



Flying Squirrel Radio Telemetry Study in Tapiola and Mankkaa in 2019-2020

Research Report 3.2.2021



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The project has received funding from the LIFE Programme of the European Union. The material reflects the views by the authors, and the European Commission or the CINEA is not responsible for any use that may be made of the information it contains.

Flying squirrel LIFE -project, LIFE17NAT/FI/000469

Aim of the Study

In this research we followed the movements of Siberian flying squirrels (*Pteromys volans*) by using special radio collars attached to individuals. The study was conducted between 2019 and 2020 in Espoo in Tapiola and Mankkaa area (approximately 31 km²), which is rather tensely built urban area with apartment buildings and detached houses. The aim of the study was to obtain more information regarding the behavior of flying squirrels in an urban environment. Although the City of Espoo has made many surveys about the living and breeding location of flying squirrels, there are only few detailed studies that examine the behavior and habitat sizes of flying squirrels in urban areas. Most of the previous studies have been made in forest areas outside the cities.

During this study, radio collars were attached onto ten flying squirrels and their movements were followed with radio transmitter on the field. First individuals were collared in August 2019 and the study continued until September 2020. The study was made by consultants Rauno Yrjölä, Timo Metsänen ja Antti Kotilainen.

The study is part of a larger EU-funded Flying squirrel LIFE -project (2018-2025), in which the City of Espoo is one of the project partners. The aim of the project is to improve the conservation of flying squirrels in Europe through cooperation. The project brings together key actors in land use, such as land-use planning and forestry, as well as information on the habitat networks of flying squirrels. More information about the project: <https://www.metsa.fi/en/project/flying-squirrel-life/>

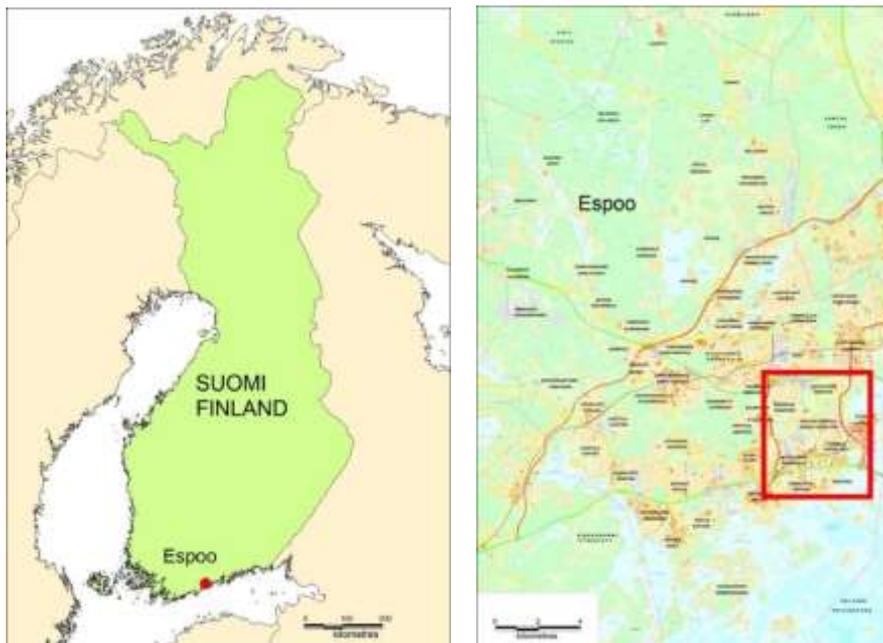


Image 1 and 2. Location of the research area. Map: City of Espoo.

Flying squirrel in Espoo

In the EU area, the Siberian flying squirrel is only found in Finland and Estonia. In Finland, flying squirrels are found south of Oulu-Kajaani axis and they live typically in old forests outside urban areas. However, in recent decades flying squirrels have also been found from many cities. For example, in Espoo there are approximately 800 flying squirrels that are spread wide across the city area: to the forested parts in Northern Espoo but also to the densely built Southern areas.

In Finland's latest national IUCN-estimation, the flying squirrel was classified as a threatened species (class vulnerable). The classification is based on the population decline within a monitoring period of 10 years (exceeding the threshold value of 30 %).

Flying squirrel is one of the species listed in the EU's Habitats Directive Annex IV and according to the Finnish law the breeding and resting sites of flying squirrels are protected, and their deterioration and destruction is prohibited. Therefore, flying squirrel must be considered carefully in forest and land use processes. In a growing city, it is important to have accurate information not only about the location of flying squirrel nesting sites but also detailed information about the behavior of flying squirrel in an urban environment.

Methods

The research was made by using a radio telemetry. During the study 10 flying squirrels were collared, and their movements were followed. Individuals were trapped from their nest holes with a special trap developed for this purpose. During autumn 2019 and early spring 2020, five males and five females were caught from the study area, and radio transmitter was fitted around each individual's neck. Radio collar weights under 5 grams and does not affect flying squirrels negatively.



Image 2. Radio collar weights under 5 grams.



Image 3 and 4. Two people are needed for collaring. One holds the flying squirrel and the other attaches the collar.



Image 5 and 6. All flying squirrels were weighed, and their sex was defined. After collaring flying squirrels were released under their nesting tree.

The movements of collared flying squirrels were monitored in the field by using a radio receiver, and the movement paths and nesting cavities of the individuals were located. The number of follow-ups varied between individuals, as some died or disappeared during the follow-up period. At least nine follow-ups were obtained from six individuals. Follow-ups were made in the evening. Usually follow-up began half an hour after sun set and lasted two hours.

Searching of flying squirrel nests and collaring was the most time-consuming part of the study and required 236 working hours. Follow-ups in the field required 206 hours.



Image 7. Movement of flying squirrels was monitored with an antenna and a receiver in the field.

All flying squirrels in the study were caught from old woodpecker nesting cavities. Other observed breeding and resting sites were woodpecker nesting cavities in pine trees, a few old twig nests in spruce trees, and one individual possibly occasionally used a building as a resting place. The great spotted woodpecker (*Dendrocopos major*) is a key species for the presence of the flying squirrel, as it excavates most of the nests used by the flying squirrel.

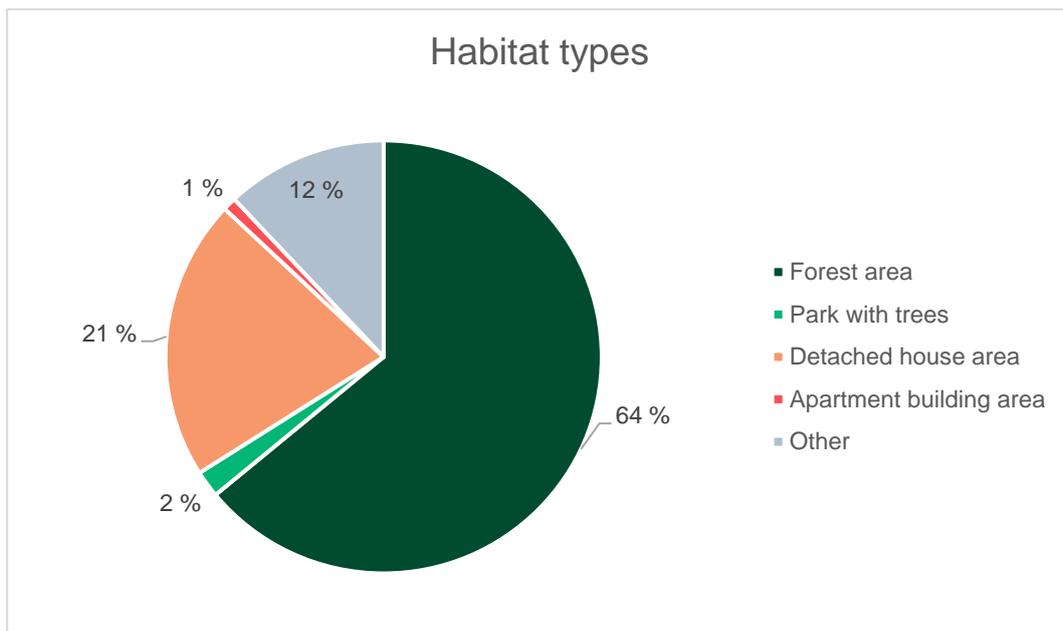
Results

One aim of the study was to define the size of the flying squirrel habitats in urban areas. The study showed that flying squirrels may live in rather small areas in urban landscapes. In this study, the habitat sizes were notably smaller than in previous studies made outside urban areas or in Matinkylä region in 2013. Particularly the females had small home ranges, spanning only a few hectares. In Matinkylä study, the average habitat of females was 15,5 hectares and males 79 hectares. However, in this study the average size of female habitat, calculated using the MCP method, was only 4.24 hectares (range 2.7–8.37 ha), while the males' habitat averaged 28.01 ha (range 18.78–37.35 ha). Only one of the tracked flying squirrels crossed a wider road. A male flying squirrel named Osku crossed Länsiväylä highway at least twice.



Image 8. Follow-up data of one flying squirrel, Osku. Osku crossed wide Länsiväylä highway at least two times during the study.

Based on the aerial image interpretation, 64 % of the flying squirrel habitats in our study can be classified as forest areas. The share of detached house areas (backyards) was 21 % and the rest were parks, apartment building areas, or other areas.



During this follow-up study, flying squirrels were found to feed or stay on several tree species for a long time, most notably spruce, pine, and aspen. Birch, maple, and lime trees in the park areas were also favored by flying squirrels.

Our main result is that flying squirrels can live and breed in the middle of semi-urban areas of Tapiola, as long as the ecological corridors between forest patches do not break apart. Remaining forest patches are suitable flying squirrel breeding habitats, and the structure of suitable forest patches resembles natural forest more than a city park. Based on the study results it is recommended that thick clusters of pines and aspens should be preserved in urban areas. These should be large enough: typically flying squirrels prefer forests with trees over 20 meters. Also, the gaps between forest patches should not be more than 2-2,5 times the height of the trees, preferable less. According to the study flying squirrels are reluctant to fly longer distances even if they could do so.

Recommendations for further research

During the study, many valuable notions were made, and the study can give some recommendations for following the movements of the flying squirrel in the future. Based on our experience, spring and summer are the best seasons for conducting a follow-up study, as the flying squirrels are most active. In wintertime flying squirrels might not move from their nest every night and they move around less than during summer. Furthermore, in wintertime flying squirrels might leave their nest even 4-5 hours after sunset which means a long waiting time for the research team.

To obtain more data, it is worth doubling the number of individuals attached with radio collars (from 10 to 20), which of course increases the cost of the follow-up studies. In the future, as technology advances, the use of GPS technology may also become possible for following nocturnal flying squirrel-sized animals. GPS technology would allow more detailed information about the movement of flying squirrels.