

Rocky Mountain

National Park
Colorado

National Park Service
U.S. Department of the Interior

Alpine Tundra



WHAT IS ALPINE TUNDRA?

*...a world by itself
in the sky.*

—Enos Mills

Where mountaintops rise like islands above a sea of trees lies the world of the **alpine tundra**. John Muir called it "a land of desolation covered with beautiful light." Yet this light shines on a tapestry of living detail. Tundra lands too cold for trees support over 200 kinds of plants, as well as animals from bighorn to butterflies.

Tundra is a Russian word for "land of no trees."

Arctic tundra occurs around the north pole. **Alpine tundra** crowns mountains that reach above treeline.

Rocky Mountain National Park is recognized worldwide as a **Biosphere Reserve** because of the beauty and research value of its alpine wild lands. Alpine tundra is a sensitive indicator of such climatic changes as global warming and acid rain. Over 1/3 of the park is tundra.

HOW FRAGILE IS IT?

For 25 years after Trail Ridge Road opened in 1932, people had free run on the tundra. Repeated trampling damaged popular places. Some of these areas, fenced off in 1959 for study, show almost no sign of recovery today. High winds and long winters make new growth slow. Trampled places may take centuries to heal.

That is why busy stops along Trail Ridge Road are marked as **Tundra Protection Areas** where no walking off the trail is allowed. Elsewhere, walking on the tundra is permitted. But walk with care! Step lightly, without scuffing the surface. Step on rocks when you can. Spread out groups to limit their impact.

SNOW IN JULY?

The tundra's brief summer is squeezed into only about 40 frost-free days per year. Temperatures stay below freezing for over 5 months, while winter winds blow up to 170 mph (274 km/hr). Summer days seldom reach 60°F (16°C). Snow may fall any day of the year.

Average annual precipitation is 25 inches (64 cm), of which 65% falls as snow.

In summer, afternoon thunderstorms with lightning, hail, and high winds are frequent. Keep an eye on the clouds; storms can arrive within minutes.

ALPINE ADAPTATIONS

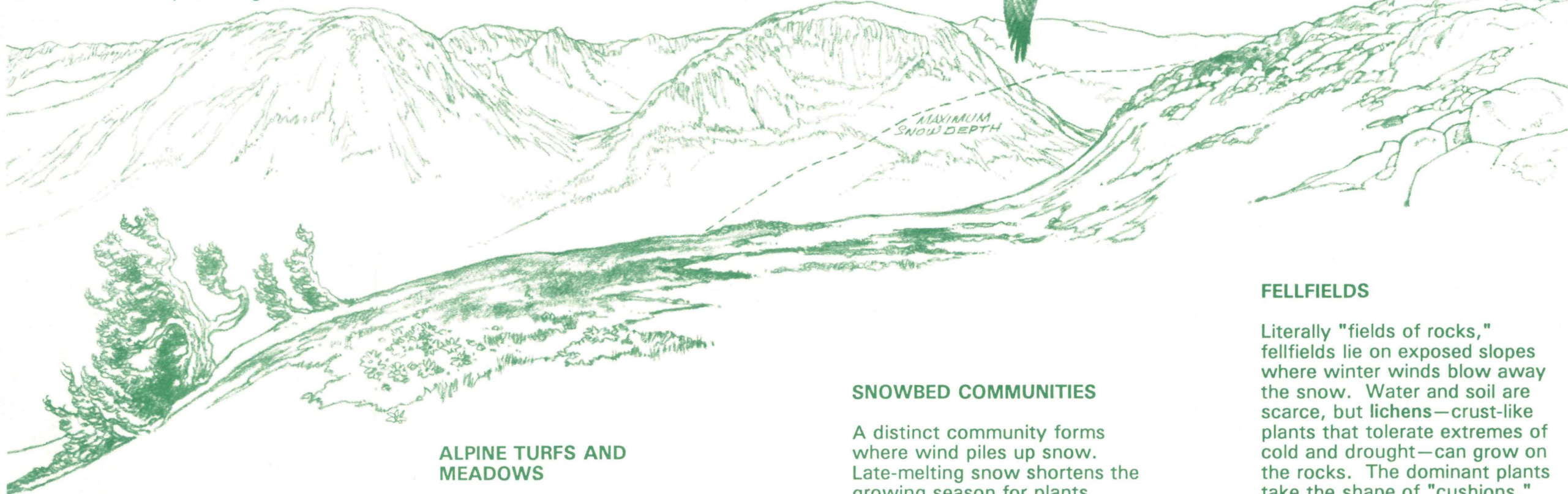
Strong winds, scant soil, a short growing season, thin air, intense sunlight, temperature extremes, and limited water challenge alpine life.

Plants cope by hugging the ground and having waxy or hairy leaves to shed wind and hold water. Red pigments act as sunscreen. Roots are extensive; tundra plants, like icebergs, have up to 90% of their bulk below the surface.

Few animals live all year on the tundra. Pika cut and dry stacks of plants in summer for their winter larder. Ptarmigans, the only birds to winter on the tundra, grow feathers on the bottoms of their feet. Their toenails sprout comb-like teeth that work as snowshoes. Many animals migrate. Marmots hibernate. Some commute: ravens, hawks, coyotes, elk, and people visit the tundra only for the day.

THE ALPINE TUNDRA ECOSYSTEM

It may look monotonous—but look again! While standing in one spot you could touch a meadow, a bog, or a rocky desert. Microclimates make the difference, as when a plant takes root where a rock shelters it from wind. How many different communities can you recognize?



KRUMMHOLZ

Alpine tundra begins where trees give up the fight against cold, wind, and a too-short growing season. At Rocky, this happens near 11,500 feet (3505 m), marked by the low, wind-blasted spruce or fir trees called **krumholz** ("crooked wood"). Many of these small trees have battled over a thousand winters.

ALPINE TURFS AND MEADOWS

Much of Rocky's alpine land is covered with dense turfs of sedges and grasses. Rich soils accumulated here support a bright diversity of wildflowers, whose colors peak in early July. The largest flower on the tundra, the **alpine sunflower** (*Rydbergia grandiflora*), grows only in the Rocky Mountains. Its roots store solar energy from ten summers or more before blooming once. Then the whole plant dies.

SNOWBED COMMUNITIES

A distinct community forms where wind piles up snow. Late-melting snow shortens the growing season for plants beneath it, but insulates in winter and yields a bonus of water in spring. Blossoms of the yellow **snow buttercup** (*Ranunculus adoneus*) often push up through the snow. Look for the sinuous casts of soil left by **pocket gophers** tunneling under the snow. The gophers eat plant roots. The soil they turn over makes a seedbed for flowers, which begins a new community, the "gopher garden."

FELDFIELDS

Literally "fields of rocks," **fellfields** lie on exposed slopes where winter winds blow away the snow. Water and soil are scarce, but lichens—crust-like plants that tolerate extremes of cold and drought—can grow on the rocks. The dominant plants take the shape of "cushions," hugging the ground to shed wind. As dead leaves and soil collect within a cushion plant, less hardy plants may sprout in this fertile bed. In time, invading plants may replace the cushion, and a fellfield may become a meadow. **Moss campion** (*Silene acaulis*) is a common cushion plant at Rocky. Like nearly half of Rocky's alpine plants, it grows in tundra lands throughout the northern hemisphere.