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Effects of Vehicles on Arctic Tundra

by

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INTRODUCTION

The traditional form of transportation in the tundra has always been, of necessity, cross-country or off-road. Limited economic development, low population density, high cost of construction, and the presence of permafrost, are several reasons for the lack of road development. In North America, long-distance travel has been and continues to be mainly by air.

A variety of tracked off-road vehicles (ORV) have been used over the past several decades for travel across tundra. Most commonly employed were the Massey Ferguson, Nodwell, Bombardier, LVT, and the conventional bulldozer with or without wide tracks. Within the past several years, other vehicles have been introduced and are still undergoing evaluation. Prominent among these are the air-cushion vehicle (ACV) and wheeled vehicles such as the Rolligon. Snow machines have rapidly replaced dog teams for the native subsistence needs and are employed extensively by all sectors of the population for recreation. The current generation of off-road vehicles exert relatively low ground-pressure and are less disruptive ground-contact systems than their predecessors—a prime consideration in minimizing the intensity of environmental impact.

The northern tundra regions are characterized by relatively low biological activity and diversity, by short, cool, and dry, growing-seasons, and by a land surface which is underlain by permafrost. Permafrost is a permanent condition of the ground in which the annual average temperature remains below 0°C for more than several years at a time and usually for many thousands of years. Therefore, water in the ground is usually present in the form of ice—frequently as large, near-surface buried ice-masses. Only a thin layer of soil on the surface thaws each summer. The surface cover of tundra plants and underlying organic layer form a protective mantle over the soil which prevents rapid seasonal thaw and erosion of the underlying, frequently ice-rich permafrost.

The traffic layer is a thin layer of soil that is exposed to the atmosphere. It is a functionally important layer because it is the site of most biological activity and is the site of most soil erosion. It is also the site of most soil compaction and is the site of most soil disturbance. It is a functionally important layer because it is the site of most biological activity and is the site of most soil erosion. It is also the site of most soil compaction and is the site of most soil disturbance.

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ENVIRONMENTAL CONSERVATION

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