

encompasses areas within the Northern Great Basin ecosystem.

A number of significant differences are found between the Columbia Basin ecosystem and the balance of pygmy rabbit range in central and southern Oregon. In general, the Columbia Basin is lower in elevation, contains soils of varying origin, and has been influenced

by different geological processes. These structural differences, combined with regional climatic conditions, significantly influence the broad plant associations found within each ecosystem (Daubenmire 1988; Franklin and Dyrness 1988). Historically, transitional steppe habitats were much more prevalent in the Columbia Basin

than in the ecosystems of central and southern Oregon. In contrast, juniper (*Juniperus* spp) woodlands and salt-desert shrub habitats were much more common in central and southern Oregon. Finally, there are significant differences in the type and distribution of sagebrush taxa among the ecosystems (Table 1).

TABLE 1. DIFFERENCES IN ECOSYSTEM ELEMENTS BETWEEN REGIONS OCCUPIED BY THE EXTANT POPULATION SEGMENTS OF THE PYGMY RABBIT IN WASHINGTON AND OREGON (AFTER WINWARD 1980; DAUBENMIRE 1988; FRANKLIN AND DYRNESS 1988; MCNAB AND AVERS 1994; DOBLER *et al.* 1996; QUIGLEY *et al.* 1997).

Ecosystem Elements: Geologic, Edaphic, and Transitional Habitats

Population segment	Elevations	Soils	Channeled scablands	Internally-drained playas	Steppe	Juniper woodland	Salt-desert scrub
Columbia Basin	<914m (<3,000 ft)	Deep/Loamy Glacial/Eolian.	Prominent (north).	Rare/Absent	Abundant (east)	Rare/Absent	Rare/Absent.
Central/Southern Oregon.	>1,067 m (<3,500 ft)	Thin/Rocky Volcanic (HLP ¹) Deep/Alluvial (NGB ¹ , OU ¹).	Rare/Absent	Prominent (NGB, OU).	Rare/Absent	Abundant (HLP) Present (NGB, OU).	Abundant (NGB, OU).

Ecosystem Elements: Sagebrush (*Artemisia*) Taxa²

Population segment	Basin ssp.	Wyoming ssp.	Mountain ssp.	Low	Three-tip	Stiff	Early	Silver	Black
Columbia Basin	Dominant	Present (west).	Rare/Absent	Rare/Absent	Abundant (north).	Abundant	Rare/Absent	Rare/Absent	Rare/Absent.
Central/Southern Oregon	Rare/Absent	Dominant	Abundant	Abundant	Present (OU).	Present	Present (HLP).	Present (NGB, OU).	Present (NGB, OU).

¹ Element primarily applies to the ecosystems noted: HLP—High Lava Plains; NGB—Northern Great Basin; OU—Owyhee Uplands.

² Big Sagebrush (*A. tridentata*) Subspecies (ssp): Basin—*A. t. tridentata*, Wyoming—*A. t. wyomingensis*, Mountain—*A. t. vaseyana*, Low—*A. arbuscula*, Three-tip—*A. tripartita*, Stiff—*A. rigida*, Early—*A. longiloba*, Silver—*A. cana*, Black—*A. nova*.

There are a number of broad habitat associations in common between the Columbia Basin and the ecosystems of central and southern Oregon (Daubenmire 1988; Franklin and Dyrness 1988). However, even within these common habitat associations, notable differences exist. In general, the composition of forb species differs considerably between the Columbia Basin and the ecosystems in central and southern Oregon (*cf* Daubenmire 1988; Franklin and Dyrness 1988). Even when the same forb species may be present, the two regions typically support different subspecies or varieties of these taxa (Hitchcock and Cronquist 1973).

Currently, it is unclear if the Columbia Basin pygmy rabbit is different in several respects (*i.e.*, physiologically, behaviorally, or morphologically) from other pygmy rabbit populations throughout the remainder of the species' historic range. However, based on the above ecological information, and the pygmy rabbit's close association with sagebrush ecosystems, we conclude that the Columbia Basin represents a unique ecological setting for the taxon due to its different geologic, climatic, edaphic (soil), and plant community

components. In addition, the Columbia Basin ecosystem holds different management implications for the Columbia Basin pygmy rabbit compared to the ecosystems of southern Oregon and the population segment of pygmy rabbits occupying that region (*see* above), and likely also compared to the other sagebrush ecosystems and population segments found throughout the remainder of the species' range (*see* Background, above, and Summary of Factors Affecting the DPS, below).

Significant gap in the range of the taxon. The Columbia Basin pygmy rabbit represents an isolated portion of the northern-most extent of the historic distribution of the taxon (Figure 1). Paleontological records indicate that the prehistoric distribution of this population segment (*ca* 150 to 10,000 + years BP) may have encompassed roughly 23 percent of the Columbia Basin (after Lyman 1991). As recently as the early 1900s, this population segment was distributed across approximately 10 percent of the Columbia Basin ecosystem (*cf* Figures 2 and 3). Currently, the Columbia Basin pygmy rabbit occurs in less than 1 percent of its overall historic distribution, and a

small fraction of its potential prehistoric distribution.

A number of studies address the characteristics of peripheral and/or isolated populations and their influences on, and importance to, the remainder of the taxon. These studies indicate that peripheral and isolated populations may experience increased directional selection due to marginal or varied habitats at range peripheries, exhibit adaptations specific to these differing selective pressures, demonstrate genetic consequences of reduced gene flow dependent on varying levels of isolation, and/or have different responses to anthropogenic influences (Levin 1970; MacArthur 1972; Morain 1984; Lacy 1987; Hengeveld 1990; Saunders *et al.* 1991; Hoffmann and Blows 1994; Furlow and Armijo-Prewitt 1995; Garcia-Ramos and Kirkpatrick 1997).

The available information regarding the past distribution and isolation of the Columbia Basin pygmy rabbit demonstrates that this population segment is likely experiencing increased directional selection due to marginal and varied habitats at the periphery of the taxon's range. In addition, this population segment is exhibiting genetic