

# Changing the fire management regime in the renosterveld and lowland fynbos of the Bontebok National Park

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## Abstract

This paper evaluates the history of fire management in the Bontebok National Park (3435 ha) over a period of almost four decades. A GIS database was compiled of all fires between 1972 and 2009 and the fire regime was analysed in terms of the frequency, season, size and cause of fires. Since the early 1970s, short interval burning was implemented to promote grazing for bontebok, but from 2004 the fire interval was lengthened to favour plant species diversity, an increasingly urgent conservation priority for the park. In total, 43 fires were recorded, ranging in size from 9 to 1007 ha, collectively spanning 14 013 ha. The majority of fires were large (100–500 ha), with fires of >100 ha accounting for 96% of the area burnt. The overall mean fire return period (FRP) for the park was 7.2 years, which is short judged by fynbos standards. FRPs under the old and new management regimes were 6.7 and 10.9 years respectively. Under the old regime, FRPs in renosterveld and fynbos were 5.8 and 8.0 years respectively. Large parts of the park repeatedly experienced fires at immature vegetation ages resulting in the elimination of slow-maturing seed-regenerating plant species such as *Protea repens*. Post-fire age distribution was highly skewed towards young vegetation, with 75% of fire-prone vegetation burning at post-fire ages of  $\leq 7$  years, and <10% of fire-prone vegetation surviving beyond 10 years of age. Prescribed and accidental fires respectively accounted for 70% and 30% of the total area burnt. Prescribed burning was mostly done in March–April, and only 8% of the total area burnt, burnt outside of the ecologically acceptable fire season. This study identified areas which have been subject to ecologically appropriate and inappropriate fire return intervals, providing a basis for informed future management and research.

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**Keywords:** Fire frequency; Fire season; Grazers; Post-fire age distribution; Prescribed burning

## 1. Introduction

The Bontebok National Park (BNP) is a small (3435 ha) protected area aiming to conserve a population of one of the rarest antelope in Africa, the Vulnerable bontebok *Damaliscus pygargus pygargus* (Friedmann and Daly, 2004; Skinner and Chimimba, 2005), within an Endangered vegetation type (Rebelo et al., 2006; Underwood et al., 2009). Park management has long been faced with the dilemma of reconciling the need for short interval fires which promote grazing for bontebok, with that for longer interval fires to maintain plant diversity.

BNP is located within the internationally renowned hotspot of biodiversity, the Cape Floral Kingdom (Goldblatt and Manning, 2002; Myers, 1990). The park's vegetation is

classified as Swellendam Silcrete Fynbos, a poorly known vegetation type exhibiting floristic features of lowland fynbos and renosterveld (Rebelo et al., 2006). Fynbos (literally meaning fine-leaved bush) is an evergreen, fire-prone, sclerophyllous shrubland on sandy, infertile soils, characterized by the presence of restioids (wiry, evergreen graminoids) (Cowling et al., 1997). Renosterveld is an evergreen, fire-prone shrubland, occurring on moderately fertile, shale-derived soils, dominated by small-leaved Asteraceous shrubs (especially *Dicerotheramnium rhinocerotis*, the 'renosterbos' or rhinoceros bush) with an understorey of grasses and geophytes (Cowling et al., 1997). Both fynbos and renosterveld are subject to recurrent fires and are therefore fire-adapted, with the frequency, season, intensity and size of fires being important determinants of species composition, vegetation structure and successional patterns (Kruger and Bigalke, 1984; Van Wilgen et al., 1992, 2010). While fire ecology has been extensively

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