Summaries of conservation plans in urban project sites

DELIVERABLE A5: Plans for conservation actions in urban areas

Action A5, Preparation of plans to support habitat networks in urban areas

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This document is a compilation of the summaries concerning the Flying Squirrel LIFE project actions A5-C1-D1 in urban areas.

The cities of Espoo, Jyväskylä and Kuopio (project's associated beneficiaries) were responsible of the site plans, their execution, and documentation.

There were 21 project sites in total at urban areas. In addition, one habitat network modelling study covered a whole municipality of Jyväskylä.

In A5, site plans to support habitat networks in urban areas were prepared. In C1, habitat network for the flying squirrel was improved as planned by 1) offering nest boxes, 2) planting young trees to create moving corridors, 3) planting aspen seedlings, and 4) improving future forest structure to support both flying squirrel and recreation. In D1, C1 actions were monitored.

Picture: Nest box for a flying squirrel (photo: Anni Koskela).

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.

NATURA 2000

Liito-orava-LIFE

Summary

There were 21 urban project sites altogether (Table 1), of which 4 located on Natura 2000 areas (N2000, in Kuopio). Urban project sites covered 1541,65 hectares. New moving connections were built or improved on 7 project sites by planting young trees (11 connections therein), and on two of them also artificial jumping poles were included (Finnoonlaakso/Espoo and Tikanväylä/Jyväskylä). Flying squirrel conservation and human recreation were combined with careful forest management at 3 sites. Nest boxes were put on 13 sites, and aspen continuity was promoted by planting seedlings on one site (Puijo/Kuopio). In addition, a habitat network model was built to the whole municipality area of Jyväskylä (coverage 1446 km^2).

Table 1. Summary of urban project sites.

City	Project site	Moving connection	Conservation & recreation	Nest boxes	Aspen seedlings	Hectares
ESPOO	Latokaskenniitty	x				24,0
ESPOO	Suvisilta	x				0,3
ESPOO	Hyljelahti		x			34,0
ESPOO	Finnoonlaakso	x				8,9
JYVASKYLA	Jyskänvuori			x		23,4
JYVASKYLA	Ylistönmäki			x		12,9
JYVASKYLA	Kotalamminmäki			x		12,7
JYVASKYLA	Jääskelä			x		33,5
JYVASKYLA	Kangasvuori			x		20,8
JYVASKYLA	Halssilanmäki			x		14,4
JYVASKYLA	Seminaarinmäki			x		0,7
JYVASKYLA	Tikanväylä	x				8,5
JYVASKYLA	Jyväskylä habitat network model					1446 km^2
KUOPIO	Puijo (N2000)			x	x	171,0
KUOPIO	Kolmisoppi-Neulamäki (N2000)			x		426,0
KUOPIO	Etelä-Kuopion lehdot ja lammet (N2000)			x		315,0
KUOPIO	Korsunmäki ja Keinälänniemi (N2000)			x		105,0
KUOPIO	Pirtti & Pirtti läntinen		x	x		197,0
KUOPIO	Jynkänvuori		x	x		133,0
KUOPIO	Rantapuistonkatu	x				0,2
KUOPIO	Keinänlahti	x				0,2
KUOPIO	Kattilamäenkatu	x				0,15

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ESPOO Project sites

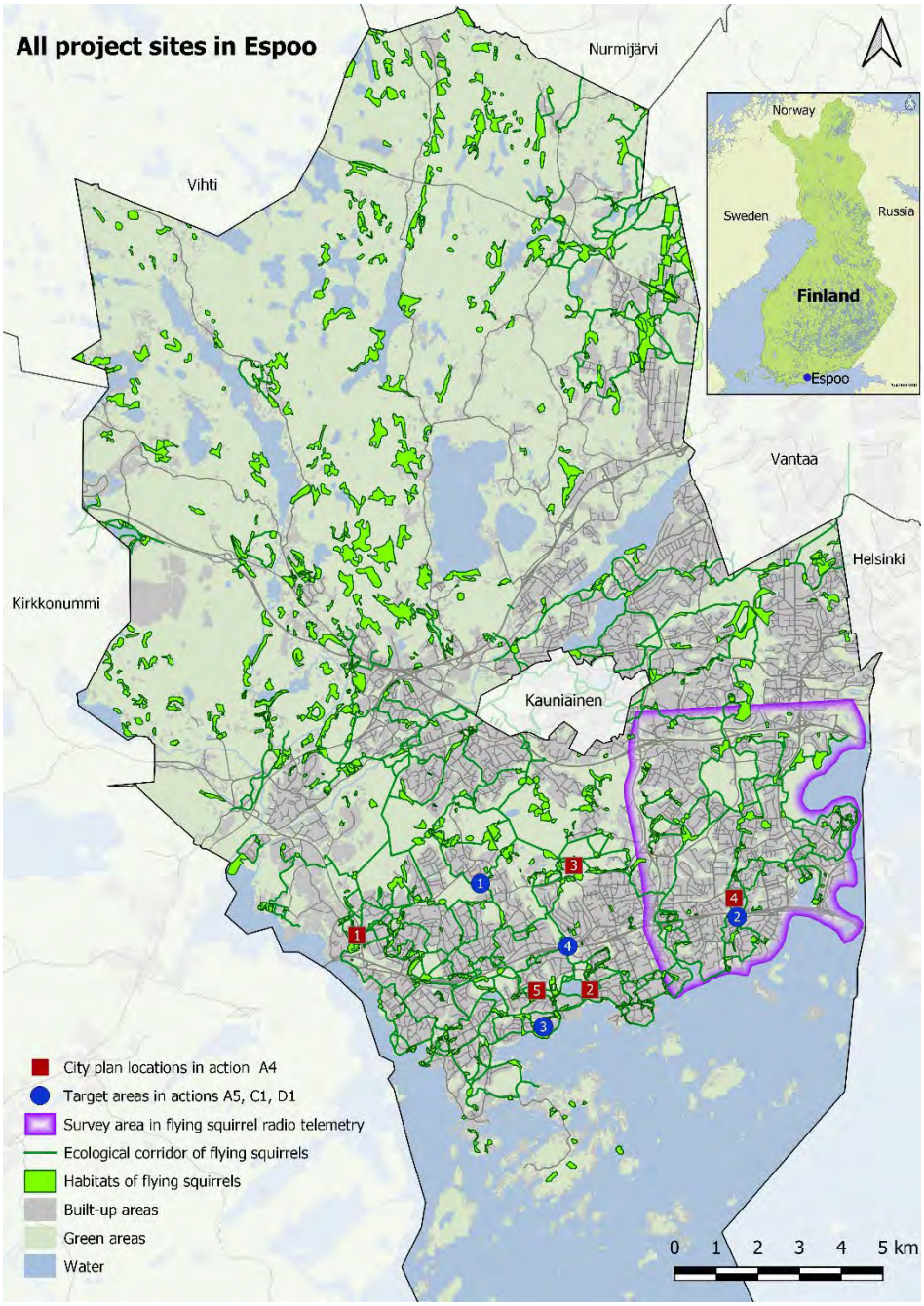
Project sites in the city of Espoo. A5-C1-D1 project sites are marked with blue dots:

1 Latokaskenniitty

2 Suvisilta

3 Hyljelahti

4 Finnoonlaakso



NATURA 2000

Flying Squirrel LIFE

Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Latokaskenniitty

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Latokaskenniitty**
Municipality: **Espoo**
Country: **Finland**
Size of the project area (ha): **24**
Responsible organisation(s): **City of Espoo**

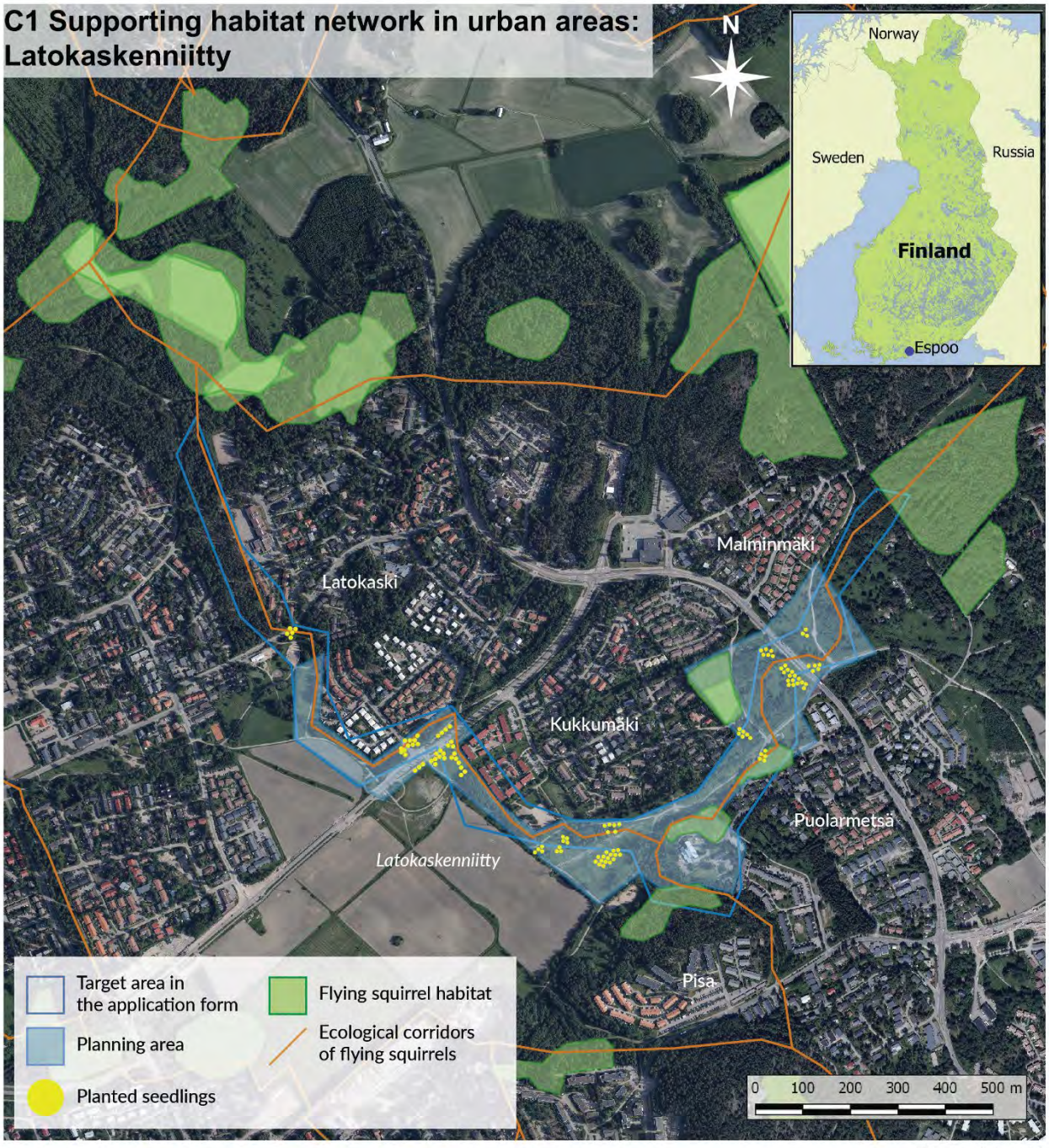
Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes.**
Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the City of Espoo in the southern Finland. Latokaskenniitty is an urban green area near Espoo Central Park and surrounded by residential neighbourhoods. An area of 24 hectares consists of urban forests, sport activity park, school and day-care centers and recreational routes for pedestrians and cyclists. A powerline has an impact on the ecological network in the area, when vegetation under the powerline is kept low and trees are cut down. Fields are still in agricultural use. Residential areas in Latokaski are mostly detached and row houses.

Espoo Central Park is a large and continuous hemiboreal forest with many flying squirrel habitats. Residential areas around the forest, on the other hand, are under a growing pressure for urbanization and construction, which causes a threat towards flying squirrel habitats in the long run. Even if greenspaces in Latokaskenniitty are mainly unsuitable habitats for the flying squirrel, the area forms a crucial ecological corridor that connects flying squirrel habitats in Espoo Central Park to habitats within the residential areas in the southern Espoo. Due to the powerline and former agricultural use, flying squirrel´s ecological network has gaps and parts, where the tree canopy connection is narrow and depends only on single trees and treelines.

Site map



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Action A5

The aim in Latokaskenniitty project site was to revitalize and strengthen ecological connectivity in between flying squirrel populations in the southern Espoo and Espoo Central Park in order to prevent isolation of the southern population in the long term. Detailed plans for the plantation were made by the Näkymä landscape architect company in autumn 2020 by a framework agreement.

In Latokaskenniitty, over 120 young trees were planted in small groups into places, where ecological corridor was weak or narrow. These included, among others, intersections with roads or recreational routes and surroundings of the powerline. Plantation was planned in a way that considers the needs of the powerline and its maintenance, sport activity park and landscaping of recreational areas. Most of the planted trees were deciduous trees, such as aspen (*Populus tremula*), birch (*Betula pendula*) or maple (*Acer platanoides*), but also spruce (*Picea abies*) and pine (*Pinus sylvestris*) were planted. Placing of different tree species was chosen in a way that may create suitable urban habitats for the flying squirrel in the future.

Action C1

The planting was carried out in autumn 2021 according to the plan created in action A5. The work was completely conducted by the green workers from the Public Works Department of Espoo.

Action D1

Monitoring of the planting sites in Espoo will be carried out in spring 2023. When settlement of project sites after actions and growth of planted trees takes time, mainly the condition of planted trees and seedlings will be monitored. For example, new ecological corridors for the flying squirrel will not be fully functional for many years, since the seedlings are not yet large enough to create a corridor — only trees over 10 meters high enable dispersal of the flying squirrel. If some of the trees and seedlings have not remained, they can be changed and/or watered based on the monitoring observations in order to enable their survival in the future.

Flying squirrel occupancy at the planting sites will be monitored by an employee of the city, who visits the project sites and their surroundings and surveys the current flying squirrel occupancy. Current situation with the flying squirrel occupancy is, then, compared with the situation before planting actions. Since actual movement of the flying squirrel at the project sites is impossible to monitor without radiotelemetry study, the employee of the city will observe surroundings of the project sites in order to define, if the occupancy at the surroundings have remained the same and if possible users of the future corridor still remain.

Monitoring after the project

City of Espoo will follow the situation with the flying squirrel at the project sites also after the Flying squirrel LIFE project whenever necessary as part of the normal work. Tree planting and forest maintenance sites in the Flying squirrel LIFE project have also been indicated in the internal map database, which ensures the sites will not be demolished by urban planning or green area maintenance activities.

Outcomes of the actions

Planting new trees aims to maintain ecological connectivity in between flying squirrel habitats as a long-term conservation effect. In Latokaskenniitty, also existing and potential flying squirrel habitats were supported.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	24	-	22	2	-
Breeding sites and resting places	1	-	-	1	-
Feeding areas	1	-	-	1	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**24**	**-**	**22**	**2**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Suvisilta

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Suvisilta**
Municipality: **Espoo**
Country: **Finland**
Size of the project area (ha): **0,3**
Responsible organisation(s): **City of Espoo**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes.**
Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the City of Espoo in the southern Finland. Suvisilta project area consists of two green embankments on both sides of six-lane Länsiväylä motorway. A pedestrian bridge crosses the motorway next to the project site. On both sides of Länsiväylä motorway there are small urban green areas within residential areas of Suvikumpu and Westend. In Suvisilta, motorway embankments grow grass and have a couple of trees. Before project actions, these single trees formed a frail ecological connection over the motorway.

Espoo´s environmental specialist conducted a baseline inventory to Suvisilta in spring 2020. Multiple known flying squirrel habitats were confirmed from both sides of Länsiväylä motorway near Suvisilta crossing point. Around the crossing point, the ecological connectivity is relatively secure.

Site map

Action A5

In Espoo, Länsiväylä motorway creates a true barrier for dispersal of the flying squirrel. Suvisilta is one of the few sites, where topography and tall trees would make it possible for the flying squirrel to cross the motorway. Therefore, the aim in Suvisilta project site was to revitalize and strengthen ecological connectivity in between flying squirrel populations in the southern and northern side of Länsiväylä motorway in order to prevent isolation of the southern population in the long term. Before project actions, only single trees formed a frail ecological connection over the motorway, and there was a high risk for the ecological connection to break, if even a couple of trees would fall.

Detailed plans to the area were made by the Näkymä landscape architect company in autumn 2020 by a framework agreement. In Suvisilta, ecological connectivity was strengthened by planting almost 40 young trees in small groups on embankments on both sides of the motorway. Planting was planned in a way that causes no safety hazards on motorway traffic but still enables smooth crossing for the flying squirrel. Both coniferous and deciduous trees were planted, mainly spruce (*Picea abies*), aspen (*Populus tremula*), birch (*Betula pendula*) and maple (*Acer platanoides*).

Action C1

The planting was carried out in spring 2021 according to the plan created in action A5. The work was completely conducted by the green workers from the Public Works Department of Espoo.

Action D1

Monitoring of the planting sites in Espoo will be carried out in spring 2023. When settlement of project sites after actions and growth of planted trees takes time, mainly the condition of planted trees and seedlings will be monitored. For example, new ecological corridors for the flying squirrel will not be fully functional for many years, since the seedlings are not yet large enough to create a corridor — only trees over 10 meters high enable dispersal of the flying squirrel. If some of the trees and seedlings have not remained, they can be changed and/or watered based on the monitoring observations in order to enable their survival in the future. In Suvisilta, some of the originally planted trees have already been replaced due to an extremely hot and dry summer in 2021.

Flying squirrel occupancy at the planting sites will be monitored by an employee of the city, who visits the project sites and their surroundings and surveys the current flying squirrel occupancy. Current situation with the flying squirrel occupancy is, then, compared with the situation before planting actions. Since actual movement of the flying squirrel at the project sites is impossible to monitor without radiotelemetry study, the employee of the city will observe surroundings of the project sites in order to define, if the occupancy at the surroundings have remained the same and if possible users of the future corridor still remain.

Monitoring after the project

City of Espoo will follow the situation with the flying squirrel at the project sites also after the Flying squirrel LIFE project whenever necessary as part of the normal work. Tree planting and forest maintenance sites in the Flying squirrel LIFE project have also been indicated in the internal map database, which ensures the sites will not be demolished by urban planning or green area maintenance activities.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Suvisilta tree planting site supports the moving population by decreasing barriers for dispersal of juvenile flying squirrels.

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	0,3	-	0,3	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**0,3**	**-**	**0,3**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Hyljelahti

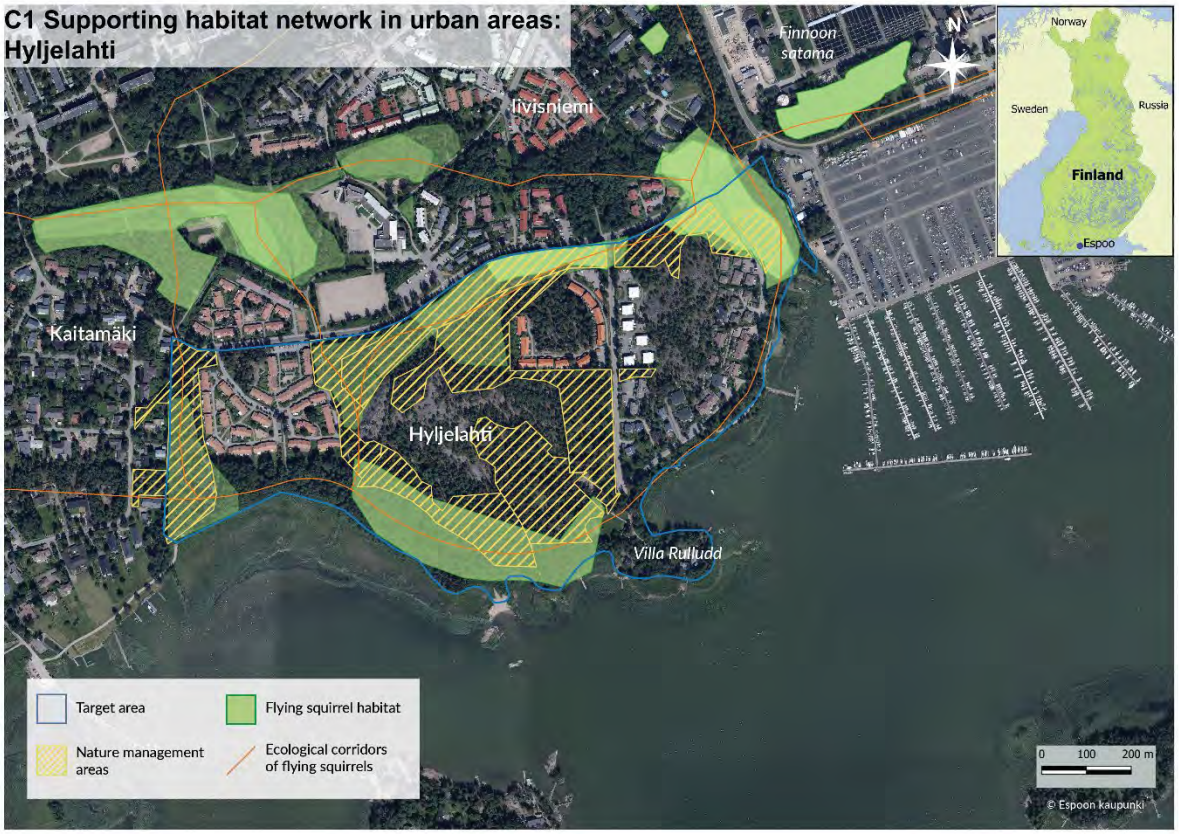
Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Hyljelahti**
Municipality: **Espoo**
Country: **Finland**
Size of the project area (ha): **34**
Responsible organisation(s): **City of Espoo**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **No.**
Hyljelahti reimbursed project site Uusimäki by an Amendment Request in 2020.
Was C-action implemented according to the A-action's plan? **Yes**

Site map



General description of the area

The project site is located in the City of Espoo in the southern Finland. Hyljelahti is the largest continuous forest area by the coastline in the southern Espoo. The area is formed mainly by recreational green areas and some residential neighbourhoods. Hyljelahti is a highly used for recreation, walking and cycling by the local residents, which cause many adverse effects: the forest floor is worn because of walking and cycling, and there are damaged trees by the trails and routes which might cause danger to the users of the area.

Hyljelahti works as an important core area of the ecological network, and the area also has values of cultural history and landscape. From the forest area, 1 hectare is forest land with low productivity and 2,3 hectares bare rock, mainly on a cliff in the middle of the area. The rest of the forest is well suitable for the flying squirrel: the forest is of a different age and species and with a lot of aged aspen and spruce. In Hyljelahti, there are at least three flying squirrel core areas with nesting trees and several feeding areas. The area is also well connected to a larger network of flying squirrel habitats.

Action A5

The aim in Hyljelahti site was to integrate flying squirrel conservation, regeneration of the forest and recreational use by forest maintenance actions, which ensure them all in the long term. The forest maintenance plan was made in 2021 in cooperation by the foresters from the Public Works Department and flying squirrel specialists from the Environment and Building Control Department in Espoo.

In the forest maintenance plan, the area is divided to forest compartments, and forest maintenance actions were planned to each compartment separately. The ecological network of flying squirrels was treated as a whole, and it was considered in each forest compartment. Forest compartments contained altogether 23 hectares from the 34 hectares overall area. From this, selective cuttings were made in an area of 13 hectares. By selective cutting, the loggers removed mainly trees that were in a poor condition or dangerous to the people. Cuttings were concentrated mainly on fringes of roads and housing plots. Also, more space was made to the seedlings in order to enable regeneration of the forest. Thinning of small-sized trees was made within an area of 19 hectares. By the thinning, more space was given to young and fertile young trees by cutting mainly coppice of rowan and maple. Fringes of recreational routes were opened more than the continuous forest areas.

Some trees that are potentially dangerous to the people were also removed from the flying squirrel core areas, but maintenance actions were kept as modest as possible. Also, nesting trees, feeding areas and individual trees on ecological connections were left intact. All actions near flying squirrel habitats were also discussed separately with the environmental specialists. Both in the selective cuttings and thinning, regeneration of tree species important for the flying squirrel were supported and, therefore, forest maintenance actions ensure flying squirrel habitats also to the future generations.

Action C1

The forest maintenance actions were carried out in during winter 2021 and spring 2022 according to the plan created in action A5. The work was conducted by the loggers from the Public Works Department of Espoo. No forestry actions were be done during nesting season of flying squirrel and birds between 1.4.-31.7.

Action D1

Monitoring of the planting sites in Espoo will be carried out in spring 2023. Flying squirrel occupancy at the planting sites will be monitored by an employee of the city, who visits the project sites and their surroundings and surveys the current flying squirrel occupancy. This current occupancy is compared with the survey data before forest management in order to define, if the flying squirrel still occupy the same sites and the quality of the forest has remained the same. Actual movement of the flying squirrel is impossible to monitor without a radiotelemetry study, but the visual monitoring offers information on the effect of the actions from the flying squirrel perspective.

Monitoring after the project

City of Espoo will follow the situation with the flying squirrel at the project sites also after the Flying squirrel LIFE project whenever necessary as part of the normal work. Tree planting and forest maintenance sites in the Flying squirrel LIFE project have also been indicated in the internal map database, which ensures the sites will not be demolished by urban planning or green area maintenance activities.

Outcomes of the actions

Careful forest management actions in Hyljelahti aimed to maintain ecologically functional areas for the flying squirrel as a long-term conservation effect, while securing the recreational values of the highly used urban forest.

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	34	-	-	-	34
Breeding sites and resting places	4,7	-	-	-	4,7
Feeding areas	5,6	-	-	-	5,6
First thinning	19	-	-	-	19
Small gap felling	13	-	-	-	13
TOTAL	**34**	**-**	**-**	**-**	**34**

Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Finnoonlaakso

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Finnoonlaakso**
Municipality: **Espoo**
Country: **Finland**
Size of the project area (ha): **8,9**
Responsible organisation(s): **City of Espoo**

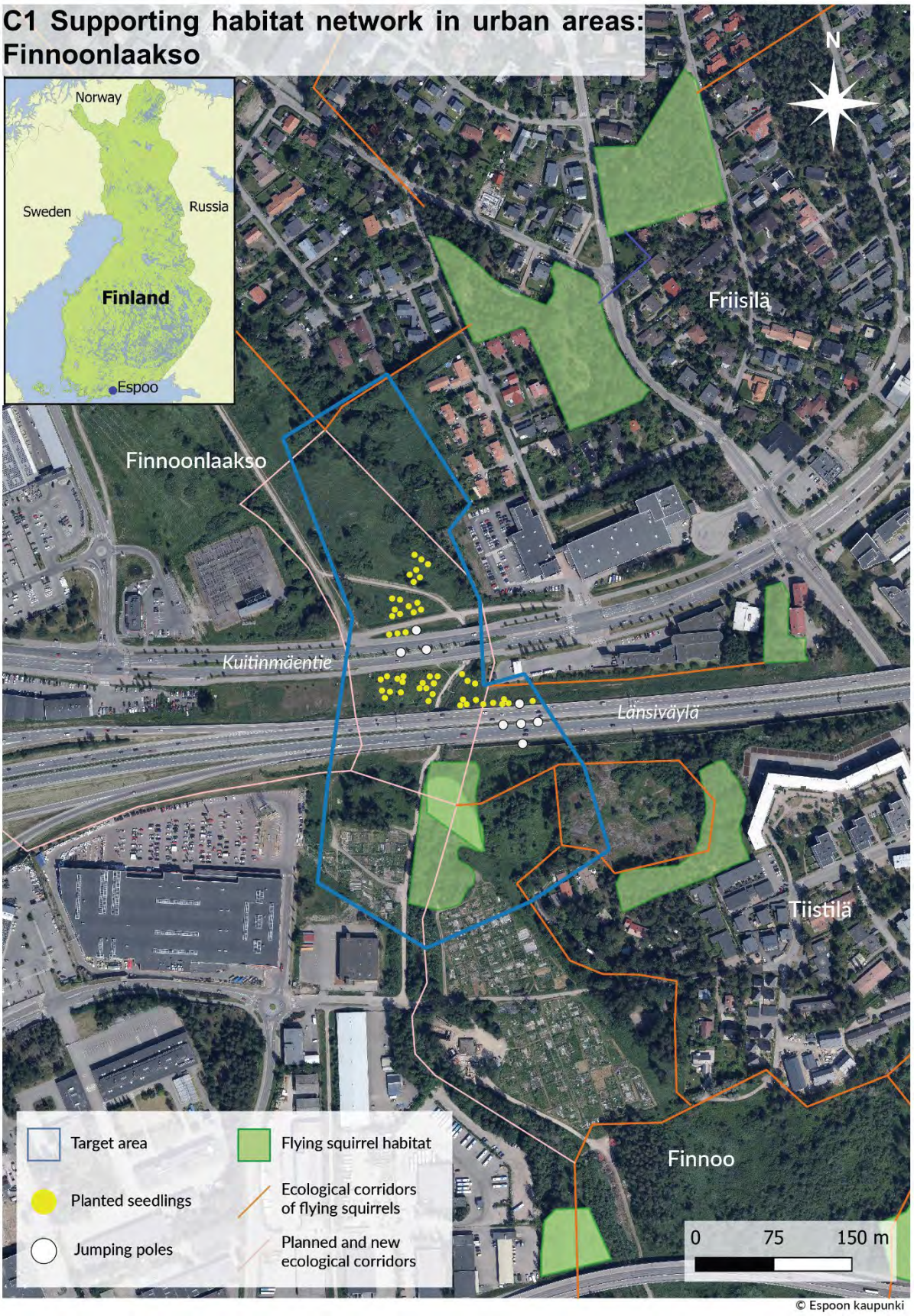
Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **No.**
Finnoonlaakso reimbursed project site Turvesolmu by an Amendment Request in 2020.
Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the City of Espoo in the southern Finland. Finnoonlaakso locate in southern Espoo and along a regionally important ecological corridor from the coast to Espoo Central Park. The size of the site is 8,9 hectares. The area is crossed by a motorway (Länsiväylä) which creates an obstacle for the ecological corridor. Before the actions, at the site was a functioning corridor underpass the motorway by land and by water (Finnobäcken stream) but no flying squirrel-suitable wooded corridor to overpass the motorway.

Vital flying squirrel populations are located at both sides of the motorway. The population in the northern side of the motorway (Friisilä area) is dependent of a few large forests and of trees in the residential areas. The population in the southern side of the Länsiväylä (Finnoo area) is struggling with proper dispersal routes, to which strengthening connectivity in Finnoonlaakso offers some relief. Due to planning and construction processes in Finnoo area as a new city center and residential area, flying squirrel habitats of the area have been monitored for several years before the LIFE actions took place.

Site map


C1 Supporting habitat network in urban areas: Finnoonlaakso
Norway
Sweden
Russia
Finland
Espoo
N
Friisilä
Finnoonlaakso
Kuitinmäentie
Länsiväylä
Tiistilä
Finnoo
Target area
Flying squirrel habitat
Planted seedlings
Ecological corridors of flying squirrels
Jumping poles
Planned and new ecological corridors
0
75
150 m
© Espoon kaupunki

Action A5

The aim in Finnoonlaakso project site was to revitalize and strengthen ecological connectivity in between flying squirrel populations in the southern and northern side of Länsiväylä motorway in order to prevent isolation of the southern population in the long term.

In 2019, City of Espoo ordered a preliminary plan from LOCI landscape architect company on how to strengthen the ecological network of the flying squirrel in the Finnoo area. The goal of the work was to examine different options for creating and strengthening ecological connections of flying squirrels. In the work, LOCI investigated how the connection could be supported by planting trees and building artificial structures like jumping poles. In the Flying Squirrel LIFE project, planning of the connection was made based on this preliminary plan. Detailed plans were made by the LOCI landscape architect company in autumn 2021 by a framework agreement.

In Finnoonlaakso, altogether 8 artificial jumping poles were placed in between Länsiväylä motorway lanes and around Kuitinmäentie road. Artificial jumping poles were used instead of trees, since municipal infrastructure under the road prevented use of real trees and falling branches and leaves would have cause a high risk near one of the busiest motorways in Finland. Ecological connection was also strengthened on the nearby area with planting young trees to places where ecological connectivity was weak. Altogether over 300 seedlings were planted, mainly birches (*Betula pendula* & *Betula pubenscens*) and spruces (*Picea abies),* but also hybrid aspen (*Populus wettsteinii*) and alder (*Alnus glutinosa*).

Action C1

The planting and construction were carried out in autumn 2022 according to the plan created in action A5. Work in the motorway and road area, including construction of the jumping poles, was carried out by an external contractor chosen through tendering process. Most of the planting was conducted by the green workers from the Public Works Department of Espoo.

Action D1

Monitoring of the planting sites in Espoo will be carried out in spring 2023. When settlement of project sites after actions and growth of planted trees takes time, mainly the condition of planted trees and seedlings will be monitored. For example, new ecological corridors for the flying squirrel will not be fully functional for many years, since the seedlings are not yet large enough to create a corridor — only trees over 10 meters high enable dispersal of the flying squirrel. If some of the trees and seedlings have not remained, they can be changed and/or watered based on the monitoring observations in order to enable their survival in the future.

Flying squirrel occupancy at the planting sites will be monitored by an employee of the city, who visits the project sites and their surroundings and surveys the current flying squirrel occupancy. Current situation with the flying squirrel occupancy is, then, compared with the situation before planting actions. Since actual movement of the flying squirrel at the project sites is impossible to monitor without radiotelemetry study, the employee of the city will observe surroundings of the

project sites in order to define, if the occupancy at the surroundings have remained the same and if possible users of the future corridor still remain.

Monitoring after the project

City of Espoo will follow the situation with the flying squirrel at the project sites also after the Flying squirrel LIFE project whenever necessary as part of the normal work. Tree planting and forest maintenance sites in the Flying squirrel LIFE project have also been indicated in the internal map database, which ensures the sites will not be demolished by urban planning or green area maintenance activities.

Outcomes of the actions

Planting new trees aims to maintain ecological connectivity in between flying squirrel habitats as a long-term conservation effect. Therefore, Finnoonlaakso project actions create a new ecological connection to moving flying squirrels.

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	8,9	-	8,9	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**8,9**	**-**	**8,9**	**-**	**-**

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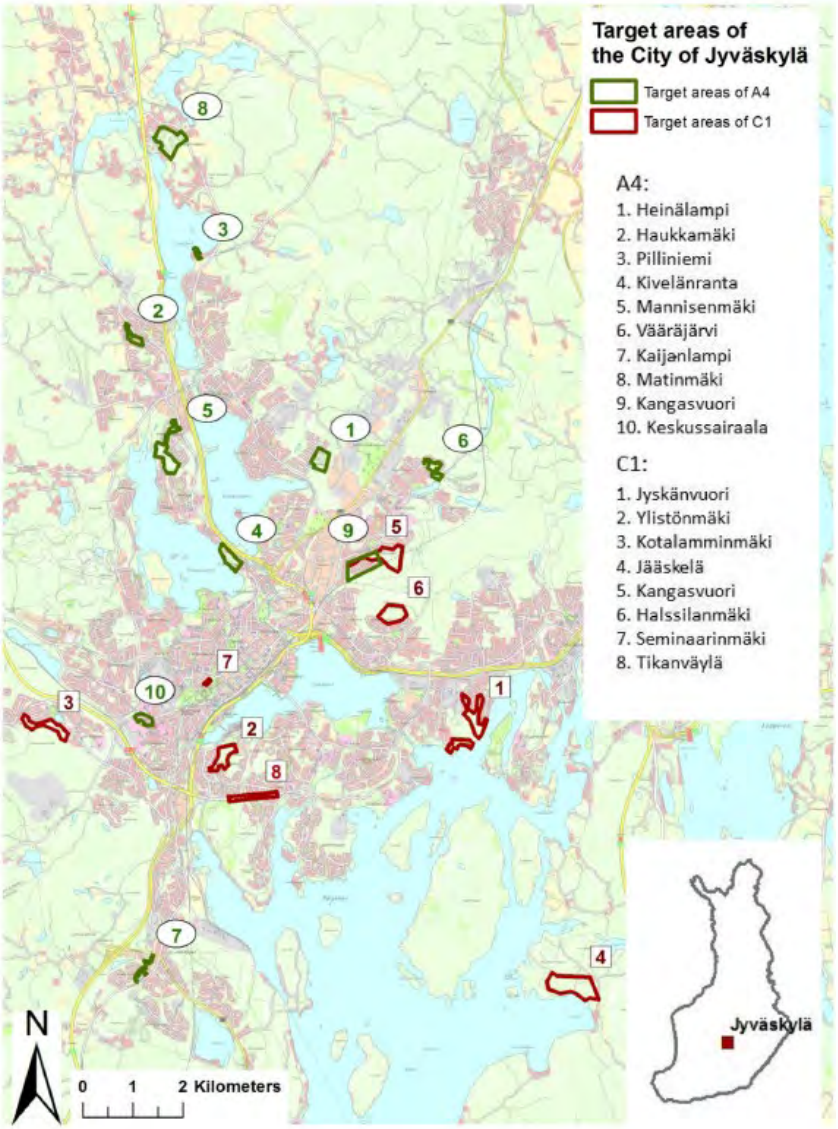
JYVÄSKYLÄ Project sites

Project sites in the city of Jyväskylä. A5-C1-D1 project sites are encircled with red line. The habitat network analysis covered the whole Jyväskylä region.

1 Jyskänvuori
2 Ylistönmäki
3 Kotalamminmäki
4 Jääskelä
5 Kangasvuori
6 Halssilanmäki
7 Seminaarinmäki
8 Tikanväylä project site



Flying Squirrel LIFE

Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Jyskänvuori

Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Jyskänvuori**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **23,4**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map


C1 Supporting habitat network in urban areas: Jyskänvuori
Jyväskylä
Project area
Nest box locations
Nesting sites
Moving connections
Suitable habitat
100 50 0 100 Metriä

General description of the area

The project site is located in Väinölä district, Jyväskylä. The area is owned by the City of Jyväskylä. It is composed of two separate sub-areas, the northern and southern. The forests in the area are not classified as suitable for flying squirrel based on the forest stand data, but still there some suitable forests for the species in the project area at a scale smaller than forest stands. The northern sub-area is an onccupied area, in which the species has nested some years ago. In southern sub-area situates a long-term core area of flying squirrel,.

Action A5

Action C1

Four nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

The nest box is being attached to a birch tree of the project area.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also inspected.

Inventory results before and after the project actions:

Before	After	2021	2022
Sub-area 1(northern)	Nest box 1	+	+
–	Nest box 2	–	+
Sub-area 2 (southern)	Nest box 3	–	–
–	Nest box 4	+	+
	Nest box 5	+	+

One of the nest boxes was occupied in spring 2021. The pellet findings of the 2022 indicate that the individual was shifted to another nest box next year.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	23,4	-	-	-	-
Breeding sites and resting places	0,5	-	-	2,5	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**23,4**	**-**		**2,5**	**-**

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 (LIFE17 NAT/FI/000469)

Project site: Ylistönmäki

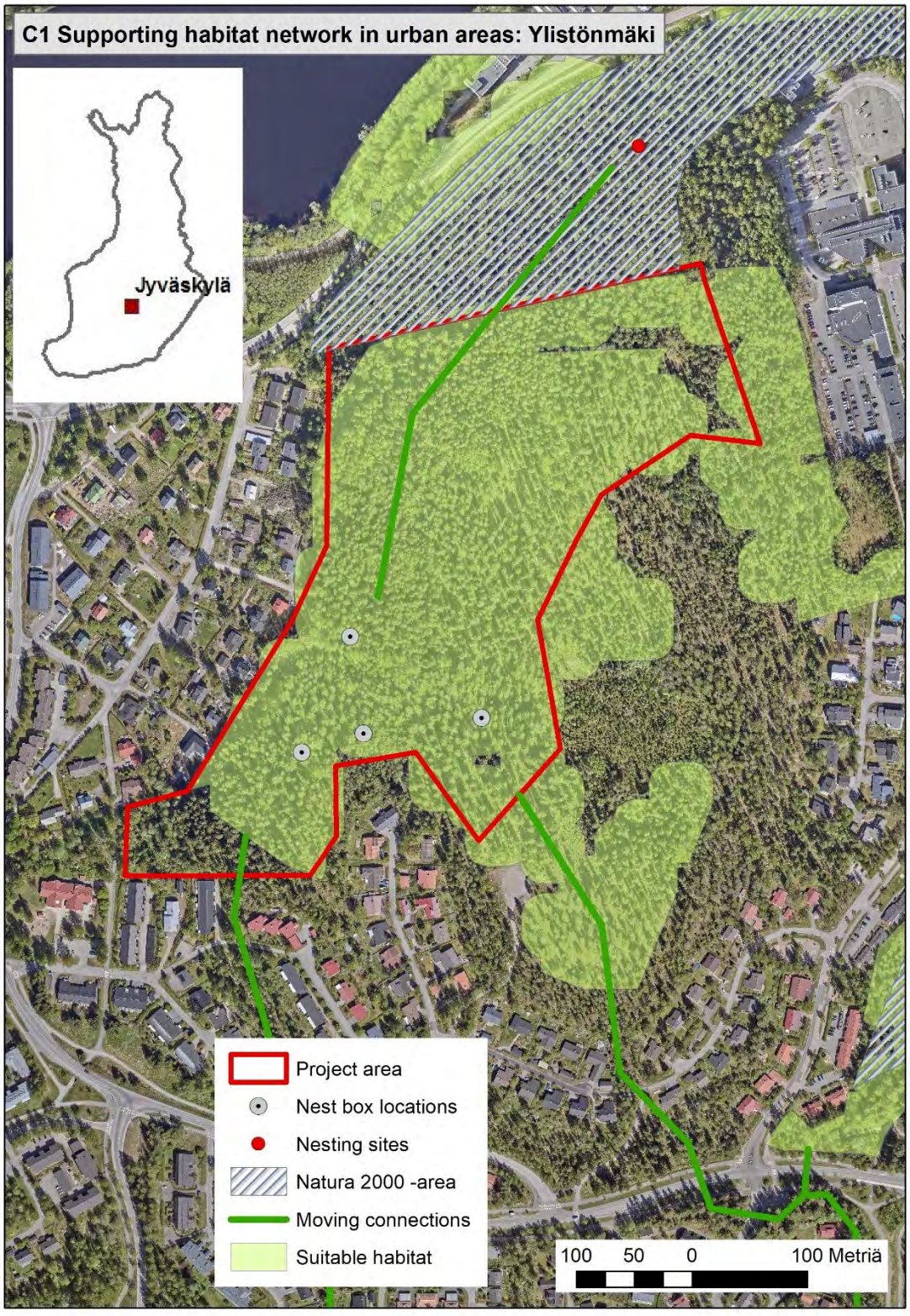
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Ylistönmäki**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **12,9**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map


C1 Supporting habitat network in urban areas: Ylistönmäki
Jyväskylä
Project area
Nest box locations
Nesting sites
Natura 2000 -area
Moving connections
Suitable habitat
100 50 0 100 Metriä

General description of the area

The project site is located in Ylistömäki, Ristonmaa district. The area is owned by city of Jyväskylä. The forests in the area are largely suitable for flying squirrel. The project area is located right next to Ylistönrinne-Kylmänoron kalliot Natura 2000-area (FI0900022). Flying squirrel is one of the species which forms the protection basis of Natura 2000 -area. There are not known nesting sites in the project area, only some old records reported by public.

Action A5

The aim of the action was to create new nest sites for the flying squirrel in the area located next to the Natura 2000 -area.

The nest box locations were planned in spring 2020.

Action C1

Four nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

Four nest boxes with project logos were placed in the project area.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also investigated.

Inventory results before and after the project actions:

Ennen		2021	2022
–	Nest box 1	+	–
	Nest box 2	–	+
	Nest box 3	–	–
	Nest box 4	–	–

One of the nest boxes was occupied in spring 2021. The pellet findings of the 2022 indicate that the individual was shifted to an other nest box next year.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	12,9	-	-	-	-
Breeding sites and resting places		-	-	2,5	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**12,9**	**-**		**2,5**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Kotalamminmäki

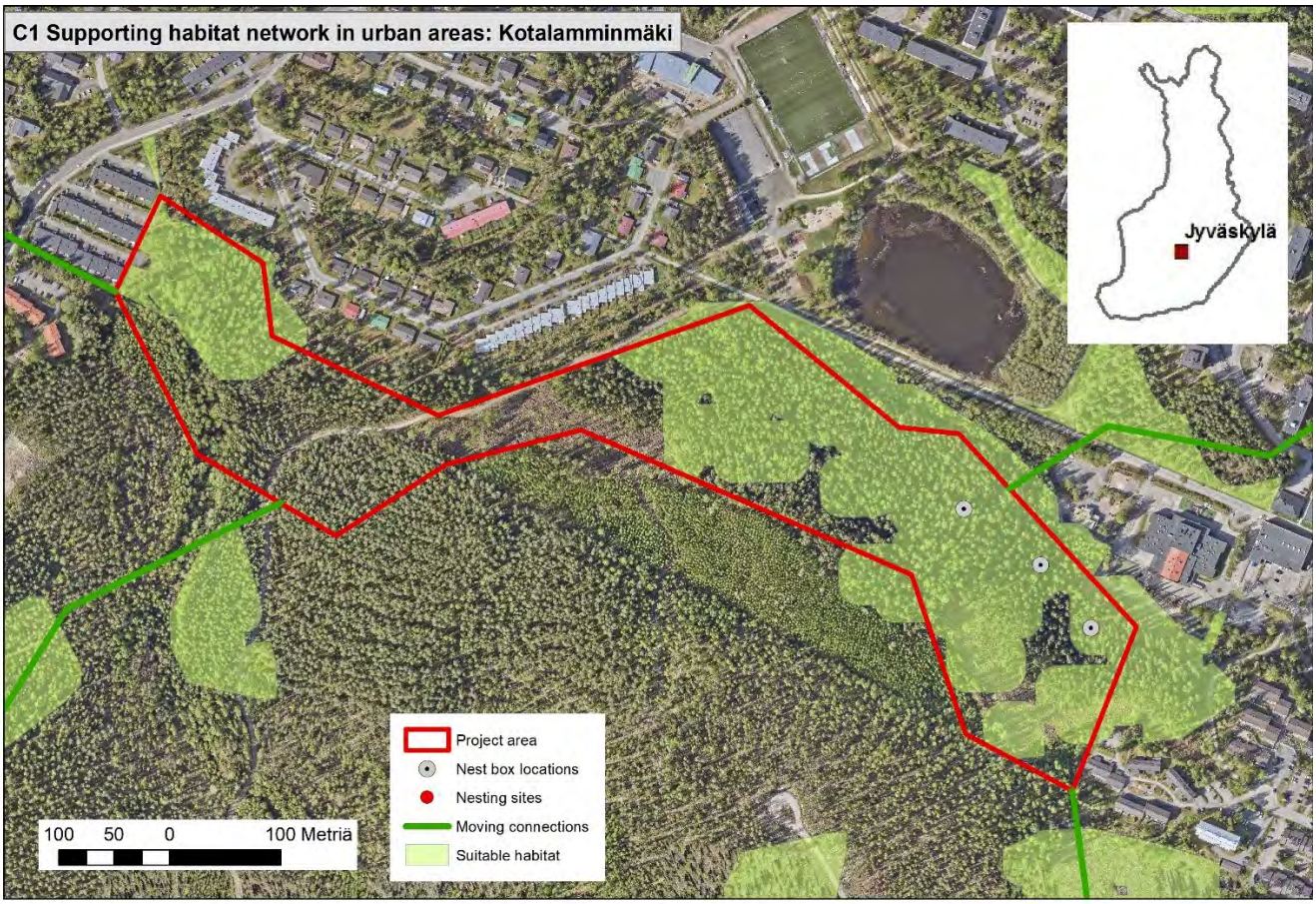
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Kotalamminmäki**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **12,7**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map



General description of the area

The project site is located in Keltinmäki district, Jyväskylä. The area is owned by the City of Jyväskylä. There are spruce-dominated forests suitable for the flying squirrel in the project area. There are yet no flying squirrel observations made from the area. Nearest nesting sites are located c. 600 meters outside of the project area in north-east. The elementary school is located next to the project site and the area is partly in a break use of the pupils.

Action A5

The aim of the action for to create nest site provision in the area where the flying squirrel is not nesting but in which the forests are suitable for the species.

Action C1

Three nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

A nest box in a spruce tree of the project area.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also inspected.

Inventory results before and after the project actions:

Before	After	2021	2022
–	Nest box 1	–	–
	Nest box 2	+	+
	Nest box 3	–	–

One of the nest boxes was occupied in spring 2021. However, in 2022 the area was unoccupied.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	12,7	-	-	-	-
Breeding sites and resting places		-	-	2,5	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**12,7**	**-**		**2,5**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Jääskelä

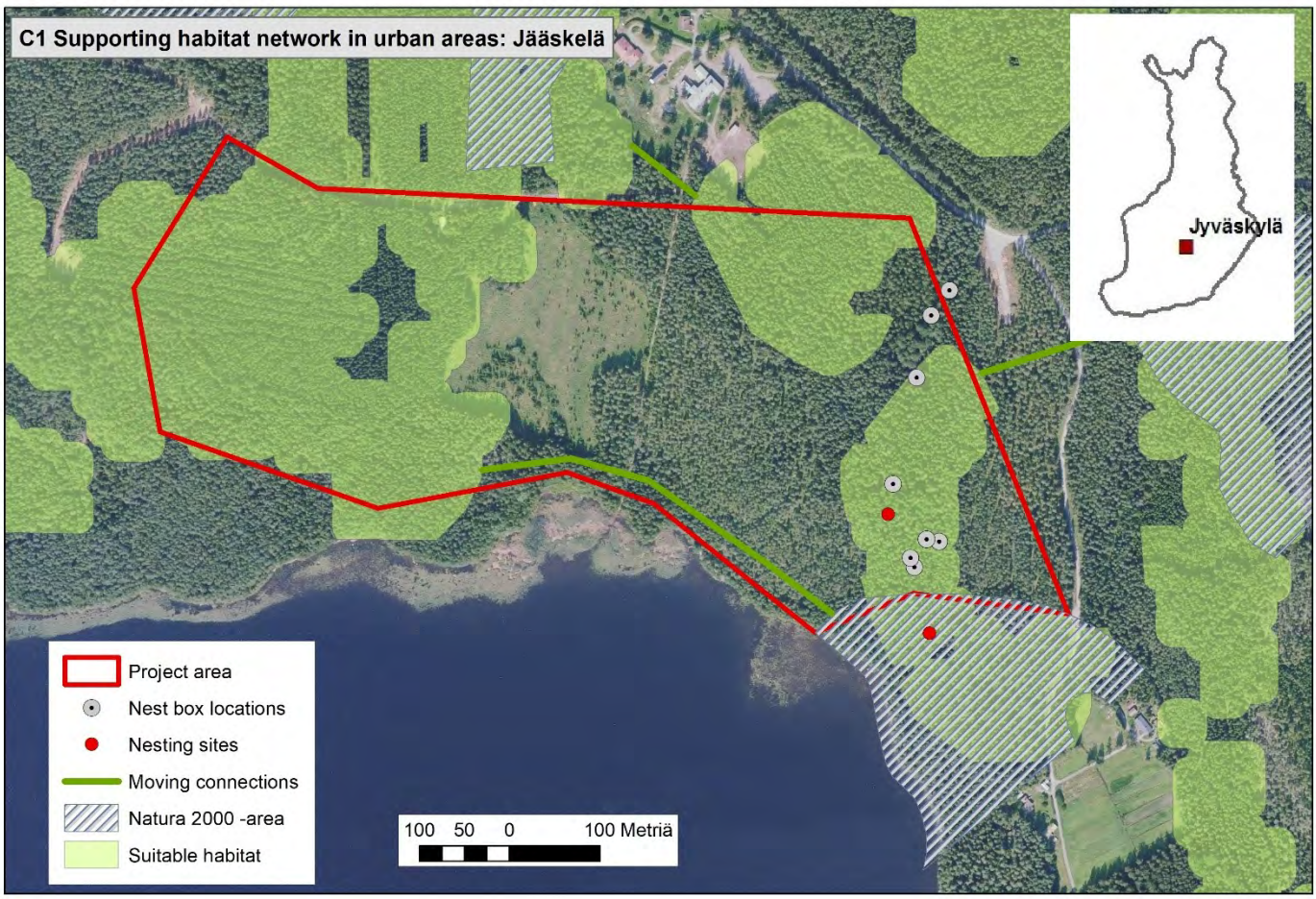
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Jääskelä**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **33,4 ha**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes (except for one nest box located c. 10 meters outside of the project area)**
Was C-action implemented according to the A-action's plan? **Otherwise except for three nest box locations shifted compared to A5 -plan.**

Site map



General description of the area

The project area is located in Jääskelä, Jyväskylä. The area is owned by the City of Jyväskylä. The area is located next to Palstonvuori-jääskelä Natura 2000 -area (FI0900088). Flying squirrel is one of the species which forms the protection basis of Natura 2000 -area. There are flying squirrel observations from the eastern part of the project area.

Action A5

The aim of the action is to create new nest sites for the flying squirrel in the area located next to the Natura 2000 -area.

The nest box locations were planned in spring 2020.

Action C1

Eight nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year. Three nest box locations were changed compared to the locations

pointed out by the plan. One of the nest boxes was located c. 10 meters outside of the project area.

The nest boxes are carried to the locations pointed out by the original plan.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also inspected.

Inventory results before and after the project actions:

Before	After	2021	2022
+	Nest box 1	–	–
	Nest box 2	+	+
	Nest box 3	–	+
	Nest box 4	–	+
	Nest box 5	+	–
	Nest box 6	–	–
	Nest box 7	–	–
	Nest box 8	–	–

Four of the nest boxes were used by the flying squirrel during the two year's follow up. Two northern nest boxes remained unoccupied.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	33,4	-	-	-	-
Breeding sites and resting places	0,5	-	-	3,0	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**33,4**	**-**		**3,0**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Kangasvuori

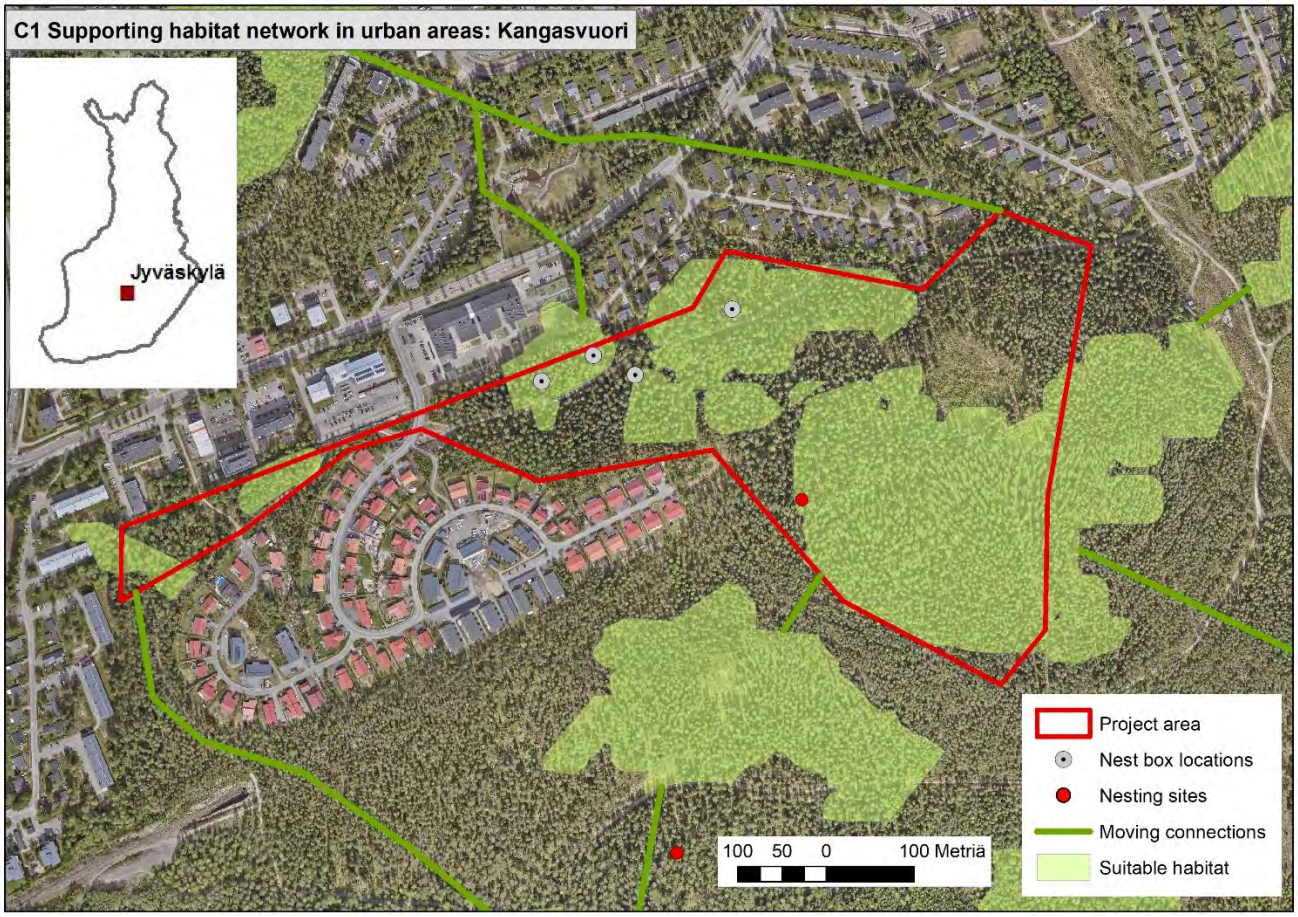
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Kangasvuori**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **20,8**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map



General description of the area

The project site is located in Kangasvuori district, Jyväskylä. The area is owned by City of Jyväskylä and it is totally forested. The forests in the site are largely suitable for the flying squirrel. The area is linked with forested connections to core areas in several directions. The area is located next to kindergarten-school complex, which affected the choice of the area as a project site.

Action A5

The aim of the action was to create new nest sites for the flying squirrel in the area in which there seem to be a lack of suitable nesting sites. There are pellets found from the area in several places. The area is still largely (c. 70%) suitable for the FS and there are nearby nesting sites with good connections to this site. A kindergarten -school is located close to the site, which originally affected the choice of the area.

Action C1

Four nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

A nest box transport to the project site of Kangasvuori.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also investigated. In addition, the project site was also inventoried in 2024 (not included to the LIFE-project).

Inventory results before and after the project actions:

Ennen (+)		2021	2022
	Nest box 1	–	–
	Nest box 2	+	–
	Nest box 3	+	–
	Nest box 4	+	–

There were pellets found from the area before the nest boxes were set to the site (without nest observations). The nest boxes were settled quickly after their placement. However, in 2022 the territory was unoccupied.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	20,8	-	-	-	-
Breeding sites and resting places	1,0	-	-	2,0	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**20,8**	**-**		**2,0**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Halssilanmäki

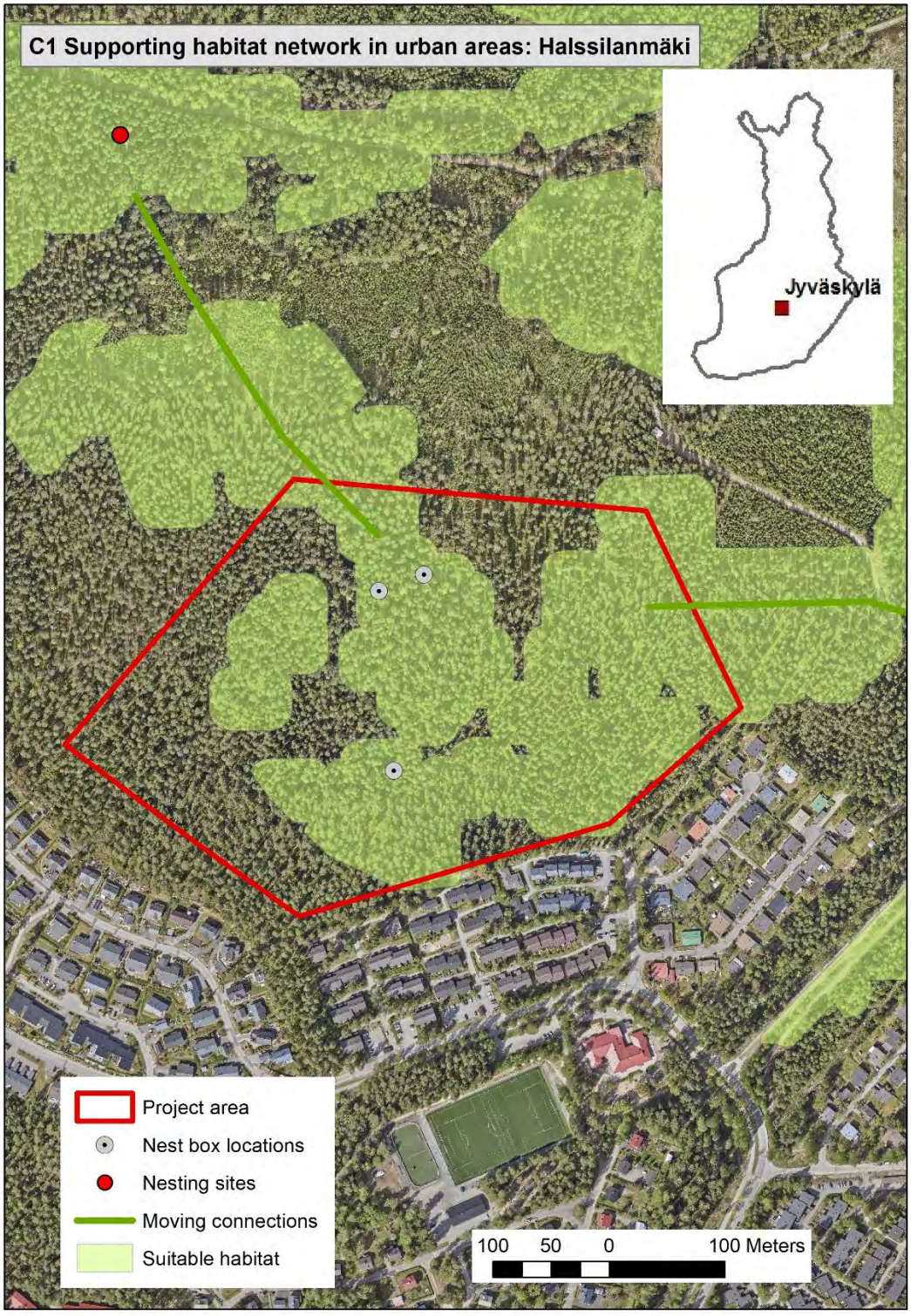
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Halssilanmäki**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **14,4**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map


C1 Supporting habitat network in urban areas: Halssilanmäki
Jyväskylä
Project area
Nest box locations
Nesting sites
Moving connections
Suitable habitat
100 50 0 100 Meters

General description of the area

The project site is located in Halssila district, Jyväskylä. The area is owned by City of Jyväskylä and it is totally forested. The forest in the site are largely suitable for the flying squirrel. The nearest nesting sites are located c. 350 meters to the north-west and south-west of the border of the project site.

Action A5

The aim of the action was to create new nest sites for the flying squirrel in the area, where there are no nesting individuals yet. The area is still largely (c. 70%) suitable for the FS and there are nearby nesting sites with good connections to this site . A kindergarten is located close to the site, which originally affected the choice of the area.

Action C1

The nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

A nest box situated in a spruce in Halssilanmäki.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest

boxes were also inspected. In addition, the project site was also inventoried in2024 (not included to the LIFE-project). No pellets were found in any of the monitor visits.

Inventory results before and after the project actions:

Before	2021	2022
–	–	–

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	14,4	-	-	-	-
Breeding sites and resting places	-	-	-	2,0-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**14,4**			**2,0**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Seminaarinmäki

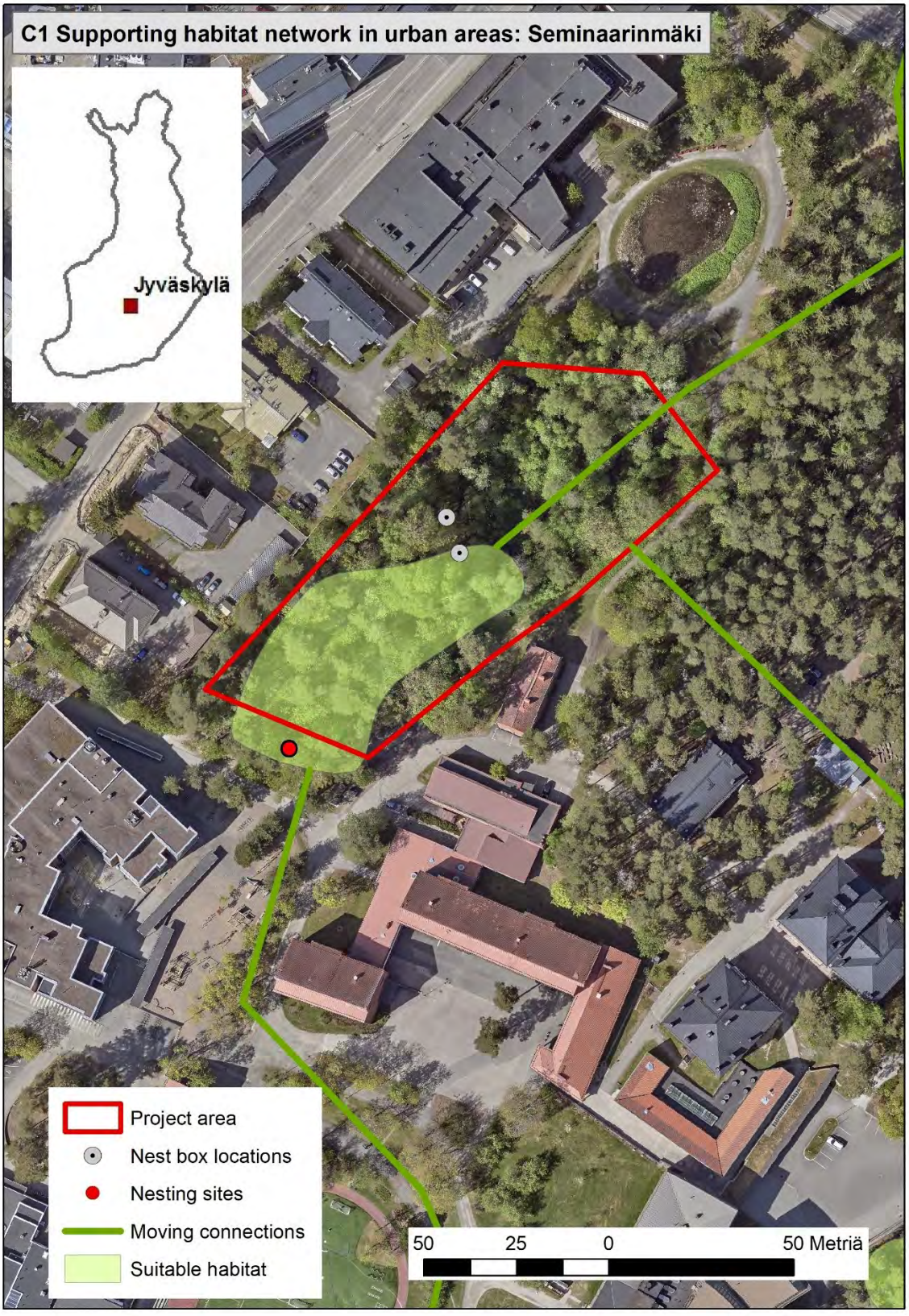
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Seminaarinmäki**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **0,7 ha**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map


C1 Supporting habitat network in urban areas: Seminaarinmäki
Jyväskylä
Project area
Nest box locations
Nesting sites
Moving connections
Suitable habitat
50
25
0
50 Metriä

General description of the area

The project site is located in the university campus area of Seminaarinmäki, Jyväskylä. The area is located quite next to city centre. The area is owned by the City of Jyväskylä. The area is a long-term living area of the flying squirrel with many core areas. The core areas are connected to the project area with woody/forested connections. Just outside of the project area is a nesting observation from about 10 years ago, but the area is unoccupied for many years. The project area is located next to an elementary school.

Action A5

The aim of the action for to create nest site provision in the area where the flying squirrel is not nesting but in which the forests are suitable for the species.

The nest box locations were planned in spring 2020.

Action C1

Two nest boxes were put to the locations in autumn 2020 pointed out by the original plan made in spring of the same year.

Forests in the project area.

Action D1

The occupancy of the nest boxes was followed with two inventories (in 2021 and 2022). The pellets of the species were searched in the area, especially close to the trees with nest boxes. The ceilings of the nest boxes were also inspected.

Inventory results before and after the project actions:

Before	After	2021	2022
–	Nest box 1	–	–
	Nest box 2	–	–

Either of the nest boxes was occupied during the monitoring. They have also been empty after year 2022 based on the visits to the project site.

Monitoring after the project

Conditions of the nest boxes is going to be followed after the project. At the same time, information is gained on the nest use of the flying squirrel.

Outcomes of the actions

Project site information	**Area (ha)**	**Flying squirrel habitat (ha) ***	**Moving habitat (ha) ****	**Future habitat (ha) *****	**Combination of flying squirrel conservation & recreation (ha)********
Total project site area	0,7	-	-	-	-
Breeding sites and resting places	0,2	-	-	0.5	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**0,7**	**-**		**0,5**	**-**

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 (LIFE17 NAT/FI/000469)

Project site: Tikanväylä

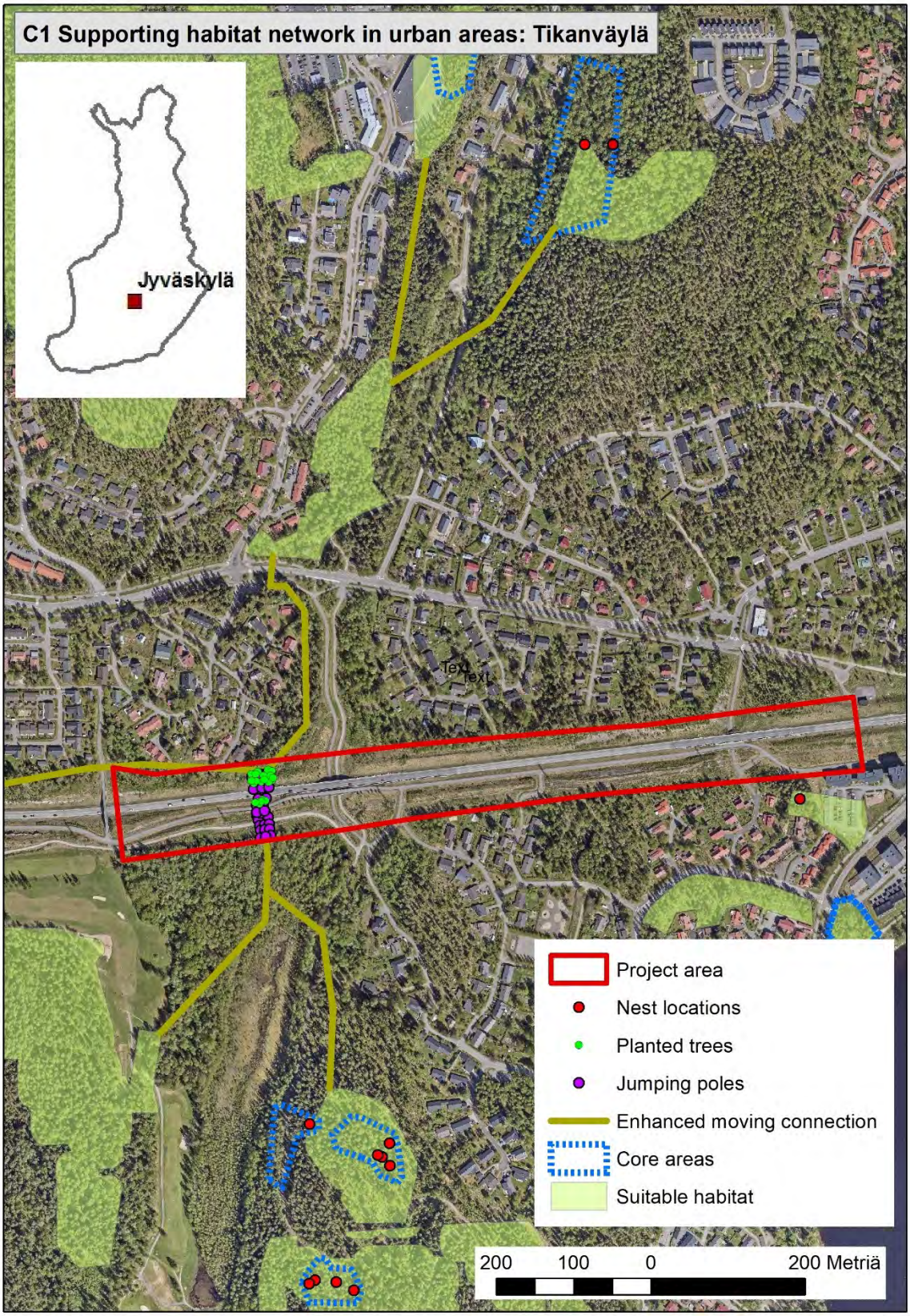
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas
Action C1 Supporting habitat network in urban areas
Action D1 Monitoring the conservation actions

Project site: **Tikanväylä**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **8,5**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**
Was C-action implemented according to the A-action's plan? **Yes**

Site map


C1 Supporting habitat network in urban areas: Tikanväylä
Jyväskylä
Text
Text
Project area
Nest locations
Planted trees
Jumping poles
Enhanced moving connection
Core areas
Suitable habitat
200 100 0 200 Metriä

General description of the area

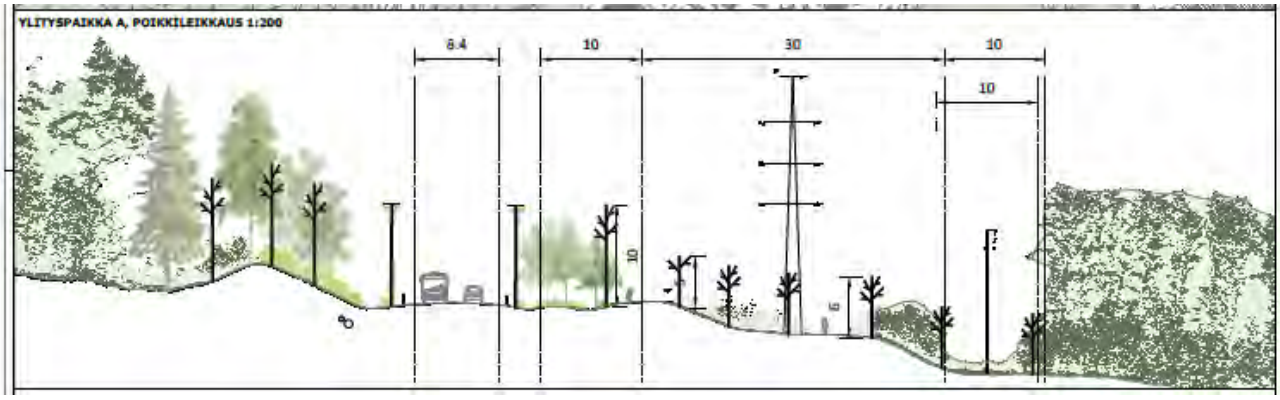
The project site located in the City of Jyväskylä in Central Finland. The project area comprises a road area called Tikanväylä and a parallel powerline area. The road area combined with powerline area creates an obstacle for flying squirrel (FS). There area vital FS core aras at both sides of the project area. The road area is is owned by the state and powerline area is administered by Fingrid. Otherwise the area is owned by the City of Jyväskylä.

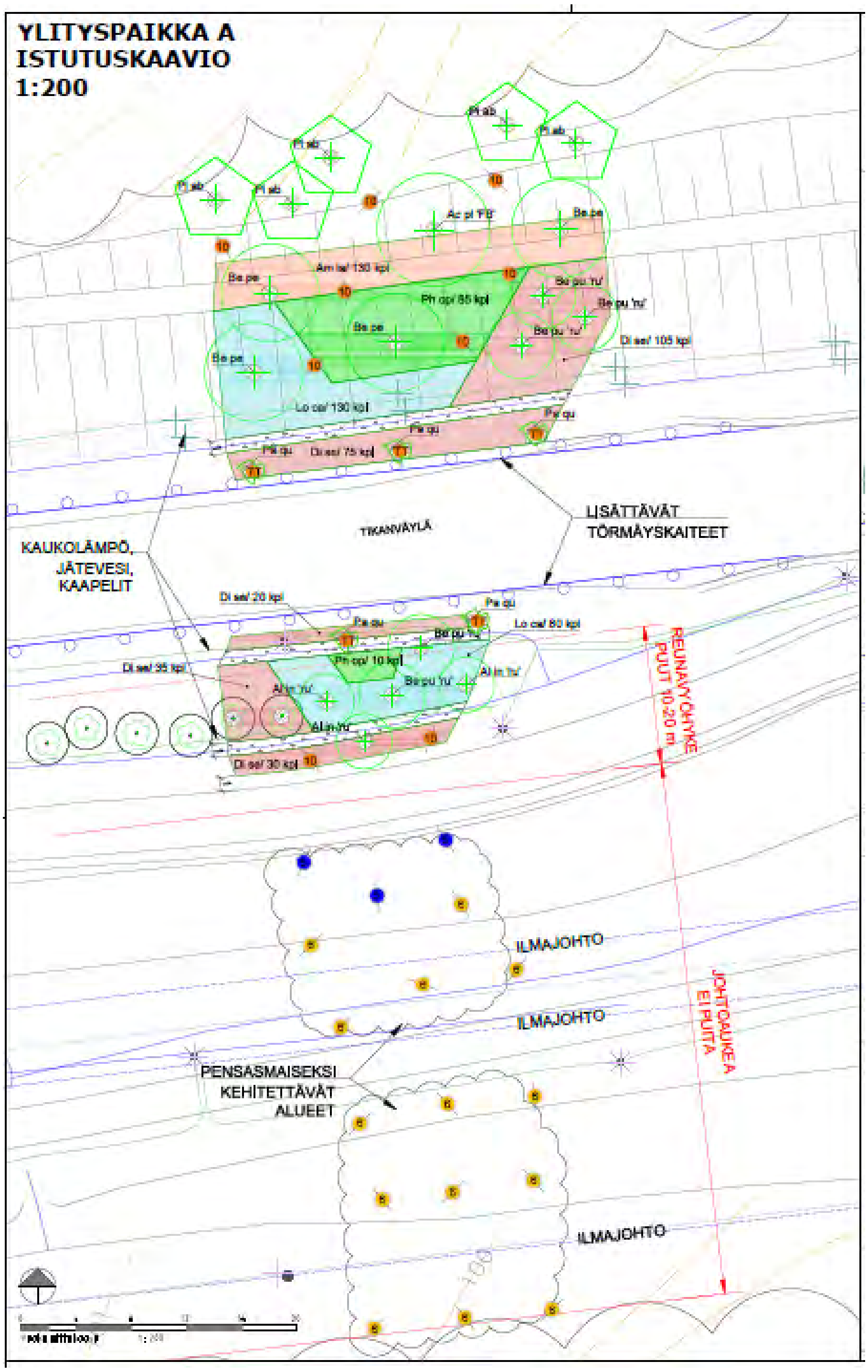
Action A5

The aim of the action was to provide a new movement corridor for flying suirrel across the road and powerline area. Ramboll Oy examined the whole project area and came up with four alternative locations for the new corridor. One of the alternative was chosen for more detailed planning. For these location, two alternative solution was planned (versions A and B). They were compared in terms of ecological efficiency, costs and amount of jumping poles needed, and on that basis the alternative A was chosen. The plans were ready by the end of 2021. During the planning, the feedback and permissions were asked from the state, Fingrid and ALVA (electricity, water and district heat provider).

The plan includes the locations for the combination of 31 jumping poles (of different heights) and new planted trees. It also includes the detailed plans for jumping poles.

Extract from the Tikanväylä site plan:





KASVILUETTELO

Tunnus	Laji	Koko	YHT Kpl	A Kpl	B Kpl	Kpl/m²	Ist.etäisyys	Kork. Täysk.
	LEHTIPUUT							
Ac pl 'FB'	Acer platanoides 'Faassen's black', punavaahtera	rym 12-14	2	1	1			10-15 m
Al in 'Ru'	Alnus incana f. rubra, punaharmaaleppä	rym 8-10	6	3	3			7-10 m
Be pe	Betula pendula, rauduskoivu	rym 12-14	10	4	6			15-25 m
Be pu 'Ru'	Betula pubescens f. rubra, punakoivu	rym 8-10	9	5	4			10 m
	HAVUPUUT							
Pi ab	Picea abies, metsäkuusi	125-150	5	5				15-30 m
	LEHTIPENSAAT							
Am la	Amelanchier lamarckii, isotuomipihlaja	60-70	350	130	220	1	80 cm	400 cm
Di se	Diervilla sessilifolia 'Rusko', ruskovuorenkuusama	30-50	600	265	335	1,5	60 cm	60 cm
Lo ca	Lonicera caerulea, sinikuusama	30-50	500	210	290	1,5	60 cm	100-150 cm
Ph op	Physocarpus opulifolius, lännenheisiangervo	60-70	245	95	150	1	100 cm	200-300 cm
	KÖYNNÖKSET							
Pa qu	Parthenocissus quinquefolia, imukärhiviini	30-70	11	5	6			6-10 m

MERKINNÄT

- Liito-oravan hyppytolppa, näkyvä korkeus 10 m, törmäysturvallinen rakenne, viiva osoittaa oksien suunnan
- Liito-oravan hyppytolppa, näkyvä korkeus 10 m
- Liito-oravan hyppytolppa, näkyvä korkeus 6 m
- Liito-oravan hyppytolppa, näkyvä korkeus 5 m
- Liito-oravan hyppytolppa, näkyvä korkeus 4 m
- Istutettava lehtipensas, kasvualusta 400 mm, männynkuorikate 70 mm
- Sepelverhous istutusalueiden ojapainanteissa, raekoko 50-100 mm, kerrosvahvuus 150 mm
- Männynkuorikate (puistokate), kerrosvahvuus 70-100 mm
- Istutettava havu-/ lehtipuu, tuenta 3 seipäällä, kastelukaulukset kasvualustasta / Säilytettävä lehtipuu
- Pa qu — Istutettava köynnös, ohjataan kasvamaan tolppaan, kasvualusta 600 mm

Action C1

The construction of the project site was carried out in autumn 2023, and the site was ready in December 2023. The construction was carried out according to the plans. It was constructed by Destia Oy. There were specific arrangements for traffic in critical working phases.

The jumpig poles located across the road line

Action D1

The monitoring of the project site is carried out as a normal procedure of green property management of City of Jyväskylä. The trees and jumping poles are marked in the public property database of the city.

Monitoring after the project

The monitoring of the condition of trees continues after the project. In addition. the camera monitoring is planned to get information on the use of the crossing.

Outcomes of the actions

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	8,5	-	8,5	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**8,5**	**-**	**8,5**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Jyväskylä

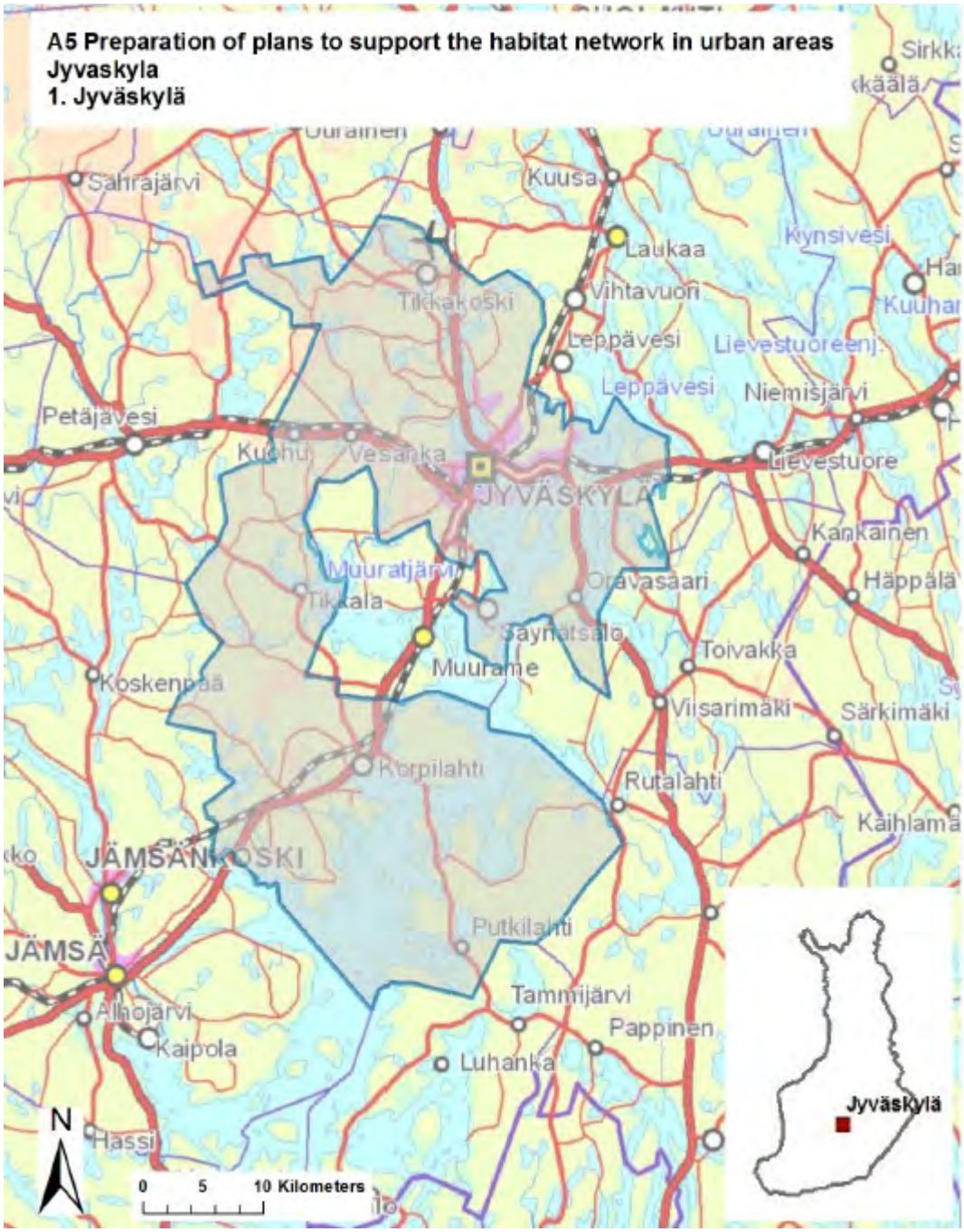
Summary of the following actions:

Action A5 Preparation of plans to support the habitat network in urban areas

Project site: **Jyväskylä**
Municipality: **Jyväskylä**
Country: **Finland**
Size of the project area (ha): **1446 km2**
Responsible organisation: **City of Jyväskylä**

Was action implemented as planned in the proposal? **Yes**
Was action implemented in the same location than described in the proposal? **Yes**

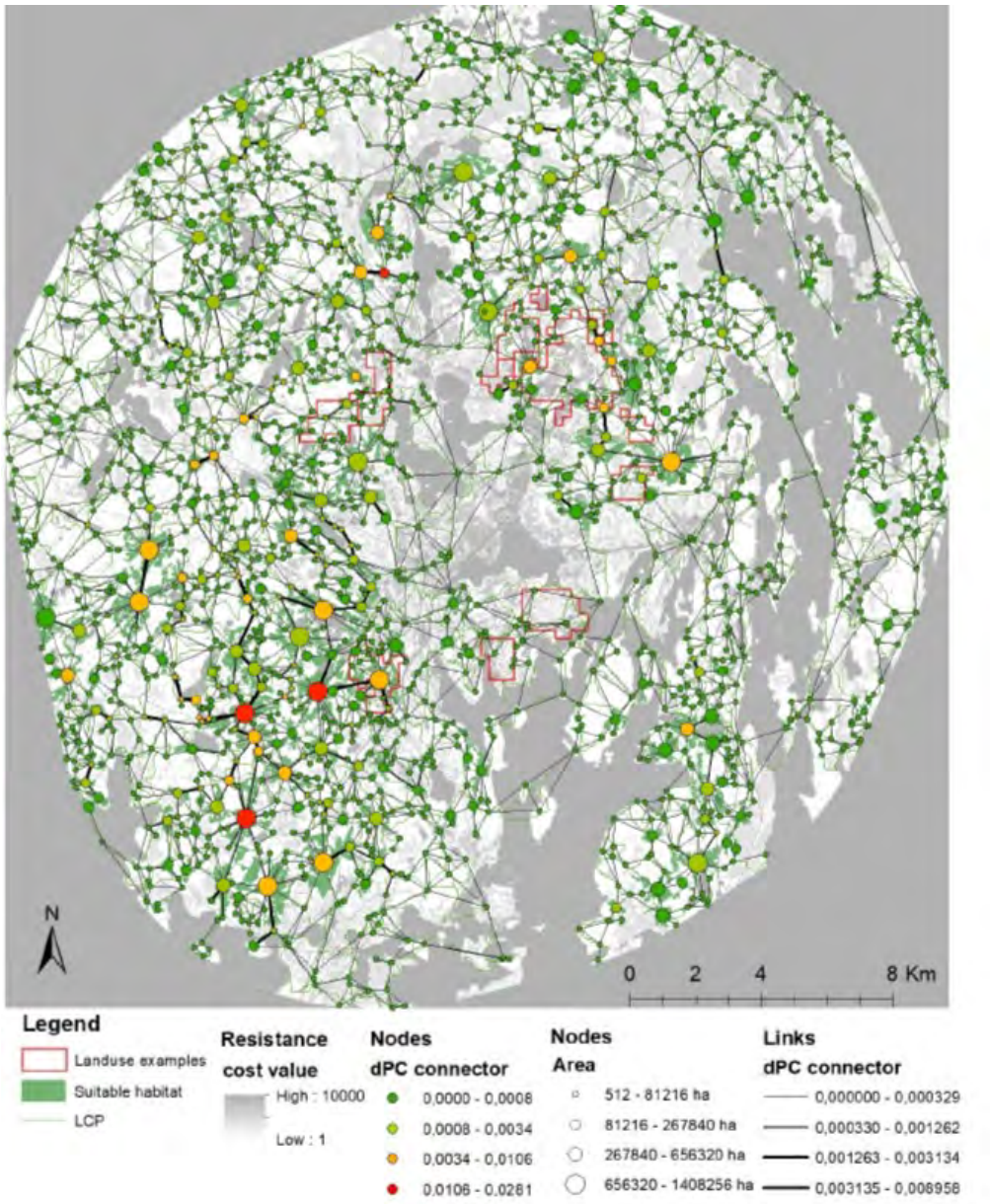
Site map



Action A5: Preparation of plans to support the habitat network in urban areas

The project area covers the whole city area. The aim of the action was to delineate the habitat network of flying squirrel so that this information can be used as a basis of general and city planning. The action proceeded in several steps. In the first phase, the existing data on flying squirrel occurrence (observations, core area information) were gathered and processed so that the data were able to be exploited in upcoming stages. This stage was carried out by a project worker.

In the next stage, data processed in previous stage were passed to an analysis stage. The data were used in Maari Kosma's master thesis. She used graph-theoretic approach to analyse the habitat network of the species at the city level. She mapped suitable habitats for the species using habitat suitability model (HSM). The flying squirrel's moving connections were modelled using resistance-to-movement surface. The least-cost path Analysis with the resistance-to-movement -layer was used to model the connections between habitat patches. Graph analysis was used to calculate connectivity values for individual patches. This enables also to analyse the impact of chosen land-use changes on the habitat network of the species.



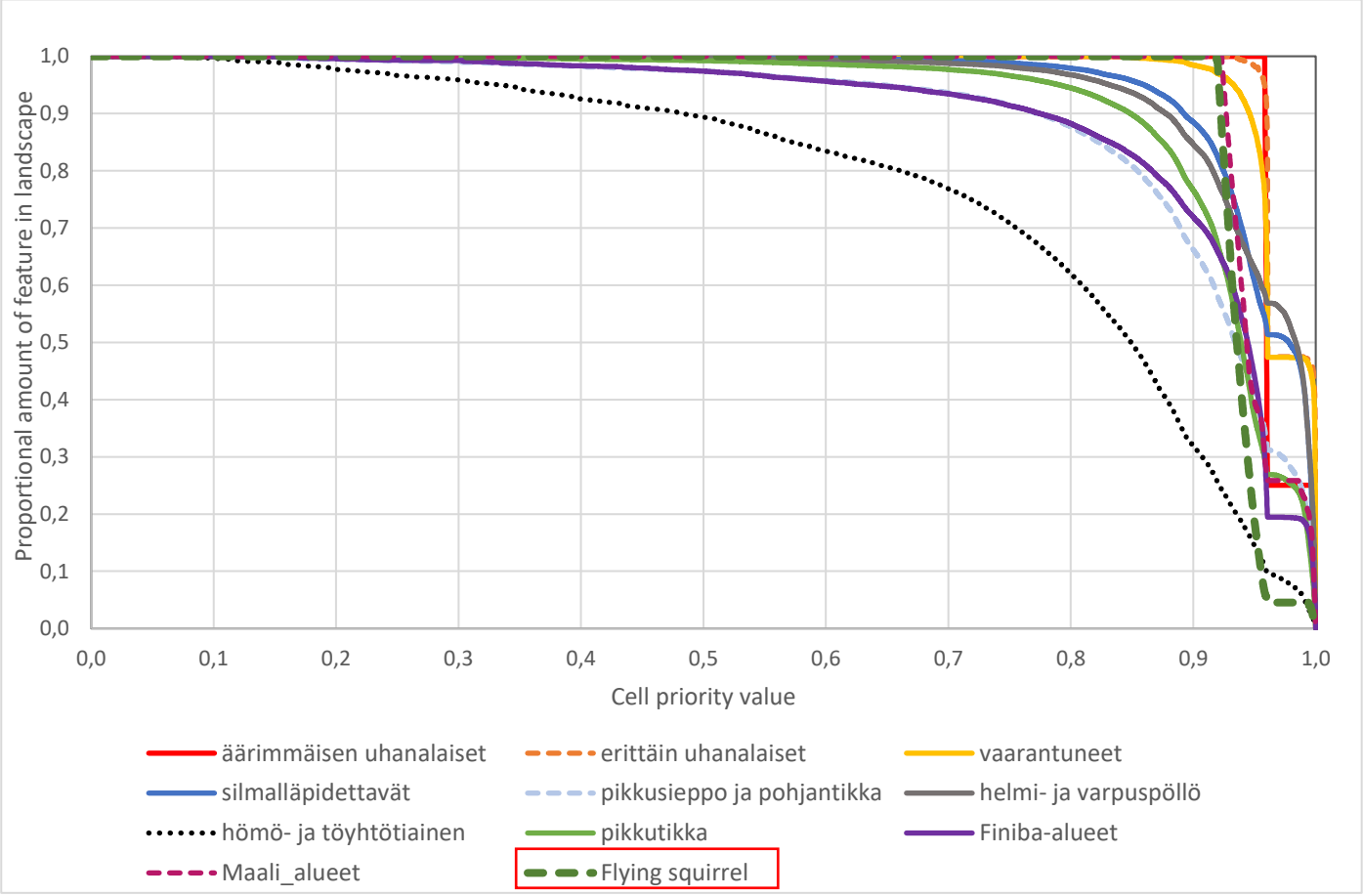
The output map from graph analysis.

The results of master thesis are also published as research article:

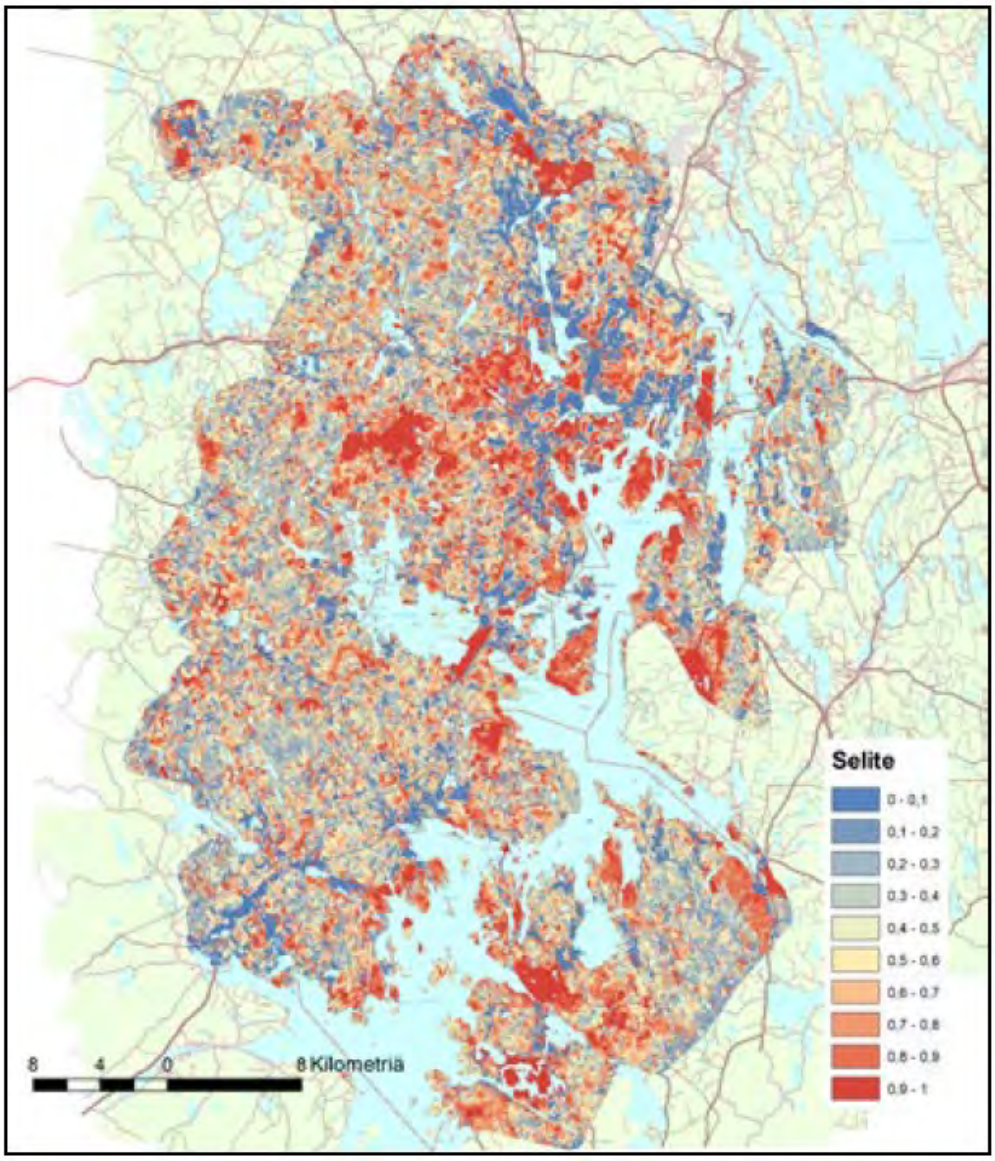
Kosma et al. 2023. No net loss of connectivity. Conserving habitat networks in the context of urban expansion. Landscape and urban planning 239:104847
https://doi.org/10.1016/j.landurbplan.2023.104847

The habitat network was also analysis using expert evaluation. Expert evaluation was carried out by a project worker. As an outcome, especially movement connections of the species were identified in a comprehensive manner.

In the third analysis, information on flying squirrel occurrence was used in the Zonation analysis for the whole city. In this analysis, both information on the occurrence of the species and well as predictive habitat maps created by LUKE in Action A3 were used. The flying squirrel data were fed into the analysis along with other environmental data. The analysis produced a prioritization map and performance curves for different features. More information on Zonation can be found at https://zonationteam.github.io/Zonation5/



Feature curves from the final analysis. Flying squirrel is well represented in the landscape with highest priority values. Its prioritization does not compromise other valuable species values.



The output map from the Zonation analysis prioritizing the landscape in respect to the distribution of nature values.

Results from the previous stages were utilized as a basis for general planning. All analysis results together enabled to take the habitat network of the flying squirrel into account in the strategic general plan covering the whole city area.

The original aim of the action was also to get information on the actual movements of flying squirrel individuals by using GPS -loggers. The loggers were ordered in spring 2024 and the follow-up period was scheduled to the end of summer. However, there was delay in the production of loggers and they were delivered later than expected. For that reason, the GPS-tracking is postponed to after LIFE-action. The area that was supposed to be followed-up with tracked individuals was also partly investigated with the dog inventory conducted in the summer 2024 (with co-operation with action A2). The dog inventory was

targeted at Seminaarinmäki campus area. The dog inventory revealed the area to be unoccupied at the end of the summer. Inventory gave information on the highly used core areas still, but not on the used connections between them. The dog inventory reveaved that the end of summer would have not been possible time for GPS follow-up in that area due to lack of individuals.

Owing to the analysis and data processing done under this action, the FS data basis of the city has remarkably improved. The data have been processed in a comprehensive manner so that new insights on habitat analysis and FS habitat network have been gained. These analysis methods are also transferable to other cities.

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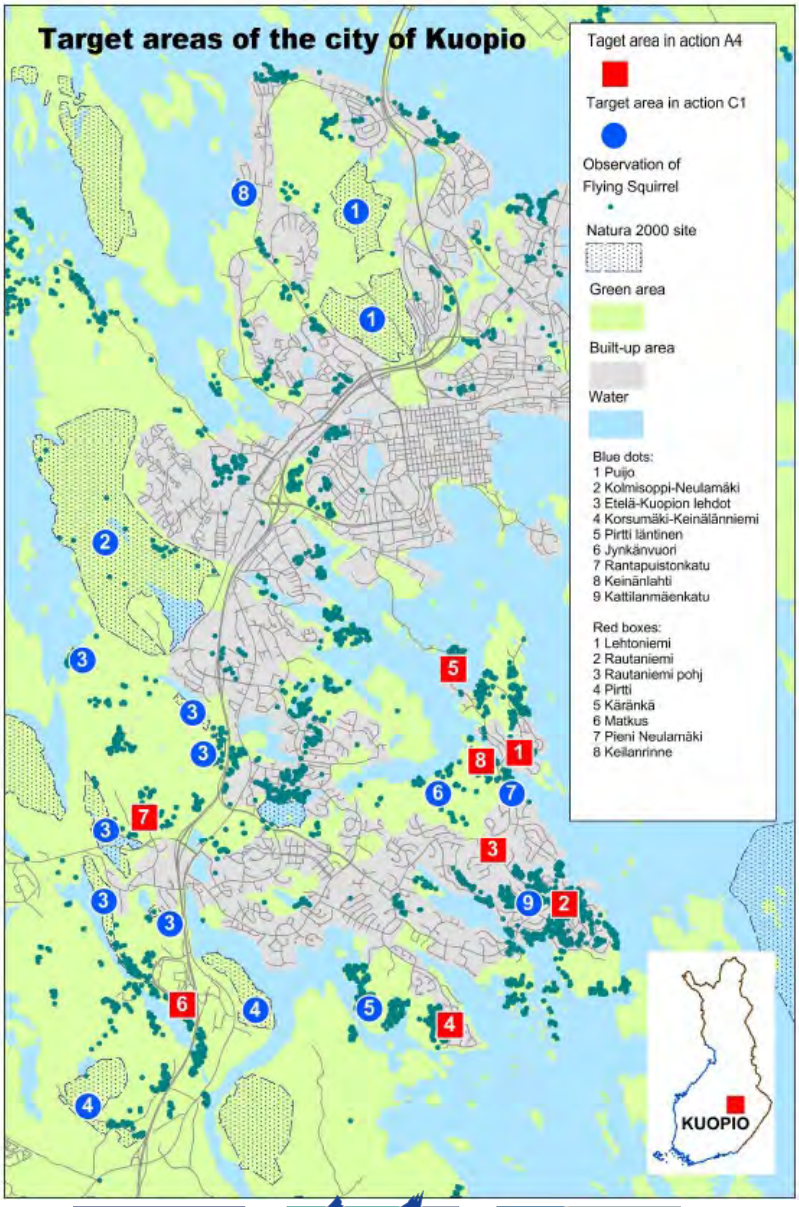
KUOPIO Project sites

Project sites in the city of Kuopio. A5-C1-D1 project sites are marked with blue dots:

1 Puijo
2 Kolmisoppi-Neulamäki
3 Etelä-Kuopion lehdot ja lammet
4 Korsunmäki & Keinälänniemi
5 Pirtti & Pirtti läntinen
6 Jynkänvuori
7 Rantapuistonkatu
8 Keinänlahti
9 Kattilamäenkatu



Life NATURA 2000 Flying Squirrel LIFE

Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Puijo

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Puijo**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **171 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Mainly. The original plan was to plant 150 aspen (*Populus tremula*) saplings into three small openings (150-1000 m²) during autumn 2020. This went well and there was still money left for this action so it was agreed in midterm report 2021 that it would be ok to plant more aspen saplings in the Puijo Natura 2000 area. In autumn 2022 80 more aspen sapling were planted in the Puijo Natura 2000 area.**
Nest boxes were installed mainly as planned. One location was changed from the original plan. Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned.

Was action implemented in the same location than described in the proposal? **Yes. One tree-planting site planned in the Grant Agreement is only partly located within the Puijo Natura 2000 area, but it is within the Puijo nature conservation area. It was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF, that some of the trees can be planted just outside the Natura 2000 site as they will still improve the integrity of the Nature 2000 network.**

Was C-action implemented according to the A-action's plan? **Mainly. One nest box location was changed from the original plan.**

General description of the area

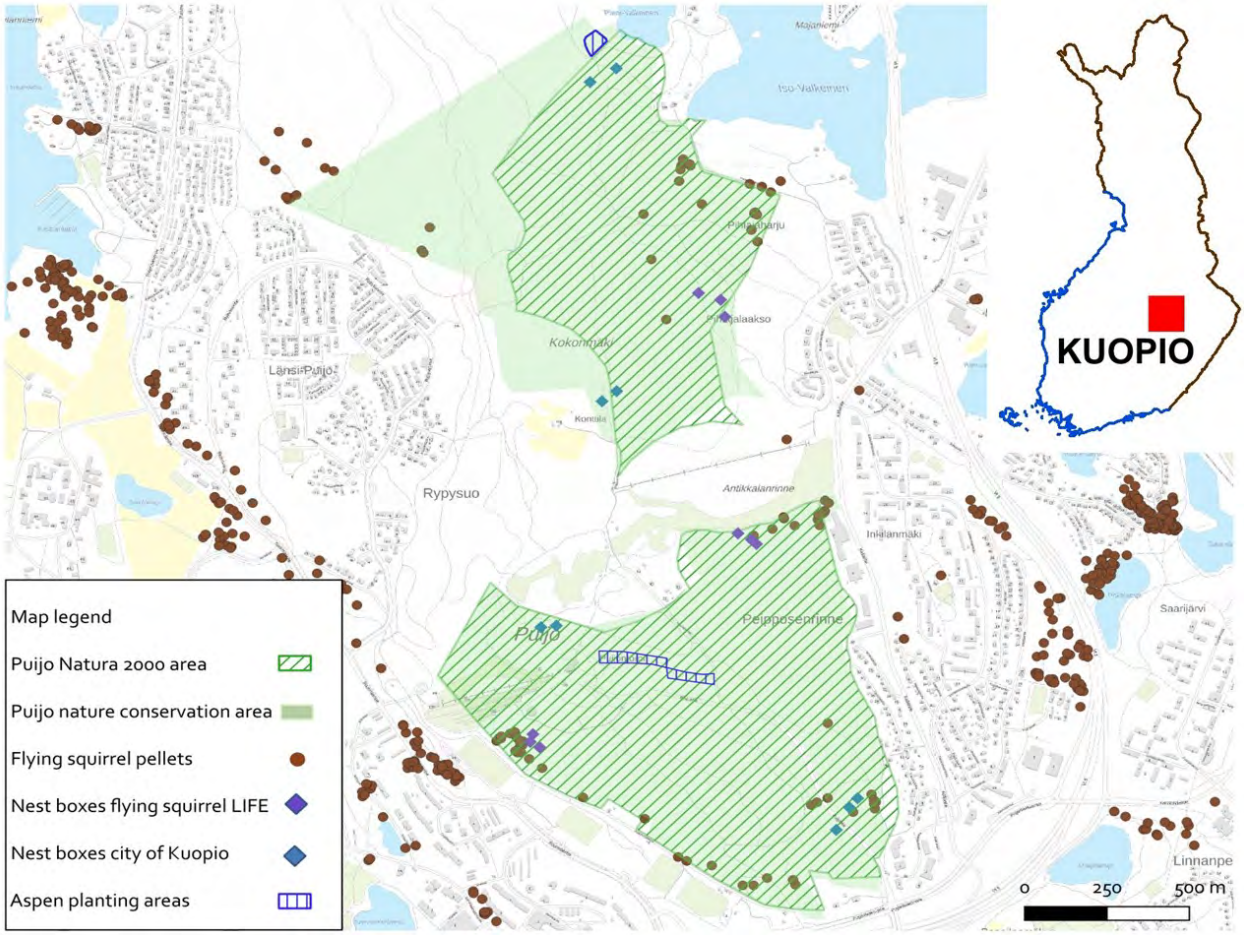
The project site is located in the city of Kuopio in the eastern Finland. Puijo is centrally located and a very popular recreational area in Kuopio. Part of the area has been a nature reserve since 1928. Currently there is 208 hectares of protected forest, most of which is part of the EU's Natura 2000 network. Most of the forests in Puijo area are classified as Fennoscandian herb-rich forests and are mainly spruce (*Picea abies*) dominated. Despite the age structure of forests and the extent of nature reserves, few flying squirrel sightings have been made in Puijo. The reasons for the shortage of flying squirrels in Puijo may be the relative scarcity of

deciduous trees in Puijo area and the predatory pressure caused by martens. Flying squirrels occur in Puijo but mainly closer to the forest edges where there are more deciduous trees than in the middle of the mainly spruce dominated forest.

Planting aspen in Puijo area improves flying squirrel habitat network and promotes the aspen continuity in the long-term. Improvement of flying squirrel habitat and planting of aspens are also mentioned in the management plan of Puijo Natura 2000 area (2016). Three of the aspen planting sites are in the city owned part of the conservation area, Puijo I, and one in Puijo III (parish association property). The planting areas are classified as Fennoscandian herb-rich forests with Picea abies (9050) according to the EU Habitats Directive Annex I. The representativeness of the habitat in Puijo I is insignificant because the original herb-rich forest has been replaced by a spruce plantation. The representativeness of the habitat type in the northern area of Puijo III is good, although the natural state of the area has deteriorated because of the removal of decaying wood. The aspen plantings improve the quality of the habitat type in both areas, especially in Puijo I, as the natural regeneration of deciduous trees in the middle of a spruce dominated forest is low and uncertain. Aspen is also an important tree for general forest biodiversity.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by hanging nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against the predators specially pine marten.

Site map



Action A5

One tree-planting site planned in the Grant Agreement was only partly located within the Puijo Natura 2000 area, but it is within the Puijo nature conservation area. It was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF, that some of the trees can be planted just outside the Natura 2000 site as they will still improve the integrity of the Nature 2000 network.

The aim of the planting aspens was to improve flying squirrel habitat network and promote aspen continuity in the Puijo area in the long-term. There were some changes in the plan presented in the proposal and in the implemented plan. The original plan was to plant 150 aspen (*Populus tremula*) saplings into three small openings (150-1000 m²) during autumn 2020. This went well and there was still money left for this action so it was agreed in midterm report 2021 that it would be ok to plant more aspen saplings in Puijo nature conservation area. In autumn 2022 80 more aspen sapling were planted in Puijo I area. Aspen saplings were planted into three small openings. Two of the openings were the same ones used in 2020 and third planting site was a small opening situated just below the previous two.

Flying squirrel pellet surveys were made in the spring 2019 and the nest boxes suitable for the flying squirrel were placed in the vicinity of pellet sightings during summer 2019 in the hope that safe nesting sites will enable flying squirrels to settle in Puijo. Nest boxes were installed into three different locations in Puijo area, three boxes in each place so altogether nine boxes were installed. Nest boxes were installed mainly as planned. One location was changed from the original plan. Three different nest box types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line.

Action C1

The planting of aspen sapling was carried out in autumns 2020 and 2022 according to the plan created in action A5. Planted trees were protected against herbivores.

Installing of nestboxes was done mainly according to the plan created in action A5. One location was changed from the original plan.

Action D1

The planted trees were monitored annually from 2021 to 2024.

Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned. Monitoring of the nest boxes was cheaper than originally estimated so no extra money was used.

Flying squirrel pellet inventories were made in 2019, 2020, 2021 and 2023 to get a better picture of the flying squirrel occurrence in the Puijo area.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the planted aspens at relevant intervals as part of the normal work. The protectors will be removed when trees have grown big enough.

The flying squirrel occupancy and the use of nestboxes in the area will be monitored at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Puijo tree planting sites improve flying squirrel habitat network and promote the aspen continuity in the long-term by creating new habitat for flying squirrels in the future. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	171	-	-	1,8	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**171**	**-**	**-**	**1,8**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Kolmisoppi-Neulamäki

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Kolmisoppi-Neulamäki**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **426 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Yes. Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned.**

Was action implemented in the same location than described in the proposal? **Yes**

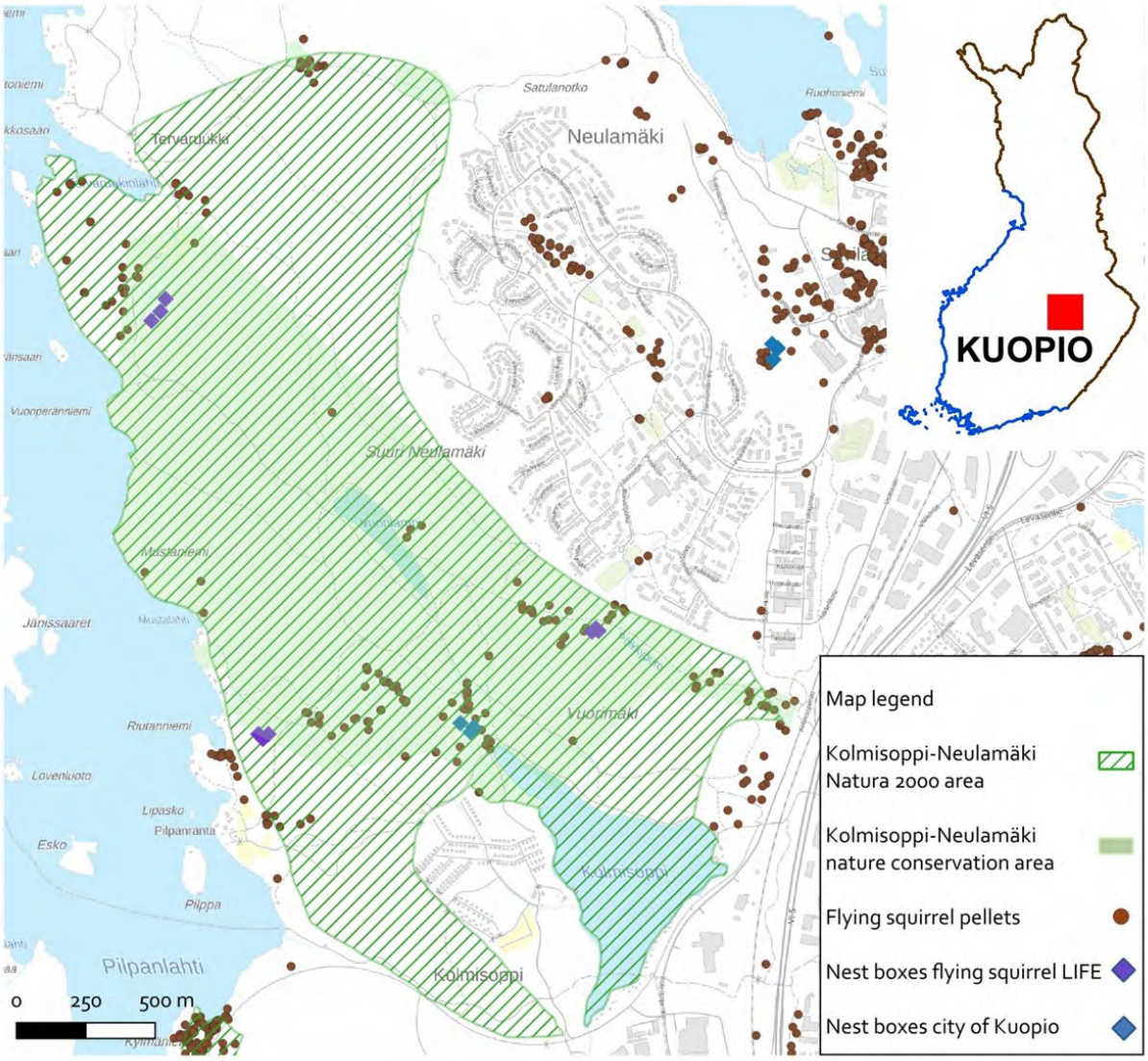
Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. Kolmisoppi-Neulamäki is located west from the city center, and it is a very popular recreational area in Kuopio. The Kolmisoppi-Neulamäki nature reserve covers approximately 230 hectares. The Natura 2000 area is bigger covering altogether 426 hectares. The Kolmisoppi-Neulamäki area is known for its diverse herb-rich forest and rock vegetation. So far, more than 500 plant species have been found in the area, of which approximately 300 are vascular plants. Approximately half of the forests in the Kolmisoppi-Neulamäki area are classified as Fennoscandian herb-rich forests and are mainly spruce (*Picea abies*) dominated. Rest of the forest are classified as western taiga. Also, siliceous and calcareous rocky slopes occur. Flying squirrels have been observed in the area but they are not very common.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by hanging nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against predators specially pine marten.

Site map



Action A5

The aim of installing nest boxes was to offer save nesting places for the flying squirrel in the hope that safe nesting places will enable flying squirrels to settle in the area.

Flying squirrel pellet surveys were made in spring 2019. There were already flying squirrel nest boxes in the area where pellets were found so there was no need to place new nest boxes there. Instead, nest boxes were placed into three different locations in the Kolmisoppi-Neulamäki area that had suitable habitat for the flying squirrel. Two of the sites were also chosen because they were situated in the vicinity of two recreation cottages that are open for everyone, and these sites can be used for nature education. Nest boxes were installed during summer 2019 three boxes in each place so altogether nine nest boxes were installed. Three different nest box types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line.

Action C1

Installing of nest boxes was done according to the plan created in action A5.

Action D1

Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned. Monitoring of the nest boxes was cheaper than originally estimated so no extra money was used.

Flying squirrel pellet inventories were made in 2019, 2020, 2021 and 2023 to get a better picture of the flying squirrel occurrence in the Kolmisoppi-Neulamäki Natura 2000 area.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy and the use of nestboxes in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effect. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	426	-	-	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**426**	**-**	**-**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **315 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Mainly. Vanuvuori nature conservation area was added later to the plans due to land transaction, but it is part of the Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori Natura 2000 area, which was already a project area. The addition of the Vanuvuori area was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF.**
Installing of nest boxes was done one year later (2020) in the Vanuvuori area than in the other areas. Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned.

Was action implemented in the same location than described in the proposal? **Yes**

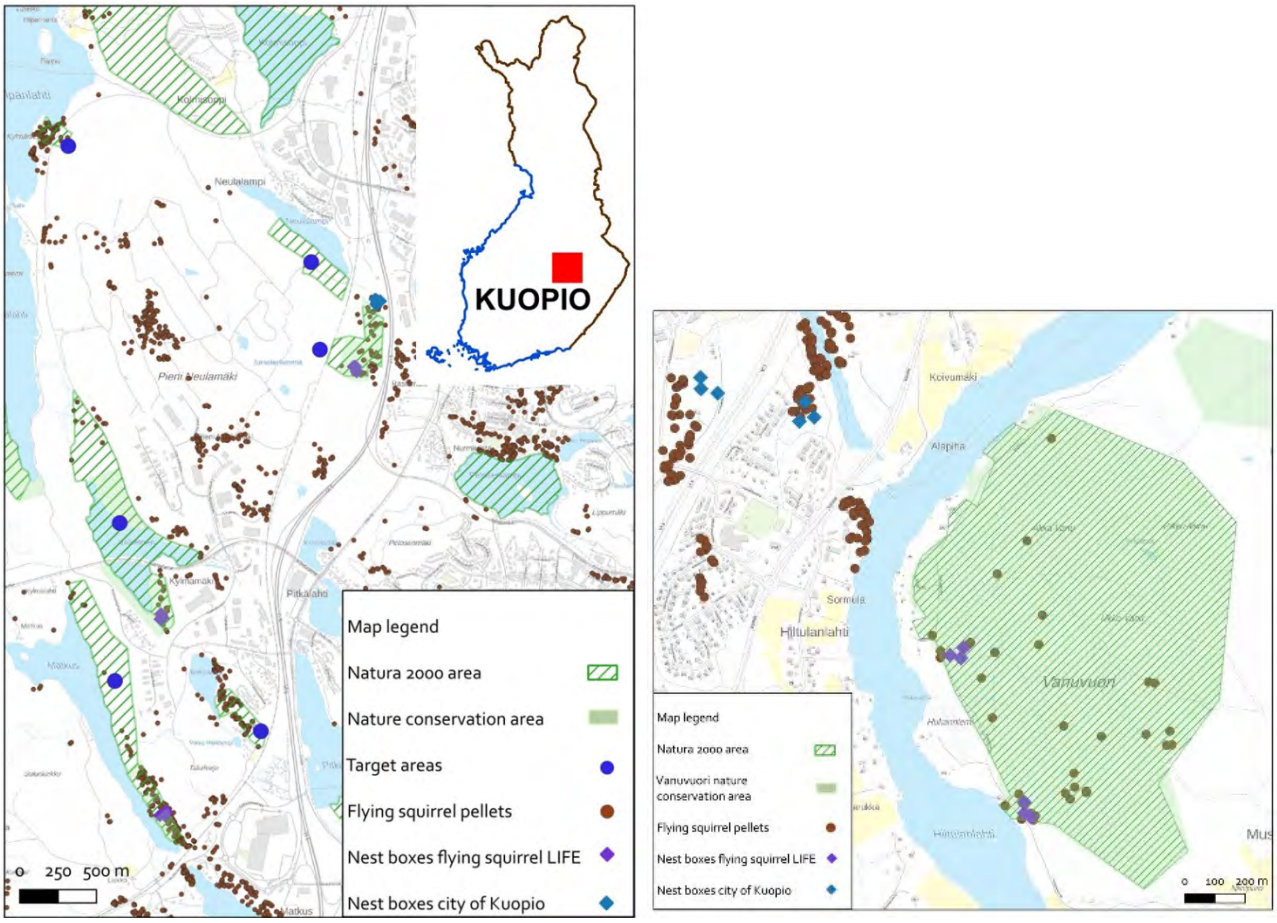
Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. The Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori Natura 2000 area is located south from the city center, and it covers 315 hectares. It consists of 11 separate nature conservation areas. The sites are quite small but have valuable nature. Vanuvuori is the biggest nature conservation site covering 125 hectares. Forests in the area are mainly classified as Fennoscandian herb-rich forests dominated by spruce (*Picea abies*) but also western taiga forest occur specially in the Vanuvuori area. Flying squirrels occur in the area.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by installing nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against predators specially pine marten.

Site maps



Map of the Etelä-Kuopion lehdot ja lammet, Vanuvuori (on the right) ja Haminavuori Natura 2000 area.

Action A5

The aim of installing nest boxes was to offer save nesting places for flying squirrel and increase attractiveness of the protected areas as habitats for flying squirrels, while also aiming to compensate for the reduction of forests and fragmentation of habitats that has occurred in the surrounding environment.

Flying squirrel pellet surveys were made in spring 2019 and in Vanuvuori 2020. Nest boxes were placed into five different sites in the Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori Natura 2000 area that had suitable habitat for the flying squirrel. Nest boxes were installed at three different sites during summer 2019. In 2020, nest boxes were installed in two locations in the Vanuvuori nature reserve. In each location three nest boxes were installed so altogether 15 nest boxes were installed. Three different nest box types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line. Vanuvuori was added later to the plan due to land transaction, which is why the nest boxes at this site were installed on a different schedule than on the other sites. The addition of Vanuvuori area was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF.

Action C1

Installing of nest boxes was done according to the plan created in action A5.

Action D1

Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned. Monitoring of the nest boxes was cheaper than originally estimated so no extra money was used.

Flying squirrel pellet inventories were made in 2019, 2020, 2021 and 2023 to get a better picture of the flying squirrel occurrence in the Etelä-Kuopion lehdot ja lammet, Vanuvuori ja Haminavuori Natura 2000 area.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy and the use of nestboxes in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effect. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	315	-	-	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**315**	**-**	**-**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Korsunmäki ja Keinälänniemi

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Korsunmäki ja Keinälänniemi**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **105 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Mainly. Nest boxes were installed mainly as planned. In Keinälänniemi nature reserve nest box location was changed from the original plan and the nest boxes were installed during autumn 2021. Nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned except boxes in Keinälänniemi, which were monitored during 2022 - 2024.**

Was action implemented in the same location than described in the proposal? **Yes**

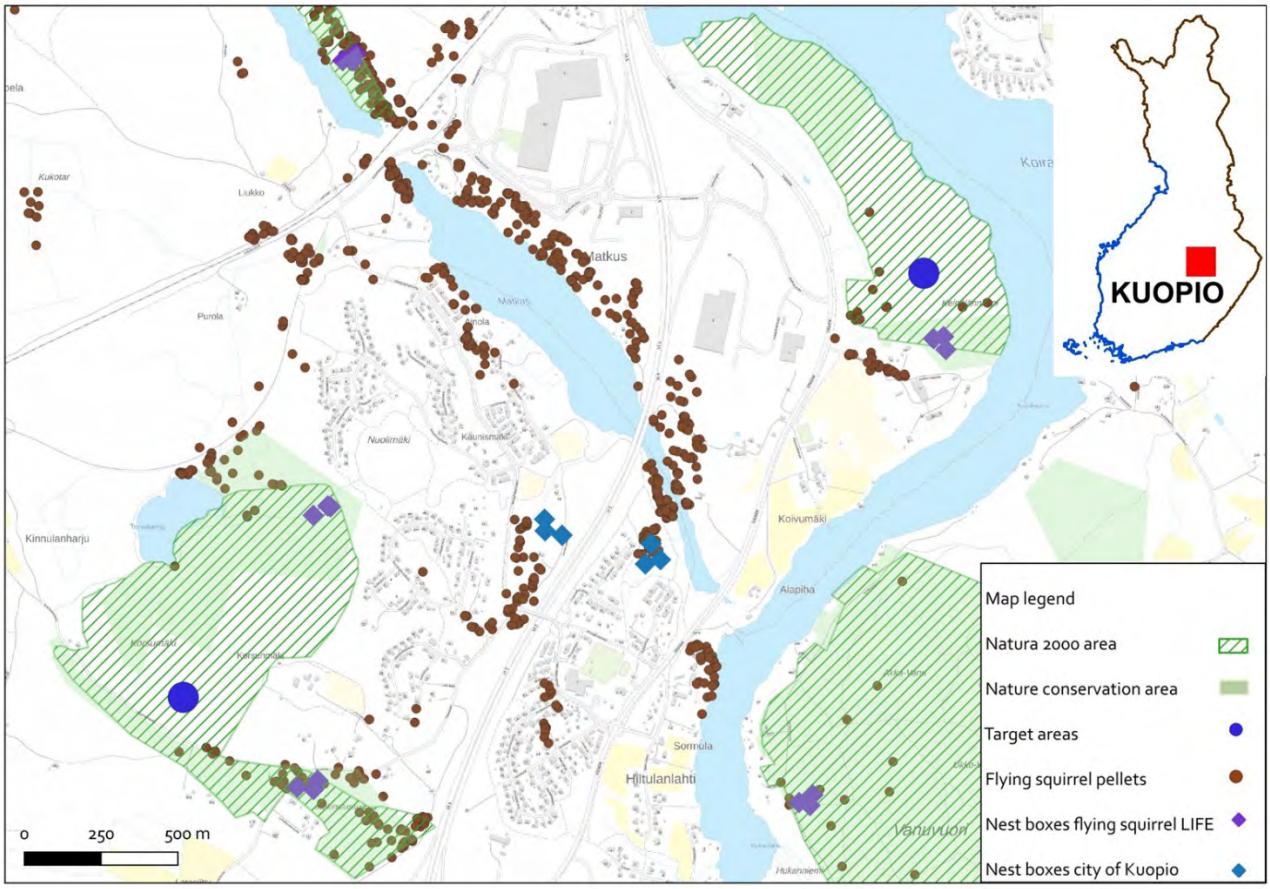
Was C-action implemented according to the A-action's plan? **Mainly. One nest box location was changed from the original plan.**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. The Korsunmäki ja Keinälänniemi Natura 2000 area is located south from the city center, and it covers 105 hectares. It consists of 4 separate nature conservation areas and Natura 2000 area connecting them. The sites are quite small but have valuable nature. Forests in the area are mainly classified as Fennoscandian herb-rich forests dominated by spruce (*Picea abies*) but also western taiga forest occur. Flying squirrels occur in the area.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by installing nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against predators specially pine marten.

Site maps



Action A5

The aim of installing nest boxes was to offer save nesting places for flying squirrel and increase attractiveness of the protected areas as habitats for flying squirrels, while also aiming to compensate for the reduction of forests and fragmentation of habitats that has occurred in the surrounding environment.

Nest boxes were placed into three different locations that had suitable habitat for the flying squirrel and flying squirrel pellet observations nearby. Nest boxes were installed at two different sites in Korsunmäki area during summer 2019 and in one area in Keinälänniemi during autumn 2021 after Metsähallitus Parks & Wildlife Finland gave permission to instal nest boxes to state owned nature protection area. In each location three nest boxes were installed so altogether nine nest boxes were installed. Three different nest box types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line.

Action C1

Installing of nest boxes was done according to the plan created in action A5 in Korsunmäki area. In Keinälänniemi nature reserve nest box location was changed from the A5 plan to a supposedly better area for the flying squirrel.

Action D1

In Korsunmäki area nest boxes were monitored for five years 2020 - 2024 instead of three years originally planned. In Keinälänniemi area nest boxes were monitored for 2022 – 2024.

Flying squirrel pellet inventories were made in 2019, 2020, 2021 and 2023 to get a better picture of the flying squirrel occurrence in the Korsunmäki ja Keinälänniemi Natura 2000 area.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy and the use of nestboxes in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effect. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	105	-	-	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**105**	**-**	**-**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Pirtti and Pirtti läntinen

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Pirtti and Pirtti läntinen**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **Pirtti 125 ha + Pirtti läntinen 72 ha = total 197 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Partly. The forestry actions were done in both the Pirtti and the Pirtti läntinen area instead of just in the Pirtti läntinen area as originally planned. The amount of removed trees was smaller than originally planned. Nest boxes were installed into five different locations. One nest box location changed from the Pirtti läntinen area to the Pirtti area. Nest boxes were monitored for five years instead of three years originally planned.**

Was action implemented in the same location than described in the proposal? **Mainly. The plan for forestry actions in the Pirtti läntinen project area was prepared for a larger area (115 ha) than planned in the Grant Agreement (72 ha) and it included part of the Pirtti area. The increase of the area was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF.**

Was C-action implemented according to the A-action's plan? **Mainly. There were minor changes in the forest management plan and in the implemented plan. In 5 sites (out of 50) planned forestry actions were not done and in 7 sites forestry actions were done by lumbermen instead of a forest machine.**

General description of the area

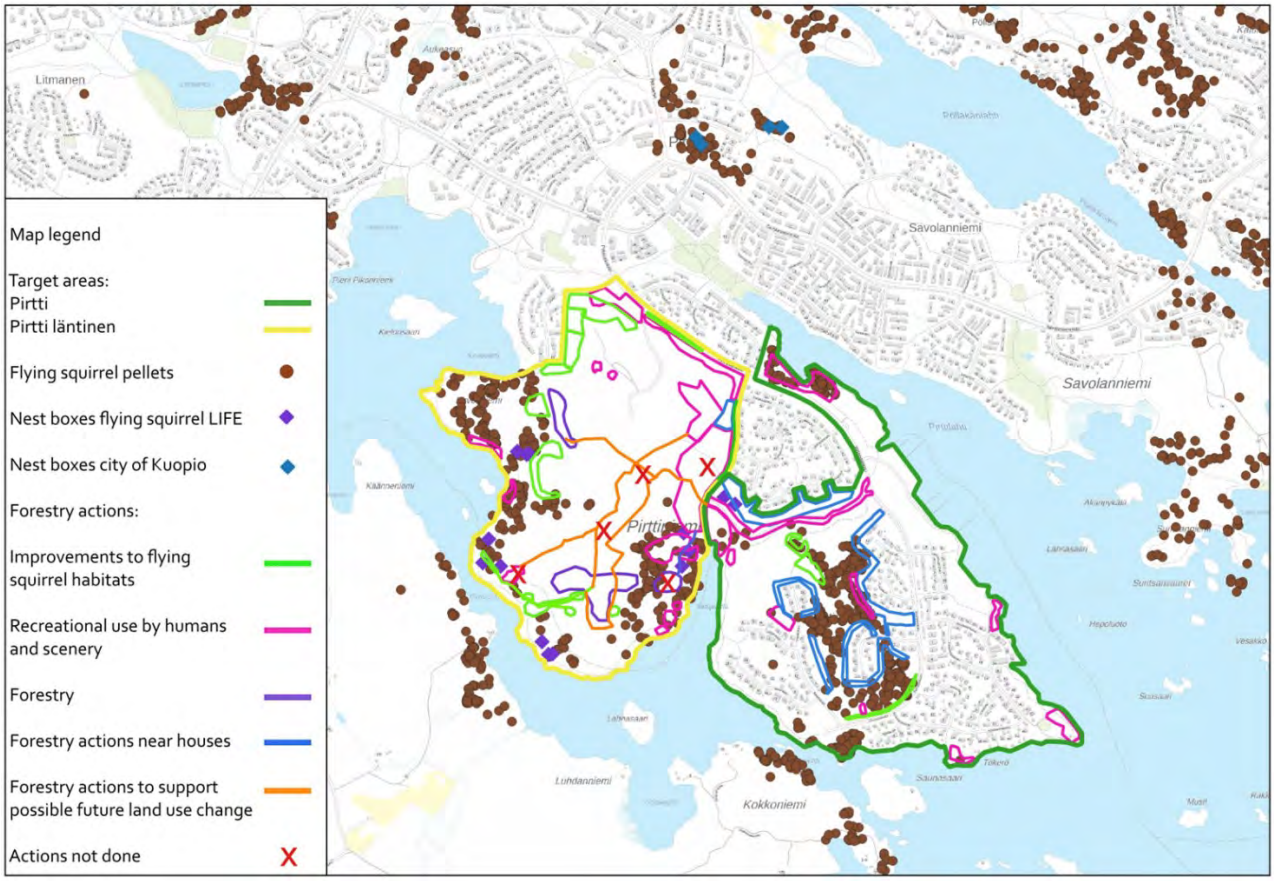
The project site is located in the city of Kuopio in the eastern Finland. The Pirtti and the Pirtti läntinen areas are located next to each other in an area called Saaristokaupunki, which is situated south from the central city area and surrounded by lake Kallavesi. Pirtti area is a newly built residential area. In the master plan, Pirtti läntinen area is marked partly as a green area (V) and partly as a possible future land use change area for supplementary building (SE/A). Currently Pirtti läntinen area is a popular recreational area.

The forests in Pirttin läntinen area are diverse and consists of herb-rich forest and older spruce dominated forests, with some very nice areas with older trees, decaying wood and different tree species. Most of the

forest are suitable for the flying squirrel. Based on pellet surveys there are several flying squirrel habitats in Pirtti läntinen and Pirtti areas.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by installing nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against predators specially pine marten.

Site map



Action A5

The plan for forestry actions in Pirtti läntinen project area was prepared for a larger area (115 ha) than originally planned in the Grant Agreement (70 ha) and it included part of Pirtti area. The increase of the area was accepted in the letter LIFE17 NAT FI 000469 MTR1LET 210510_AF. In the proposal the area is presented in the maps Action A4 Kuopio, Pirtti and Action C1 Kuopio, Pirtti läntinen.

The aim of the forest management plan was to harmonize the habitat requirements of the flying squirrel with the wishes of recreational users and local residents as effectively as possible. Different factors were emphasized in various areas. For instance, in the most critical areas of the flying squirrel's habitats, known as core areas, only actions that do not degrade the flying squirrel's habitat could be undertaken. Flying squirrel pellet survey from spring 2019 and older observations were used than planning forestry actions. Also, other nature values in the area were taken into account. The wishes of recreational users were considered in the

vicinity of paths and routes, and residents' wishes were considered near houses. Questionary for the residents of the area was done during winter 2020.

Forestry actions were classified into five main categories: improvements to potential flying squirrel habitats, improvements to recreational use by humans and scenery, forestry actions, forestry actions near houses and forestry actions to support possible future land use change. Forest management measures planned were mainly small-scale thinning and small-gap felling, which increases the growth space of deciduous trees and saves the most robust trees. Heavy felling was not planned in the area. Permission for the forestry actions in the area was applied during spring 2020.

Flying squirrel pellet surveys were made in spring 2019. The nest boxes suitable for the flying squirrel were installed in the vicinity of pellet sightings in four different locations during summer 2019 in Pirtti läntinen area. In Pirtti area nest boxes were installed in one location and the location was chosen so that it would encourage flying squirrels to move closer to the bigger forested area from the densely build residential area. Three boxes were installed in each location. Three different nestbox types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line. Nest boxes were monitored for five years (2020 – 2024) instead of three years (2020, 2021 and 2022) originally planned.

Flying squirrel inventories were made in Pirtti and Pirtti läntinen area between years 2019 – 2024 to get a better picture of the flying squirrel occurrence in the area.

Action C1

The forest management actions were carried out during autumn 2020 and autumn 2021 mainly according to the plan created in action A5. There were some minor changes in the forest management plan and in the implemented plan. In 5 sites (out of 50) planned forestry actions could not be done and in 7 sites forestry actions were done by lumbermen instead of a forest machine. Four of the planned sites were not done because the plans of the city of Kuopio changed for the Pirtti läntinen area after the urban forest management plan was done. The current plan is to save most of the forests in the Pirtti läntinen area as a recreational area for citizens, instead of building new houses, and therefore there was no need for harvesting in those areas anymore.

The autumn 2020 when the main forestry actions were started was very wet and some planned areas could not be reached by forest machine. Work continued during autumn 2021 when actions for improving flying squirrel habitats in seven remaining sites were done by lumbermen instead of a forest machine. Actions were done by felling and girdling existing spruces to give more space for deciduous trees (especially aspen) to grow. Felled trees were left in the forest. No forestry actions were done during nesting season of flying squirrel or birds.

Installing of nestboxes was done according to the plan created in action A5.

Action D1

Flying squirrel pellet inventories were made between years 2019 – 2024.

Nest boxes were monitored for five years (2020 – 2024) instead of three years (2020, 2021 and 2022) originally planned. Monitoring of the nest boxes was cheaper than originally estimated so no extra money was used.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy and the use of nestboxes in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Careful forest management actions in Pirtti and Pirtti läntinen area aimed to maintain ecologically functional areas for the flying squirrel as a long-term conservation effect, while securing the recreational values of the highly used urban forest. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	197	-	-	-	115
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**197**	**-**	**-**	**-**	**115**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Jynkänvuori

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Jynkänvuori**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **133**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Mainly. The amount of removed trees was smaller than originally planned. Nest boxes were installed as planned. Nest boxes were monitored for five years instead of three years originally planned.**

Was action implemented in the same location than described in the proposal? **Yes**

Was C-action implemented according to the A-action's plan? **Mainly. There were minor changes in the forest management plan and in the implemented plan. In 4 sites (out of 36) planned forestry actions could not be done and in 4 sites forestry actions were done by lumbermen instead of a forest machine. On one site it was possible to do only half of the site.**

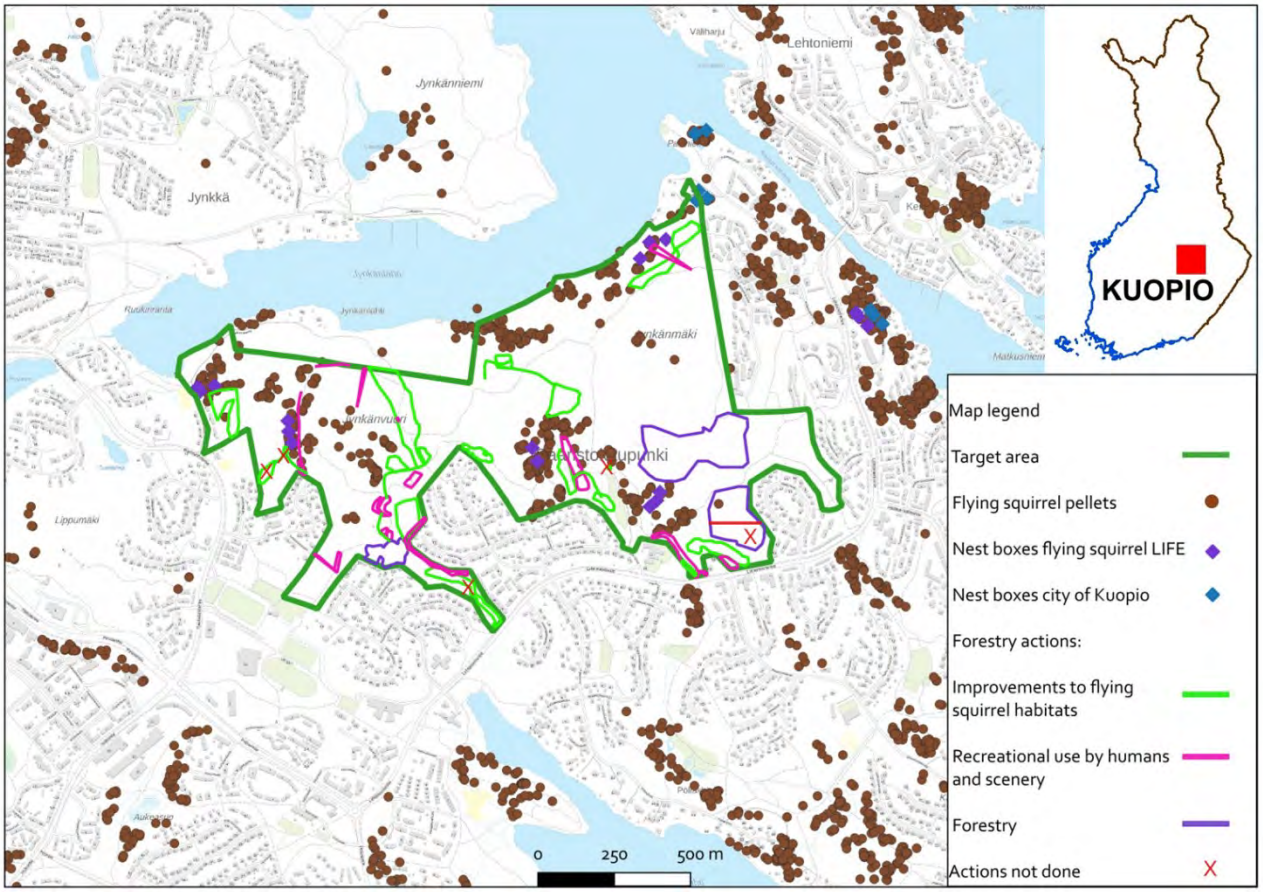
General description of the area

The project site is located in the city of Kuopio in the eastern Finland. Jynkänvuori is located in an area called Saaristokaupunki, which is situated south from the central city area and surrounded by lake Kallavesi. Jynkänvuori area is surrounded by newly built residential area. In the master plan, the Jynkänvuori area is marked as a green area (V) and an area for sports and recreational services (VU). Jynkänvuori is one the largest forest areas in central Kuopio, and it is a popular recreational area. There are several kilometers of hiking trails and ski tracks during winter. In the forest area there are forest paths, where people can run, walk or mountain bike.

The Jynkänvuori area consists of younger and older forest, with some very nice areas with older trees, decaying wood and different tree species. Most of the forest are suitable for the flying squirrel with mixture of pine and deciduous trees. Based on pellet surveys there are several flying squirrel habitats in the forests of Jynkänvuori.

Installing nest boxes can be used to strengthen attractiveness of the site for flying squirrels. Also, the lack of suitable natural nesting sites (natural burrows and squirrel nests) can be compensated for by installing nest boxes suitable for flying squirrels. Nest boxes also offer a safe nesting place against predators specially pine marten.

Site map



Action A5

In the forest management plan for Jynkänvuori the aim was to harmonize the habitat requirements of the flying squirrel with the wishes of recreational users and local residents as effectively as possible. Different factors were emphasized in various areas. For instance, in the most critical areas of the flying squirrel's habitats, known as core areas, only actions that do not degrade the flying squirrel's habitat could be undertaken. Flying squirrel pellet survey from spring 2019 and older observations were used than planning forestry actions. Also, other nature values in the area were taken into account. The wishes of recreational users were considered in the vicinity of paths and routes, and residents' wishes were considered near houses. Questionary for the residents of the area was done during winter 2020.

Forestry actions were classified into three main categories: improvements to potential flying squirrel habitats, improvements to recreational use by humans and scenery and forestry actions. Forest management measures planned were small-scale thinning and small-gap felling, which increases the growth space of deciduous trees and saves the most robust trees. Heavy felling was not planned in the area. Permission for the forestry actions in the area was applied during spring 2020.

Flying squirrel pellet surveys were made in spring 2019 and the nest boxes suitable for the flying squirrel were installed in the vicinity of pellet sightings during summer 2019. Few places were chosen close to the forest edges to compensate for degraded habitats. Nest boxes were installed into five different locations in Jynkänvuori area, three boxes in each place. Three different nestbox types were used: Robust timber box with a thick front wall, drilled ´cylinder´ in a log and a lean board timber box with a double floor system, a thin wall and a hole near the bottom line.

Action C1

The forest management actions were carried out during autumn 2020 and autumn 2022 mainly according to the plan created in action A5. There were some minor changes in the forest management plan and in the implemented plan. In four sites (out of 36) planned forestry actions could not be done and in 4 sites forestry actions were done by lumbermen instead of a forest machine. On one site it was possible to do only half of the site.

The autumn 2020 when the main forestry actions were started was very wet and some planned areas could not be reached by forest machine. Work continued during autumn 2022 when actions for improving flying squirrel habitats in four remaining sites were done by lumbermen instead of a forest machine. Actions were done by felling and girdling existing spruces to give more space for deciduous trees (especially aspen) to grow. Felled trees were left in the forest. No forestry actions were done during nesting season of flying squirrel or birds.

Installing of nestboxes was done according to the plan created in action A5.

Action D1

Flying squirrel pellet inventories were made between years 2019 – 2024.

Nest boxes were monitored for five years (2020 – 2024) instead of three years (2020, 2021 and 2022) originally planned. Monitoring of the nest boxes was cheaper than originally estimated so no extra money was used.

Detailed plan for monitoring was presented in the Annex 4_Issue 20_Action D1_Detailed plan for monitoring_MHPWF.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy and the use of nestboxes in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Careful forest management actions in the Jynkänvuori area aimed to maintain ecologically functional areas for the flying squirrel as a long-term conservation effect, while securing the recreational values of the highly used urban forest. Installing nest boxes will strengthen the attractiveness of the sites for flying squirrels and offer safe nesting places.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	133	-	-	-	133
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**133**	**-**	**-**	**-**	**133**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Rantapuistonkatu

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Rantapuistonkatu**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **0,2 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **Partly. The original plan was to plant 65 new trees along the street Rantapuistonkatu but due to new pipelines this could not be done at the western end of Rantapuistonkatu. In the updated plan 44 trees were planted along Rantapuistonkatu excluding the western end of the street to improve flying squirrel moving connection.**

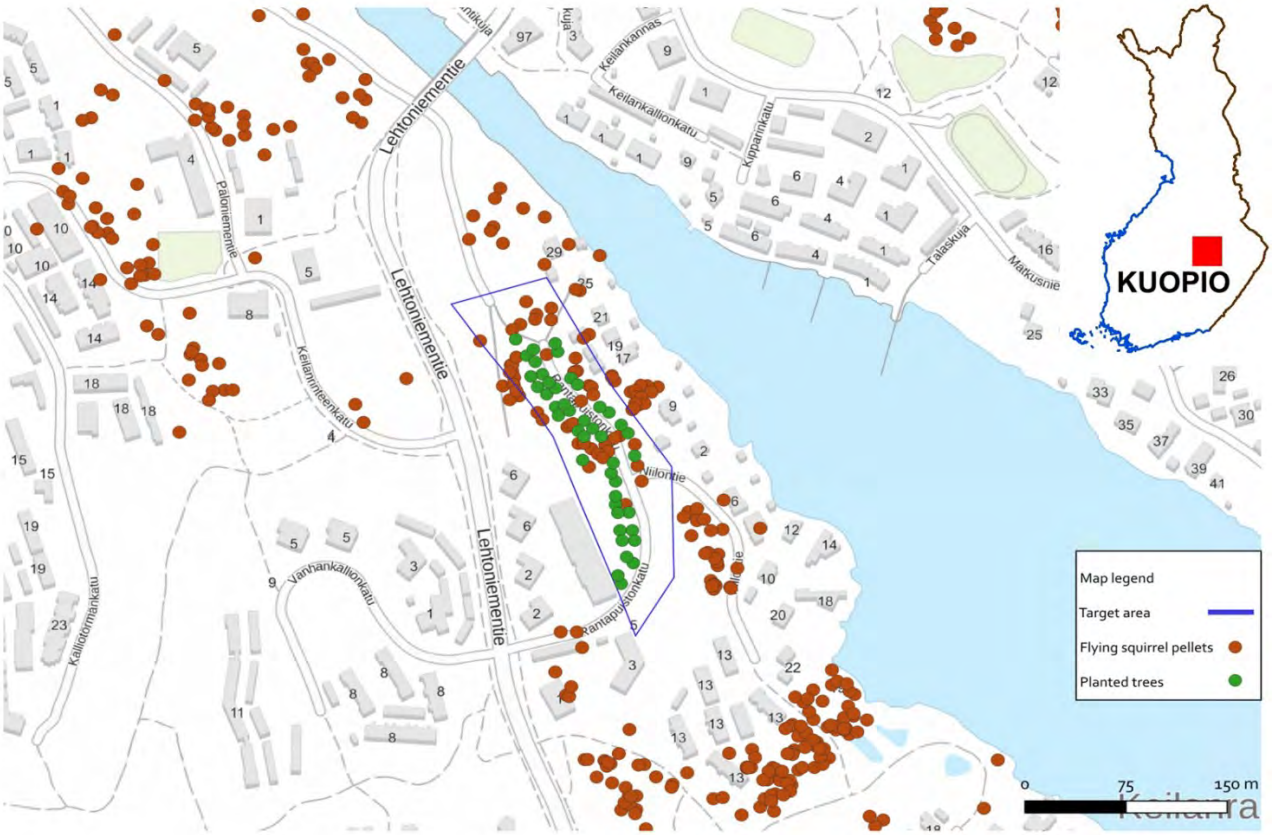
Was action implemented in the same location than described in the proposal? **Yes**

Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. Rantapuistonkatu is located in an area called Saaristokaupunki, which is situated south from the central city area and surrounded by lake Kallavesi. The area is newly built residential area. There are flying squirrel habitats on both sides of the street Rantapuistonkatu and the area has been recognized to be important flying squirrel area. During the building process large number of trees have to be cut down from the area. In this project trees are planted along the street Rantapuistonkatu to improve flying squirrel moving connection.

Site map



Action A5

The aim was to support flying squirrel moving connection between two known flying squirrel habitats in newly built residential area. There were some changes in the plan presented in the proposal and in the implemented plan. The original plan was to plant 65 new trees along the street Rantapuistonkatu but due to new pipelines that were put on to different place than originally planned this could not be done on the western end of the street Rantapuistonkatu. There were also some minor chances on the locations of the planted trees and few trees were not planted because of changes in already build house locations. In the updated plan 44 trees were planted along Rantapuistonkatu excluding the western end of the street to improve flying squirrel moving connection. Five different tree species were used (common alder *Alnus glutinosa*, ash *Fraxinus excelsior*, aspen *Populus tremula*, goat willow *Salix caprea* and wych elm *Ulmus glabra*). These species were chosen so that they would adjust to surrounding activities and trees that were already in the area. Residents' opinions were heard about the tree species that were planted close to houses. Only species that would grow higher than ten meters were used.

Flying squirrel inventories were made in the area in 2019 and 2020 as part of A4-C1-D1 project action change. Inventories confirmed that flying squirrels still occurred in the area.

Action C1

Planting was carried out in autumn 2020 according to the plan created in action A5. Planted trees were protected against herbivores.

Action D1

The planted trees were taken care of and monitored two years after planting. After this two-year period the monitoring continued annually for years 2023 and 2024. Only the condition of the planted trees was monitored since it takes many years for trees to grow high enough for flying squirrel to use them.

Monitoring after the project

City of Kuopio will continue monitoring the flying squirrel occupancy in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Rantapuistonkatu tree planting site supports the moving connection of flying squirrel by decreasing barriers between two known flying squirrel habitats.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	0,2	-	0,2	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**0,2**	**-**	**0,2**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Keinänlahti

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Keinänlahti**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **0,2 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **No. In the original plan the idea was to support flying squirrel moving connection by planting new birches next to the pedestrian sidewalk to replace the trees that were planned to be cut down during the building proses of the recreational area. Then the more detailed planning started it was however possible to save these trees. In the updated plan 14 trees were planted on the park area to improve flying squirrel moving connection.**

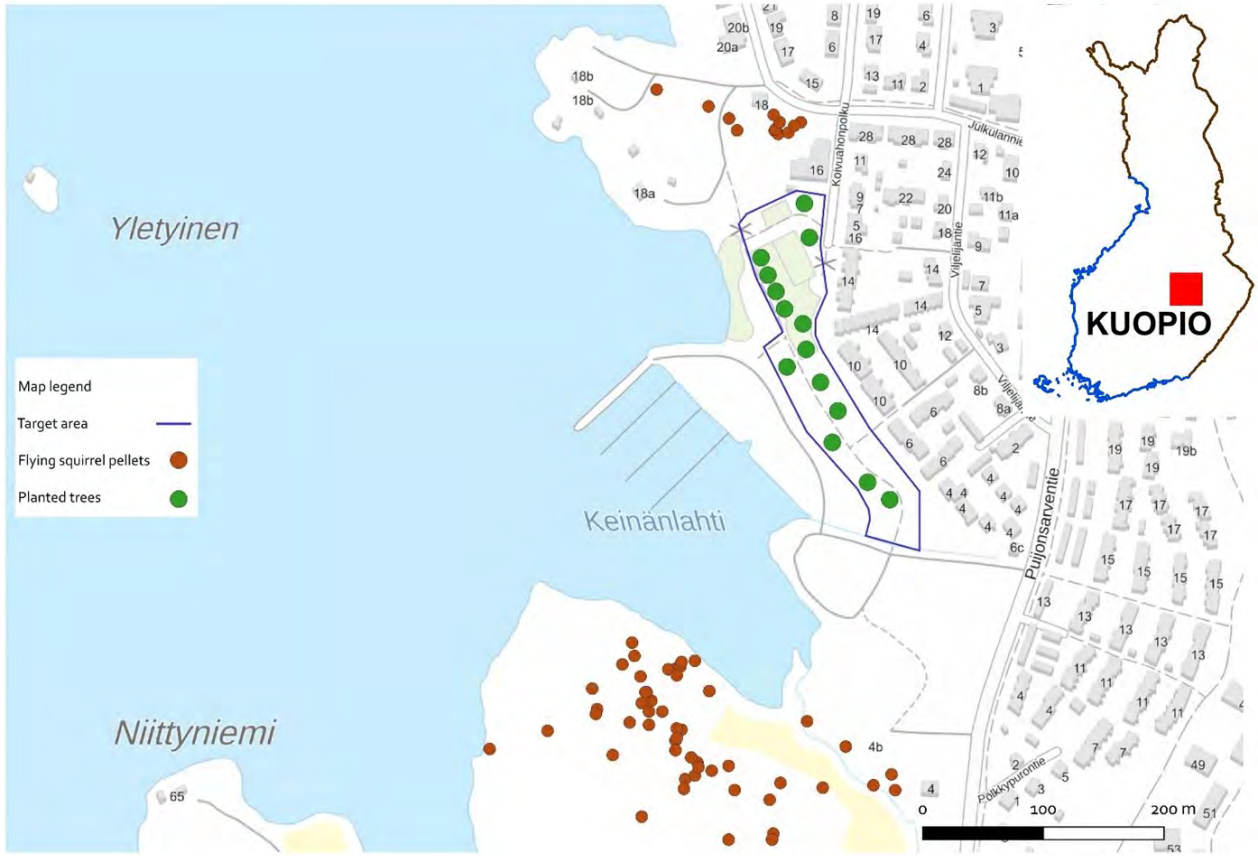
Was action implemented in the same location than described in the proposal? **Yes**

Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. Keinänlahti is in the western site of central city area next to Puijo hill and lake Kallavesi. The area consists of a playground area, area for sports, a small swimming beach and a park. There are some trees in the park area. There are two forest patches on both sides of the recreational area and flying squirrel pellets have been observed from both forest patches from 2010 onwards.

Site map



Action A5

The aim was to support flying squirrel moving connection between two forest patches separated by the recreational area. There were some changes in the plan presented in the proposal and in the implemented plan. The original planned measure was to plant 14 birches to support flying squirrel moving connection, to replace the existing row of trees, which was to be cut down during the building proses of the recreational area. Then the more detailed planning started it was however possible to save these trees. In the updated plan 14 trees were planted on the park area to improve flying squirrel moving connection. Five different tree species were used (ash *Fraxinus pennsylvanica*, birch *Betula pendula*, oak *Quercus robur*, aspen *Populus tremula* and pine *Pinus Sylvestris*), and the species were chosen so that they would adjust to surrounding activities and trees that were already in the area. Only species that would grow higher than ten meters were used.

Action C1

The planting was carried out in autumn 2020 according to the plan created in action A5. Planted trees were protected against herbivores.

Action D1

The planted trees were taken care of and monitored two years after planting. After this two-year period monitoring continued annually for years 2023 and 2024. Only the condition of the planted trees was monitored since it takes many years for trees to grow high enough for flying squirrel to use them.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy in the area at relevant intervals as part of the normal work.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Keinänlahti tree planting site supports the moving connection of flying squirrel by decreasing barriers between two flying squirrel habitats.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	0,2	-	0,2	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**0,2**	**-**	**0,2**	**-**	**-**

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Flying Squirrel LIFE (LIFE17 NAT/FI/000469)

Project site: Kattilanmäenkatu

Summary of the following actions:

A5 Preparation of plans to support the habitat network in urban areas
C1 Supporting habitat network in urban areas
D1 Monitoring the conservation actions

Project site: **Kattilanmäenkatu**
Municipality: **Kuopio**
Country: **Finland**
Size of the project area (ha): **0,15 ha**
Responsible organisation(s): **City of Kuopio**

Was action implemented as planned in the proposal? **No. The original plan was to plant 90 new trees in the area to improve flying squirrel moving connection. During the planning trip in summer 2020 it was noticed that the vegetation in the area had naturally regenerated so that there was a thicket of young deciduous trees especially aspen in the area. The action changed from planting saplings to thinning out the existing ones, to speed up the growth of the young trees, to improve flying squirrel moving connection.**

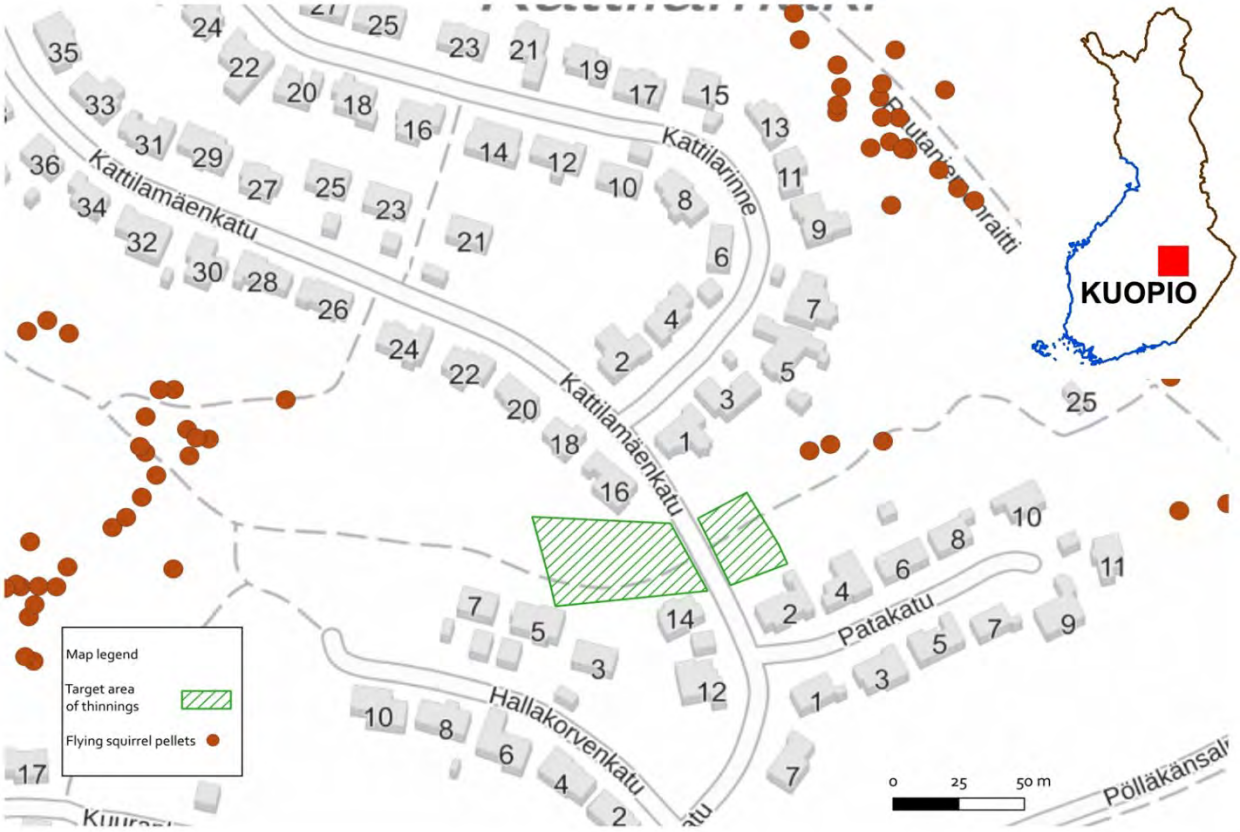
Was action implemented in the same location than described in the proposal? **Yes**

Was C-action implemented according to the A-action's plan? **Yes**

General description of the area

The project site is located in the city of Kuopio in the eastern Finland. Kattilanmäenkatu is located in an area called Saaristokaupunki, which is situated south from the central city area and surrounded by lake Kallavesi. The area is newly built residential area. There are flying squirrel habitats on both sides of the street Kattilanmäenkatu and there is also combined pedestrian and cycle route going through the area. The area has been recognized to be a weakened moving connection for the flying squirrel.

Site map



Action A5

The aim was to support flying squirrel moving connection between two known flying squirrel habitats in newly built residential area. The original plan was to plant 90 new trees in the area to improve flying squirrel moving connection. During the planning trip in summer 2020 it was noticed that the vegetation in the area had naturally regenerated so that there was a thicket of young deciduous trees especially aspen and some spruce in the area. The action changed from planting saplings to thinning out the existing ones to speed up growth of the young trees.

Flying squirrel inventories were made in the area in 2019 and 2020 as part of A4-C1-D1 project action change. Inventories confirmed that flying squirrels still occurred in the area.

Action C1

Thinning was carried out in autumn 2021 according to the plan created in action A5.

Action D1

The thinned area was monitored during 2022 and 2023. Only the condition of the thinned area was monitored since it takes many years for trees to grow high enough for flying squirrel to use them.

Monitoring after the project

The city of Kuopio will continue monitoring the flying squirrel occupancy in the area at relevant intervals as part of the normal work. If necessary, thinning will be repeated in the area.

Outcomes of the actions

Management aims to maintain ecologically functional areas for the flying squirrels as long-term conservation effects. Kattilanmäenkatu site supports the moving connection of flying squirrel by decreasing barriers between two known flying squirrel habitats.

Project site information	Area (ha)	Flying squirrel habitat (ha) *	Moving habitat (ha) **	Future habitat (ha) ***	Combination of flying squirrel conservation & recreation (ha)****
Total project site area	0,15	-	0,15	-	-
Breeding sites and resting places	-	-	-	-	-
Feeding areas	-	-	-	-	-
First thinning	-	-	-	-	-
Small gap felling	-	-	-	-	-
TOTAL	**0,15**	**-**	**0,15**	**-**	**-**

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