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Fire History in a Chaparral Ecosystem: Implications for Conservation of a Native Ungulate

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Abstract

Mature chaparral vegetation in the San Gabriel Mountains, California, resulting from long fire-return intervals (50–70 yr), has resulted in reduced visibility and availability and quality of forage, all of which are important attributes of mountain sheep (*Ovis canadensis*) habitat. Concomitantly, vegetation changes have decreased availability and quality of forage. We developed a resource-selection model to determine the effect of fire history on habitat use by mountain sheep, examined the hypotheses that habitat selection was associated with fire occurrence, and determined whether fire occurrence influenced the amount of potential habitat available to mountain sheep. The best model indicated that mountain sheep selected vegetation that had burned within 15 yr and avoided areas that had not burned within that time frame. We then used our model to quantify potential changes in mountain sheep habitat that have occurred over time based on fire conditions. We identified 390 km² of mountain sheep habitat that existed in 2002 (when only 63 mountain sheep were tallied), 486 km² in 1980 (when the mountain sheep population was at its highest), and 422 km² in 2004 (just after a series of large wildfires). We also estimated that 615 km² of suitable habitat would be available in a hypothetical situation in which the entire study area burned. Our results suggest that restoration of mountain sheep to their historical distribution in chaparral ecosystems will depend upon more frequent fires in areas formerly occupied by those specialized herbivores.

Resumen

La vegetación madura del chaparral en las Montañas San Gabriel, en California, resultado de largos intervalos de regreso del fuego (50–70 años), ha ocasionado reducida visibilidad, así como una baja disponibilidad y calidad de forraje los cuales son atributos importantes del hábitat de las ovejas de montaña (*Ovis Canadensis*). Asimismo, con los cambios en la vegetación, ha resultado en la disminución de la cantidad y calidad de forraje. Nosotros desarrollamos un modelo de selección de recursos para determinar el efecto histórico del fuego en el uso del hábitat por la oveja de montaña, y examinamos la hipótesis de que la selección del hábitat estaba asociada con la ocurrencia del fuego, la cual afecta al hábitat potencial disponible por las ovejas de montaña. El mejor modelo indicó que las ovejas de montaña seleccionaron vegetación se había quemado en los pasados 15 años, y evitaron áreas que no se habían quemado en ese que mismo periodo de tiempo. Usamos nuestro modelo para cuantificar los cambios potenciales en el hábitat de las ovejas de montaña que han ocurrido con el tiempo basándose en las condiciones del fuego. Identificamos 390 km² del hábitat de las ovejas de montaña que existía en 2002 (cuando solamente hubo un incremento de 63 ovejas de montaña), 486 km² en 1980 (cuando se tenía la población mas alta de ovejas de montaña), y 422 km² (justo después de una serie de grandes incendios). Estimamos también que 615 km² de hábitat sería apropiado, en una situación hipotética donde toda el área de estudio haya estado sujeta al fuego. Nuestros resultados sugieren que la re-introducción de la oveja de montaña a su distribución histórica en ecosistemas de chaparral dependerá de la ocurrencia de fuegos más frecuente en las áreas que originalmente estuvieron ocupadas por esos herbívoros especializados.

Key Words: California, chaparral, fire, habitat, mountain sheep, *Ovis canadensis*, restoration

INTRODUCTION

In the San Gabriel Mountains (SGM), California, the population of mountain sheep (*Ovis canadensis*) appears to have declined from 740 (± 49 SE) sheep in 1980 (when > 500 animals were tallied) to < 100 in 2002 (when only 63 were tallied; California Department of Fish and Game, unpublished data, 2002). Mountain sheep inhabiting the SGM are recognized by the US Department of Agriculture Forest Service (Region 5) as a sensitive species and, in 2002, they met criteria for federal endangered status as a distinct population segment

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