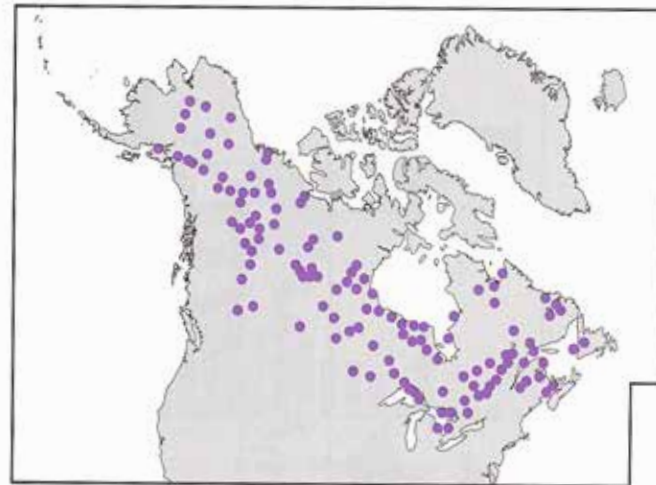
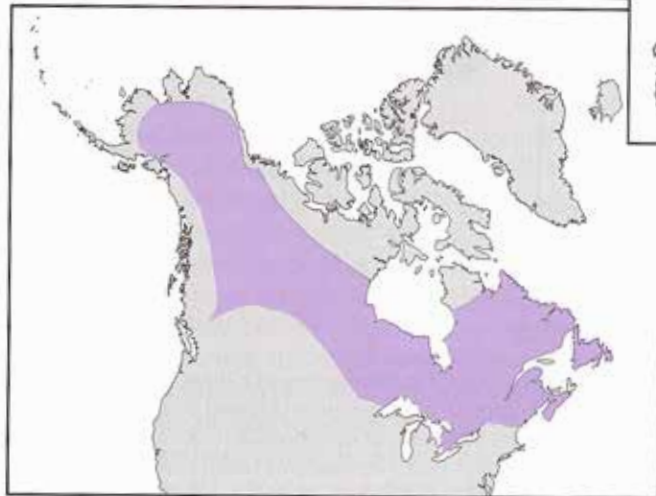


# Biogeographical Distributions



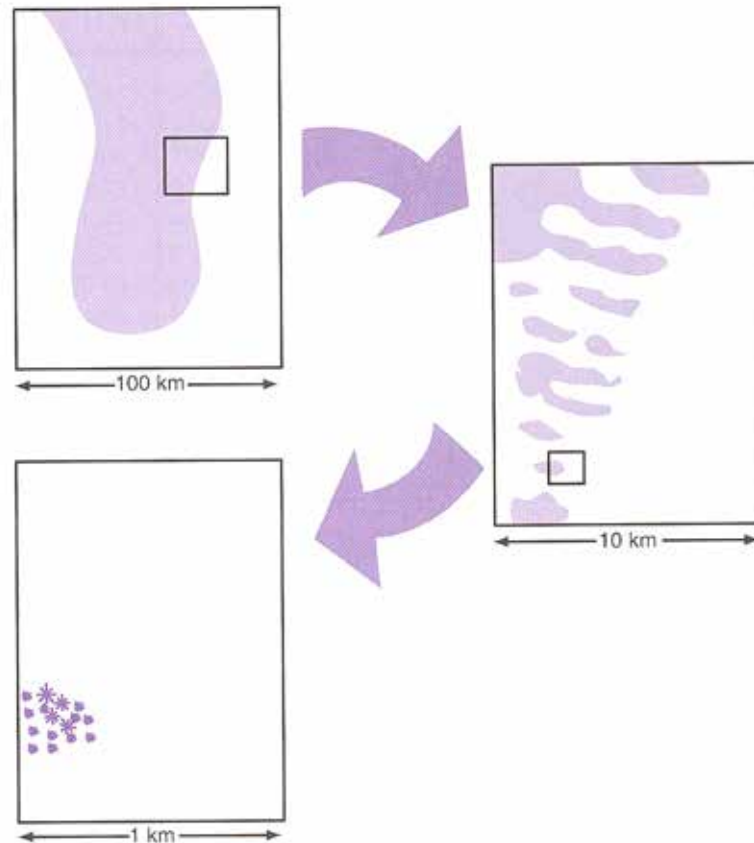
actual observations



derived choropleth map

**FIGURE 13.1** A dot map based on recorded collection sites for black spruce (*Picea mariana*) in North America (after Porsild and Cody, 1980) and a choropleth map based on the same data. Detailed surveys based on field observations and airphoto analysis show that the density of spruce decreases dramatically near the northern treeline. The actual northern boundary is relatively diffuse and composed of scattered disjunct individuals and stands.

# Biogeographical Distributions



Finer resolution mapping reveals discontinuous populations or individuals that are hidden by coarse-resolution maps

**FIGURE 13.2** The typical geographic distribution of a plant species. The distribution appears continuous on a choropleth map, but when viewed at a smaller scale we can see that the species actually occurs as scattered metapopulations and when viewed at an even smaller scale the species is seen to occur as scattered individuals.

# Biogeographical Distributions

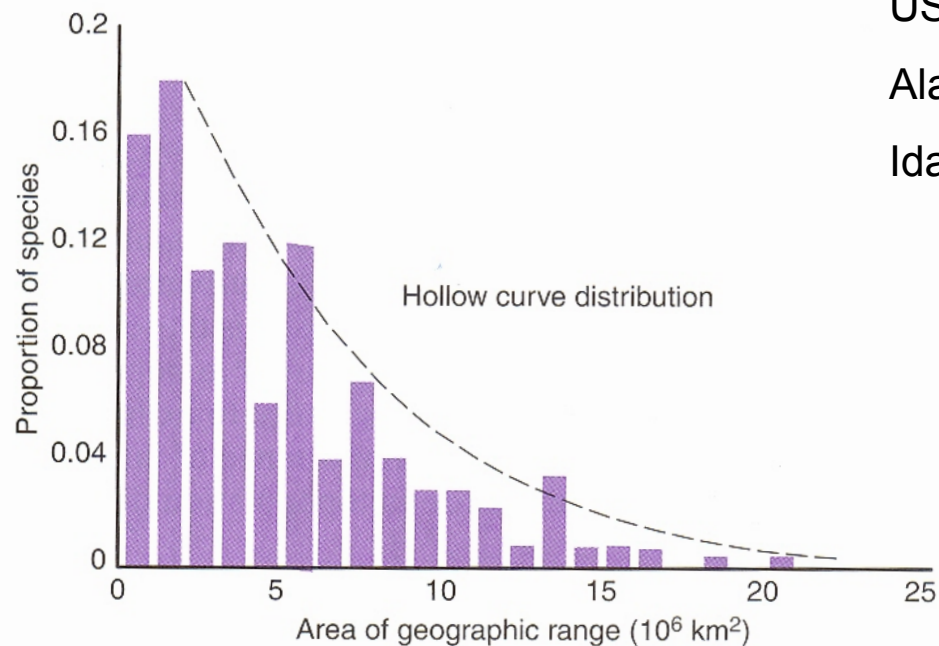
What is the typical range size of a species (not an individual)?

For reference:

US:  $9 \times 10^6 \text{ km}^2$

Alaska:  $1.5 \times 10^6 \text{ km}^2$

Idaho:  $0.2 \times 10^6 \text{ km}^2$



**FIGURE 13.3** Size of the geographic ranges on North and Central American land birds (after Brown, 1995).

*Similar patterns for mammals, other organisms*

# Biogeographical Distributions

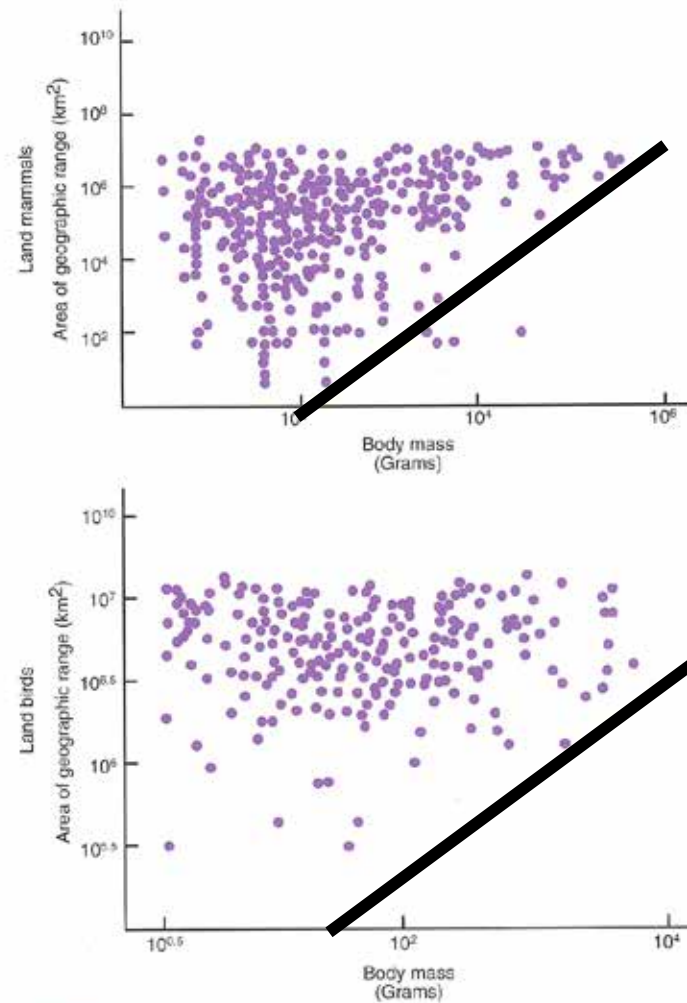
## Relative range size

amphibians/fish < mammals < birds  
(*why?*)

herbivores < predators  
(*why?*)

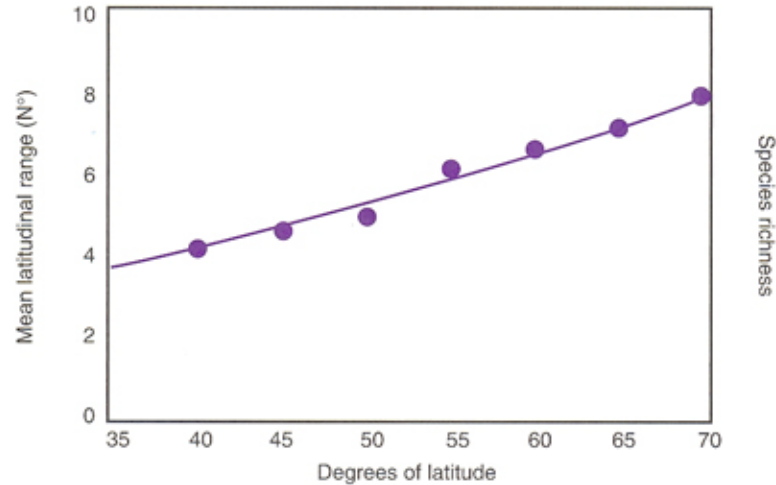
smaller animals < larger animals  
(*why?*)

# Biogeographical Distributions



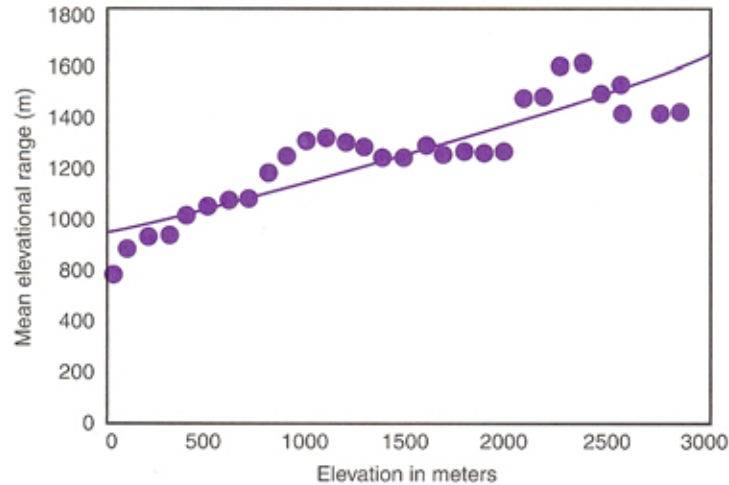
**FIGURE 13.4** The relationship between range size and body mass for North American terrestrial mammal and bird species. Small and medium-sized animals can have large or small ranges, but few large animals have small ranges (after Brown, 1995).

# Biogeographical Distributions



Rapoport's Rule

More northern species have larger ranges



Higher elevation species have larger ranges

**FIGURE 13.5** The relationship between the latitude and elevation at which a species is found and the degrees of latitude or meters of elevation that its range spans. The examples here are for tree species in North America and tree species in Costa Rica (after Brown, 1995).