping of small mammals in 1989 in bushes between the coast and meadow nearby the forester's house "Kalviņi". Species inhabits opened, semi-open grasslands including coastal zone of the island. Probably its occurrence has decreased as proportion of grasslands also has decreased.

***Microtus agrestis* Linnaeus, 1761**

The field vole was trapped in 1989 in bushes of Moricsala Island. Generally it is a quite widely distributed species but always rare.

***Arvicola amphibius* (Linnaeus, 1758)**

On Moricsala Island the water vole was trapped in 1959/1960. Laiviņa & Laiviņš (1980) have recorded its activity signs in the garden nearby the forester's house. It should be a relatively common species in the Reserve as it is also a typical dweller of coastal habitats in Latvia.

***Myodes glareolus* (Schreber, 1780)**

The bank vole was trapped on Moricsala Island both in 1959/1960 and in 1989. In the Reserve it should be the most common species of *Myomorpha* like in Latvia in general.

***Apodemus agrarius* Linnaeus, 1771**

On Moricsala Island the species was trapped in 1989 in bushes between the coast and the meadow nearby the forester's house "Kalviņi". The striped field mouse is a typical species in open and semi-open grasslands.

***Apodemus flavicollis* (Melchior, 1834)**

On Moricsala Island yellow-necked field mouse was trapped both in 1959 and 1960 as the second

most common *Myomorpha* species but was not trapped in 1989 (probably due to intra-specific variation in the number). It dwells in a quite large variety of habitats but prefers broad-leaved forests with hazel in the understorey.

***Castor fiber* Linnaeus, 1758**

In 2011 altogether 10 inhabited beaver lodges were recorded: of 3 at the coast both of Lielaksnīte and the Moricsala Island as well as 4 at the mainland coast of the Usma Lake within the Moricsala SNR (Sāmīte 2011).

The beaver has been exterminated in Latvia in the 19th century. So, at the time of establishment of Moricsala SNR the species was not present there. Species was not recorded in 1970s during systematic vegetation studies (Laiviņa & Laiviņš 1980). Beavers reappeared in the area of nowadays Moricsala SNR in the 1980s, i.e. 30 years after the release of a few animals in the Baņģava River, which mouths into Usma Lake. They are descendants of the 5 pairs of beaver from the Voronezh SNR, which were released in three rivers in Latvia (also in Kroja and Slocene) in 1952 (Балодис 1990).

***Sciurus vulgaris* Linnaeus, 1758**

It is a common species on Moricsala Island according to Laiviņa & Laiviņš (1980), also recorded in 2008.

***Lepus europeus* Pallas, 1778**

The brown hare was recorded (Ā. Zoss) on the Moricsala Island in 14.03.1983. Probably it is one of those species, which occasionally visit islands of the Reserve.

***Mustela erminea* Linnaeus, 1758**

On Moricsala Island the stoat in white coating is recorded once by Laiviņa & Laiviņš (1980). Probably it is also one of those species, which occasionally visit islands of the Reserve.

Mustela vison Schreber, 1777

Currently the American mink probably is the most common medium-sized carnivore the Reserve: the number of specimens based on track survey in March (R.Čakstiņš) was estimated 12 and 10 in 2010 and 2011 respectively.

It is an invasive species, which appeared in Latvia in wild probably in 1940s (Tauriņš 1982). In Moricsala SNR the American mink probably appeared in 1970s when rapid increase of its population was observed in Latvia (Ozolins & Pilats 1995).

Martes martes Linnaeus, 1758

During 2008 scat of the pine marten was found several times on the Moricsala Island, mostly on its Eastern part. In the Reserve two specimens in 2010 and no one in 2011 were recorded during a track survey in March (R.Čakstiņš). Probably it is an impermanent inhabitant of both islands.

Meles meles Linnaeus, 1758

The species was recorded on the Moricsala Island in 14.03.1983 (Ā. Zoss) as well as on Lielaksnīte Island (burrows and footprints) during 2008. It is either a regular visitor or a permanent inhabitant of both islands of the Reserve.

Vulpes vulpes Linnaeus, 1758

The fox was recorded (Ā. Zoss) on the Moricsala Island in 14.03.1983. Both in 2010 and 2011 a specimen was recorded during a track survey in the Reserve in March (R.Čakstiņš). Probably it is an impermanent inhabitant of both islands.

Nyctereutes procyonoides Gray, 1834

The species was once recorded by Laiviņa & Laiviņš (1980). During a track survey in the Reserve in March, a specimen was recorded both in 2010 and 2011 (R.Čakstiņš). It might be a permanent inhabitant of both islands of the Reserve.

The racoon dog also is an invasive species, which was introduced in Latvia in 1948 (Tauriņš 1982). In Moricsala SNR the racoon dog probably appeared already in 1950s when rapid increase of its population started in Latvia (Ozolins & Pilats 1995).

Lynx lynx Linnaeus, 1758

According to Laiviņa & Laiviņš (1980) footprints of the lynx were recorded by A.Meijers in the winter of 1979. Tracks of two specimens as well as remains of their prey - roe deer - were found also in 22.03.2013 (V.Vasiljevs). The species should be regarded as a rare visitor of the Reserve.

Capreolus capreolus Linnaeus, 1758

The roe deer is regarded by Laiviņa & Laiviņš (1980) as one of the most common large mammal species. During 2008 at least 5 individuals were counted on the Moricsala Island and 1 specimen – on the Lielaksnīte Island. Both in 2010 and 2011 seven specimens were recorded during the track survey in the Reserve in March (R.Čakstiņš).

Cervus elaphus Linnaeus, 1758

Species was recorded on the Moricsala Island in 14.03.1983 (Ā. Zoss) as well as during 2008 (droppings and footprints). According to the track survey in March, red deer was not registered in the Reserve in 2010, but two specimens were recorded in 2011 (R.Čakstiņš). Numerous signs of the red deer activity, including those of feeding on aspens cut by beavers, were observed by one of the authors on the Moricsala Island in March 14, 2013. The species should be regarded as an impermanent inhabitant of both islands.

Alces alces Linnaeus, 1758

Once recorded by Laiviņa & Laiviņš (1980). Probably it also is one of those species, which only occasionally visit islands of the Reserve.

Sus scrofa Linnaeus, 1758

The wild boar was not recorded in 1970-ies during systematic vegetation studies (Laiviņa & Laiviņš 1980). Later it is recorded (Ā. Zoss) on the Moricsala Island in 14.03.1983 as well as observed occasionally by other Administration staff members. In early 1990-ies a heard of wild boar settled on the Moricsala Island for a whole summer and autumn during several years and heavily influenced (partly destroyed) island's ground vegetation (Reihmanis 2009). Currently it is not a permanent inhabitant of Moricsala Island but periodically visit the island, most often in autumn when it searches for acorns.

DISCUSSION

The 32 mammal species recorded in the Moricsala SNR is not a complete list. Most probably some more species, especially among bats should be possible to record if more systematic research would be carried out. Calls of bats of *Myotis* genus were recorded once on the Lielaksnītes Island and regularly on the Moricsala Island. The species of this genus, except the pond bat in some situations, are hard to separate according to their ultrasound calls. Thus the presence of other *Myotis* species - *Myotis brandtii* Eversmann, 1845, *Myotis mystacinus* Kuhl, 1819, *Myotis nattereri* Kuhl, 1818 and the recently described new European bat species *Myotis alcathoe* von Helversen and Heller, 2001 cannot be excluded.

The mammal list of Moricsala SNR misses two species which are very common in Latvia: pygmy shrew *Sorex minutus* Linnaeus, 1766 and otter *Lutra lutra* Linnaeus, 1758. The pygmy shrew is not recorded probably due to inadequate trapping methods (the pitfalls/cone traps should be used).

Few kilometres of water and ice doesn't provide a dispersal barrier for shrews (e.g. Hanski & Kaikusalo 1989, Peltonen & Hanski 1991). As both islands of Moricsala SNR are situated quite close (0,5-1,5 km) to the mainland, most probably populations of other small mammals also are not

isolated, and some individuals time to time cross waters of Usma Lake.

The only exception most probably is the hazel dormouse *Muscardinus avellanarius* (Linnaeus, 1758). Although it is widely distributed species in the Western part of Latvia (Kurzeme) and suitable habitats exist also on Moricsala Island, the species has not been recorded yet. The water seems to be dispersal barrier for this typical arboreal and hibernating species.

The otter is shy enough to be missed even as a regular visitor of the Reserve during the ice-free period of Usma Lake. Also the wolf *Canis lupus* Linnaeus, 1758 is not recorded yet, but taking into account its wide distribution in Latvia and in Northern Kurzeme in particular, it should be considered as a rare or potential visitor of the Reserve islands, especially in winter time.

Of all recorded species almost only small mammals (except bats) can be regarded as true permanent inhabitants of both the Moricsala Island and the Lielaksnīte Island. For particular individuals of larger species these islands are temporal habitat. A striking example of this phenomenon is wild boar. Usually these mammals appear on Moricsala Island when acorns can be found on the ground. Visitation of Moricsala Island by this species noticeably increased in early 1990-ies when poaching due to economic reasons got up in Latvia (E.Pēterhofs, pers.com.). Wild boar was using the Island not only as a feeding ground but mainly as a refuge.

Although being an impermanent inhabitant of both islands, the red deer turned to be a significant factor influencing the vegetation, i.e. regeneration of the forest. Due to these mammals almost no tree seedlings can be found (V.Skuja, pers.com.). Besides, the beaver promotes longer stay of red deer on the islands supporting them with additional winter food - branches and bark of the felled trees.

The survey data demonstrate a high species richness of bats in the relatively small territory of Moricsala reserve, although the fact is not

surprising. Of nine bat species eight species were recorded inhabiting the Moricsala Island and only one species on the Lielalksnīte Island (Table 1). The territory of Moricsala Island includes more diverse forest habitats rich with old trees that are suitable as bat roosts. We found neither bats nor their traces in the bird boxes. It might be indirect indication on high number of natural cavities there. Undisturbed old forest stands provide less cluttered forest structures preferred by bats for foraging. However, both islands can be used by bats only in summer season, as there are no suitable underground shelters for hibernation. Occasional wintering of a few animals in tree hollows may be probably possible only in mild winters.

Six bat species were recorded flying over Usma Lake. It provides a large area with aquatic and coastal habitats – main foraging habitats for pond, Daubenton's and Nathusius' bats and important feeding grounds for pygmy bat, common pipistrelle and northern bat.

Recent studies have improved our knowledge on faunistic aspects of the bat fauna in Moricsala Strict Nature Reserve. However there are still several bat species that could be found on the islands only by more detailed and long-term studies. Moreover, the spatiotemporal aspects of the habitat use of bats in Moricsala SNR remain largely unknown. When do bats arrive on the islands and how late in the season do they stay there? Do the species adapted to forage in open space like noctule bats use the forest exclusively for roosting or also for foraging? Do the short-distance flyers like long-eared bats spend all their reproduction period exclusively on the island or do they cross the open water to reach the forest habitats on the main land? The same question applies to small *Myotis* species if they are present on the island. To get the answers, at least a one whole-season study is needed with more emphasis on mist netting, long-term unattended detector survey and telemetry studies.

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