

## ARCTIC AND RED FOX DEN SEARCH

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### PURPOSE

An effective way to census both red fox (*Vulpes vulpes*) and arctic fox (*Vulpes lagopus*) populations is to take advantage of their dependence on den sites for reproduction and cub rearing. Fox dens are usually easily recognisable, but separating species reliably is not possible from den characteristics only. With a good knowledge of every available denning site in a study area, an annual visit of each den at the time of reproduction becomes an effective and rapid method for evaluating the total number of reproductive adults, the number of litters produced, and the approximate number of cubs in each litter.

### TIME PERIOD

Den search can be carried out at any time after snowmelt, but preferably in July and August to maximize the chances of finding them. At this period, dens can be easier to spot due to the lush vegetation present on them. But not all den possess this characteristic.

### PROCEDURE

#### Ideal procedure: systematic search of the study area by foot

A systematic scan of the entire study area minimizes chances of missing dens. It ensures an appropriate monitoring of the species. Den search should be conducted by foot, following parallel transects 600 meters apart, and scanning for potential den sites, using binoculars, up to 300 meters on each side of this transect (refer to “Den description” section below). When the topography is relatively flat, it is fairly easy to spot a den inside this 300 meters range. However, when the topography is rough, observers need to quit the transect line more often to visit potential den sites hidden by topography. A particular attention should be given to river and stream banks, which are highly used by foxes but easily overlooked. Each time a potential den site is spotted, the observer should walk up to that site and verify the presence or absence of a den. We recommend using a 1:50 000 map of the area to gradually record the area surveyed. When a den is found, its position should be recorded using the GPS, and a pair of wood battens can be installed on the den to spot it more easily during future visits.

#### Quicker procedures: systematic searches of the study area by snowmobile or helicopter

**Snowmobile:** In the case where a thorough systematic search by foot is not possible, an adequate alternative method is to conduct the census by snowmobile in spring. Den search using a snowmobile can be a very efficient method to cover rapidly a large area when there is still a small cover of snow on the ground. Fox dens are usually located on sites with early snowmelt in spring and can therefore be relatively easily spotted among the snow-covered tundra. However, this technique may miss some smaller dens or lesser quality ones, still covered by snow. When using a snowmobile, avoid getting too close to dens as this could prompt foxes to abandon their den.

Helicopter: Many dens are missed when search is performed by helicopter. However the most conspicuous dens can be spotted because of the lush vegetation that grows on the most intensely occupied dens.

## DEN DESCRIPTION

### Arctic fox

Arctic foxes are strongly dependent on dens for breeding. Due to the shallow permafrost-free layer in most of arctic fox's range, new dens are rarely dug and existing ones are often used repeatedly year after year. They can therefore become impressive structures with more than a hundred entrances and covering more than 500 m<sup>2</sup>. With the accumulation of organic matter from faeces and prey remains, dens sites may become covered with lush green vegetation, contrasting with the barren tundra landscape. Dens are usually situated on mounds, ridges, slopes or river banks, preferably on south facing and early thawed areas, where the soil is well drained and the active layer over permafrost is deeper.

The openings of arctic fox dens are round or slightly oval, measuring 15-20 cm in diameter, and may vary between one to more than a hundred in a single den. Cubs and adults gradually dig new openings and dens are progressively excavated deeper and deeper as the permafrost layer drops due to increased ventilation and better soil drainage. Where habitat is favourable, complexes of multiple dens separated by only a few meters can sometimes be observed. Arctic fox dens can be used by other species such as red fox or arctic hare.

### Red fox

Like the arctic fox, the red fox uses dens for parturition and rearing of cubs. They may dig their own den, which are small and rarely used more than once, or use those abandoned by other species such as ground squirrels, hares or other foxes. Most dens are found in sandy soil and have several entrances up to 40 cm high. In arctic regions where permafrost is present, red foxes often reproduce in already existent arctic fox dens. Therefore, differentiation of arctic and red fox dens usually requires the observation of an individual at the den. More sophisticated techniques, such as DNA probing of fresh faeces, can also be used.



Figure 1: Sample of arctic fox dens

**PERSONNEL**

One person alone can cover an area of approximately 5-8 km<sup>2</sup> per day when surveying for dens on foot, and 12-25 km<sup>2</sup> by snowmobile, depending on the topography.

**MATERIAL**

- Map of the area (1:50 000 recommended)
- Binoculars
- Geographic Positioning System (GPS) receiver
- Wood batten and marker pen to identify den sites (if this is allowed on your study area)

**DATA MANAGEMENT**

It is important to note the projection used for UTM locations (e.g. NAD28, NAD 83)

Den number: _____	Species (if individual observed on den): _____
UTM location (NAD__): _____	East _____ North
Latitude: _____	Longitude: _____
Den number: _____	Species (if individual observed on den): _____
UTM location (NAD__): _____	East _____ North
Latitude: _____	Longitude: _____
Den number: _____	Species (if individual observed on den): _____
UTM location (NAD__): _____	East _____ North
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