

# The use of aerial spraying to eliminate tsetse from the Okavango Delta of Botswana

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## Abstract

In Botswana, 16,000 km<sup>2</sup> of the Okavango Delta were aerial sprayed five times with deltamethrin, applied at 0.26–0.3 g/ha, to control *Glossina morsitans centralis* Machado (Diptera: Glossinidae) over a period of ~8 weeks. The northern half of the Delta (7180 km<sup>2</sup>) was sprayed in June–September 2001 and the southern half (8720 km<sup>2</sup>) in May–August 2002. A barrier (mean width ~10 km) of 12,000 deltamethrin-treated targets was deployed at the interface of these two blocks to prevent tsetse from invading from the southern to the northern block. Prior to spraying, the mean catches of tsetse from man fly-rounds were 44.6 round/day in the northern block and 101 in the southern. Between September 2002 and November 2005, surveys (~820 daily fly-rounds and ~2050 trap-days) in the northern and southern blocks failed to detect tsetse. Simulations of tsetse populations suggest that while spraying operations can reduce tsetse populations to levels that are difficult to detect by standard survey techniques, such populations will recover to densities >100 tsetse/km<sup>2</sup> after 1000 days, at which density there is a very high probability (>0.999) that the survey methods will catch at least one fly. Since none was caught, it is argued that tsetse have been eliminated from the Delta. The particular success of this operation in comparison to the 18 aerial spraying operations conducted in the Delta prior to 2001 is attributed to the application of an adequate dose of insecticide, the use of a GPS-based navigation system to ensure even application of insecticide, and the large size and spatial arrangement of the spray blocks coupled with the use of a barrier of targets which prevented tsetse from re-invading the northern sprayed block before the southern one was treated.

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## 1. Introduction

*Glossina morsitans centralis* Machado (Diptera: Glossinidae) is the only species of tsetse found in Botswana, and is limited to ~30,000 km<sup>2</sup>, extending northerly from Maun up through the Okavango Delta and along the Savuti, Chobe and Kwando Rivers to

the Zambezi (Davies, 1980). Like most populations of tsetse in southern Africa, the Botswana infestation virtually disappeared following the 1896 epizootic of rinderpest which greatly reduced the numbers of tsetse hosts (Jordan, 1986; Ford, 1971). However, in the last 100 years the flies have expanded back to their natural limits (Davies, 1980).

The tsetse-infested area covers <5% of Botswana but has had significant impact on livestock and human populations, largely because it is the only wet area in an otherwise arid country. For instance, the region was

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