



Influence of predators on shorebirds' breeding success during the low phase of a rodent cycle in Sabetta, high arctic Yamal (Russia)



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Background

Shorebirds are the most common birds in the north of the Yamal Peninsula. In 2016-2018, we measured the impact of predators on 3 *Calidris* species (Dunlin *Calidris alpina*, Little Stint *Calidris minuta*, Temminck's Stint *Calidris temminckii*) in Sabetta, which is located between low and high arctic (71°N). This study is part of a long-term and large-scale initiative of the “Interactions Working Group”.



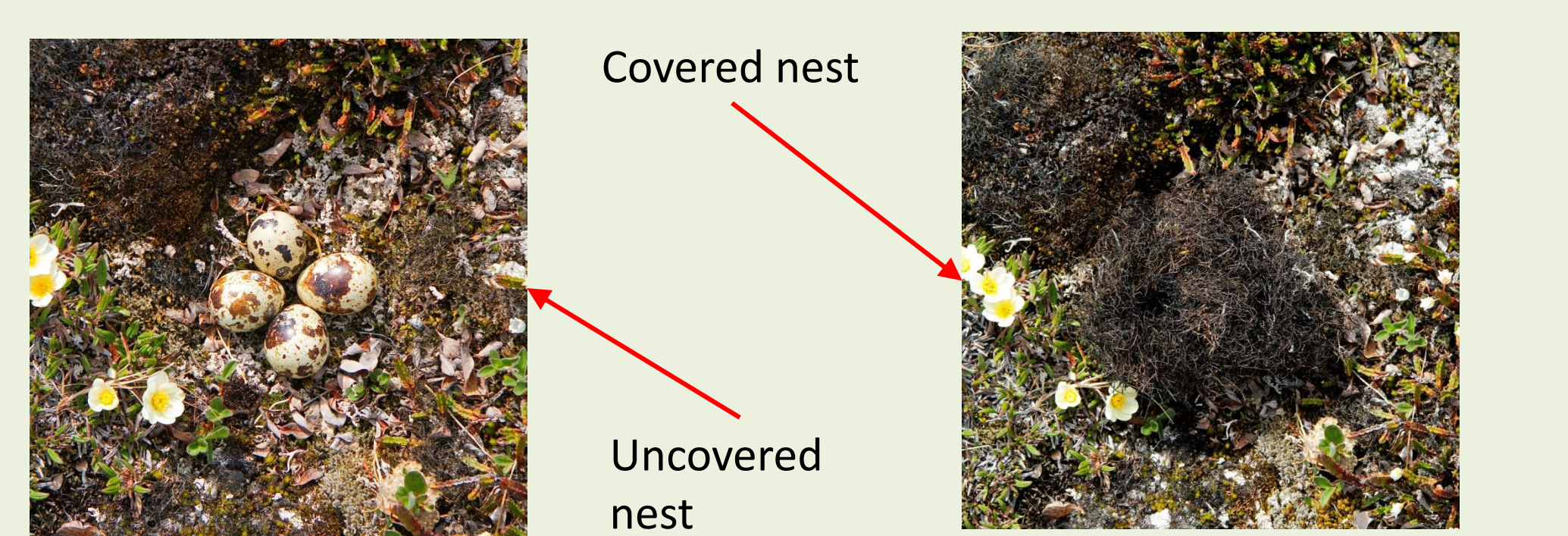
Temminck's Stint

Little Stint



Methods

1. a standardized measure of predation pressure was monitored using artificial nests (50% uncovered and 50% covered with moss/lichens);



2. daily survival rates of real *Calidris* nests was assessed by monitoring the incubation temperature in the nest cups;

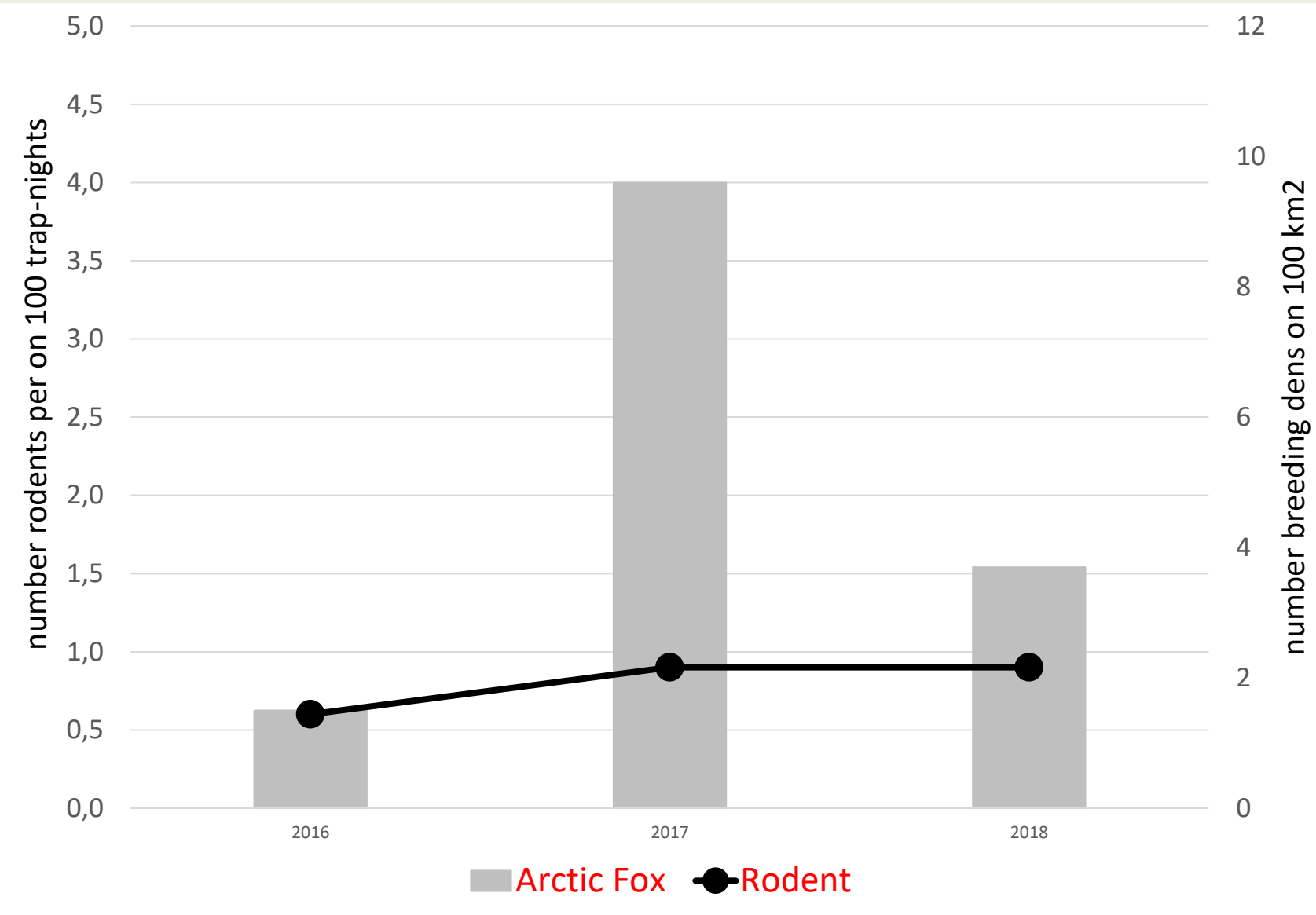
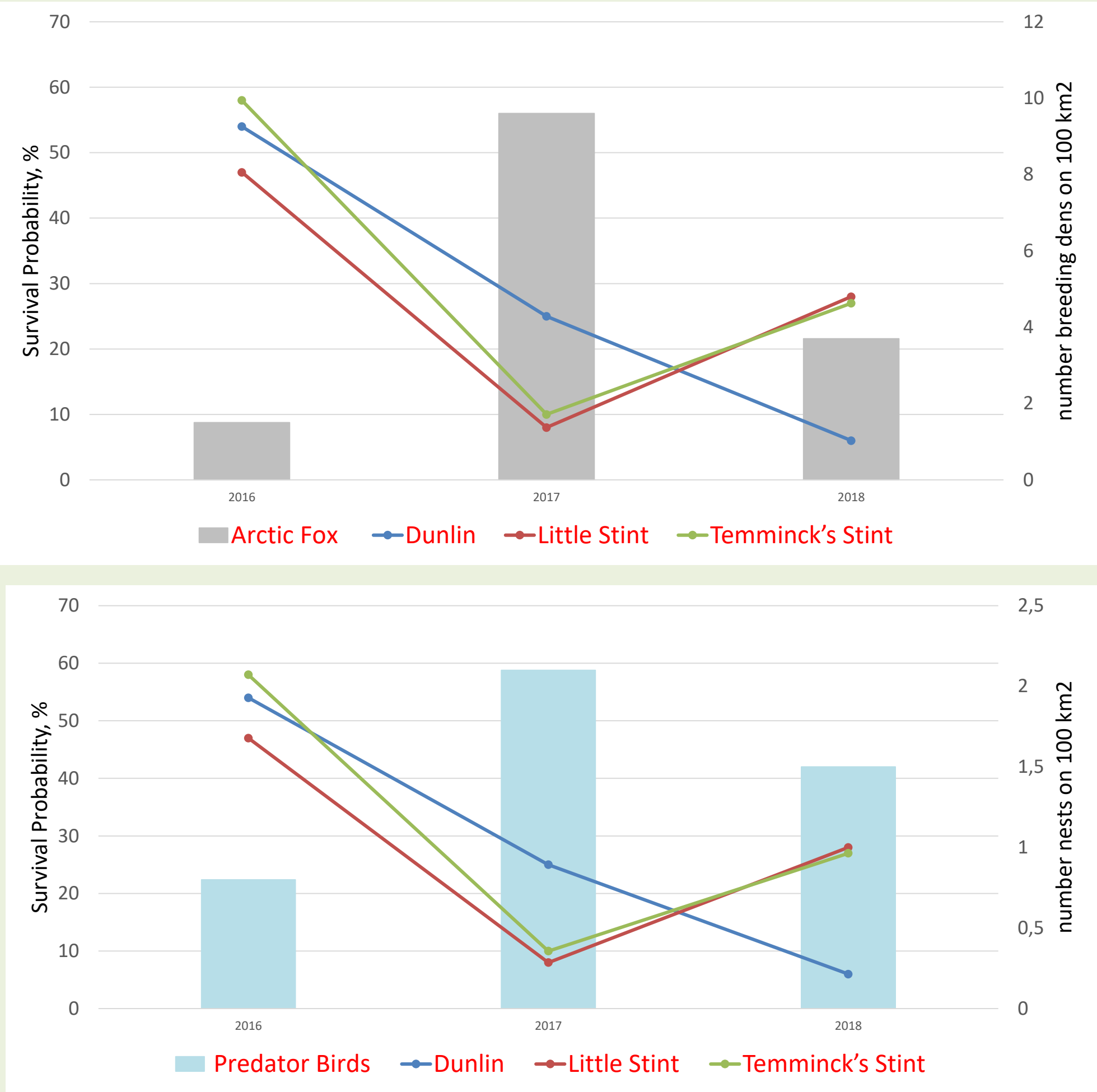
3. monitoring of the breeding activity of arctic foxes and avian predators;



4. snap-trapping of rodents according small-quadrat method (Myllymäki et al., 1971).

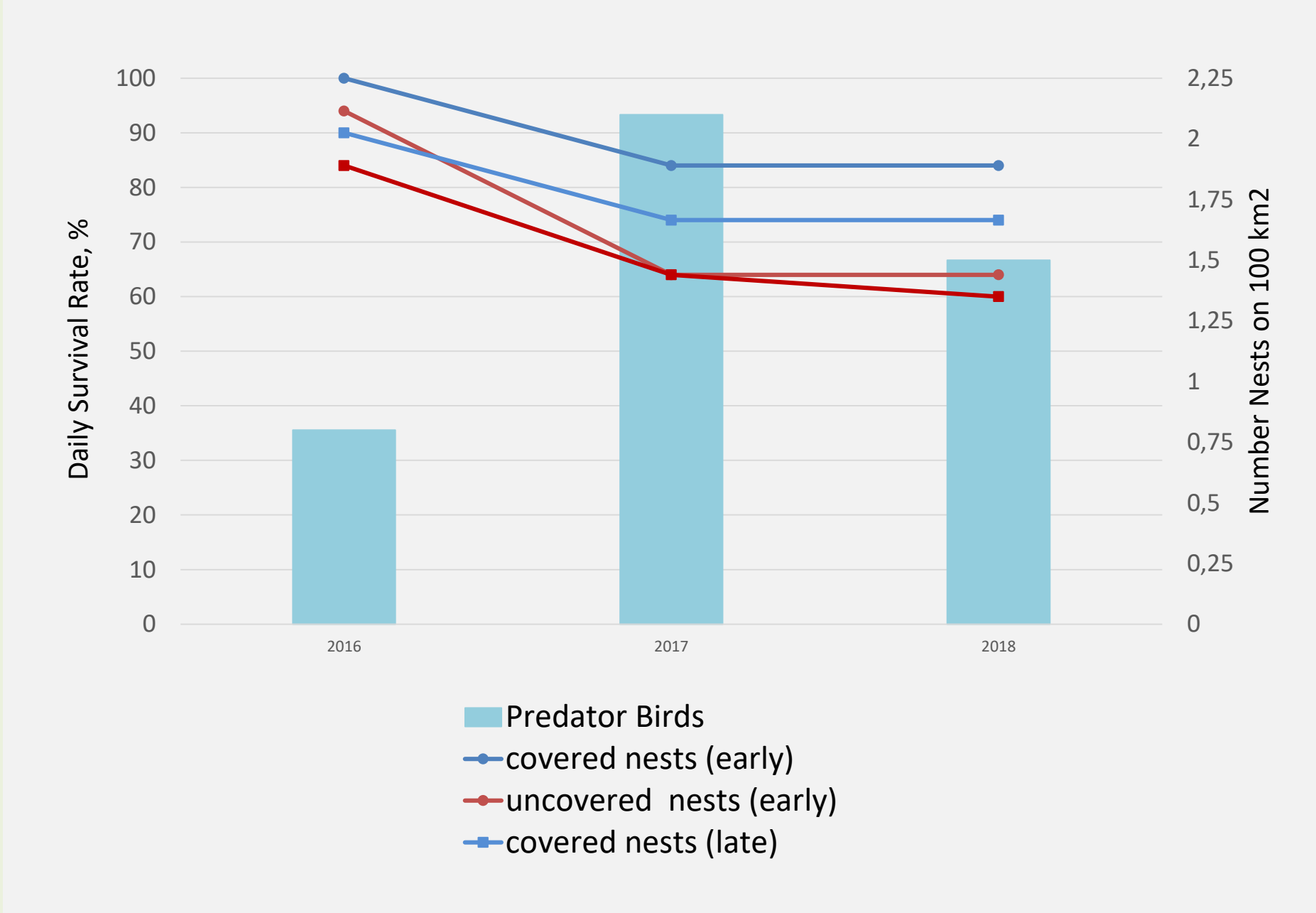
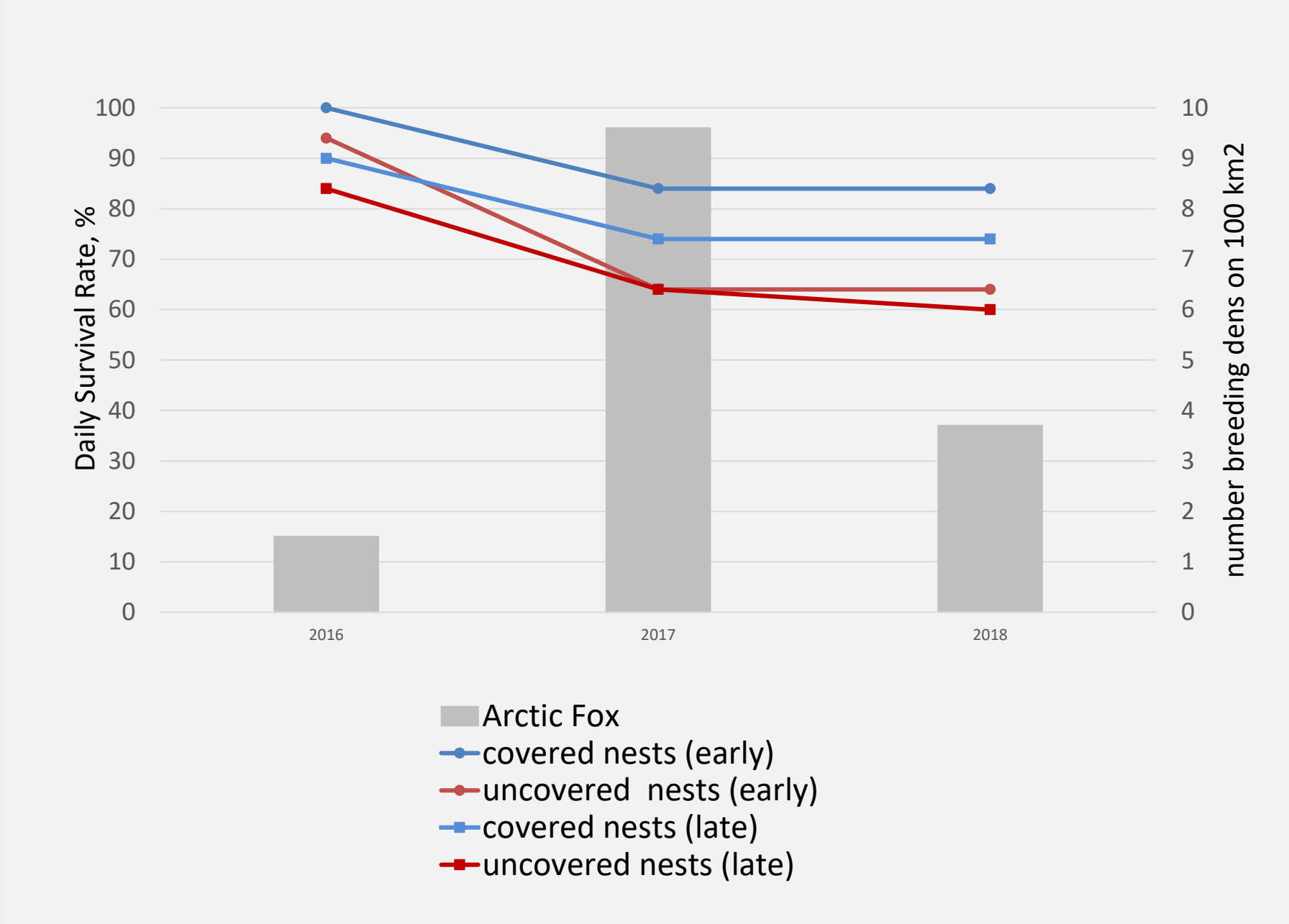
Results

During our study, the abundance of small rodents (*Dicrostonyx torquatus*, *Lemmus sibiricus*, *Microtus* voles) was less than 1 per 100 trap-nights. The number of active dens of arctic foxes varied from 1.5 to 9.6 per 100 km², and the number of nests of avian predators vary from 0.8 to 2.1 per 100 km². In 2017, the number of breeding dens of arctic foxes was very high (we are not sure how to explain it).



Survival probability of real nests was negatively correlated with breeding activity of arctic foxes and predatory birds. Real nests had a higher probability of survival in years with low densities of breeding Arctic foxes (*Vulpes lagopus*; upper panel) and breeding avian predators (Rough-legged Buzzard *Buteo lagopus*, Long-tailed Skua *Stercorarius longicaudus*, Arctic Skua *Stercorarius parasiticus*; lower panel). In 2018, the low probability of survival rate of the Dunlin was likely due to the extremely high level of water: most of the typical nesting habitat was under water and birds were forced to build nests on dry slopes and other unusual places.

Decline in artificial and real daily nest survival was synchronous between 2016-17 (as expected). Between 2017-2018 survival of artificial nests continued to slightly decline (especially for late experiments), as real nests of dunlin did, but contrary to survival of Little and Temminck's Stint nest whose survival increased.



Conclusion

By simultaneously monitoring all major components of this community of Arctic terrestrial vertebrates (rodents, predators, and shorebirds), we could document, between 2016 and 2017, a synchronous change in population dynamics of predators and rodents (main prey), while the relation was opposite between rodent-predators and shorebirds (alternative prey). The indirect interaction between small rodents and shorebirds (mediated by the numerical response of predators, mainly arctic foxes, which benefit from the lemming increase and in turn impose a higher predation pressure on birds) is known as an “**apparent competition**”. The promising results of the 3 first years of this study call for the continuation of this monitoring of multiple interactions at the ecosystem scale.



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