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# EFFECTIVENESS OF FENCING, UNDERPASSES, AND DEER GUARDS IN REDUCING KEY DEER MORTALITY ON THE US 1 CORRIDOR, BIG PINE KEY, FLORIDA

## PROBLEM STATEMENT

Florida Key deer (*Odocoileus virginianus clavium*) occupy 20–25 islands in the Lower Florida Keys, with approximately 65% of the overall population found on Big Pine Key (BPK). Since the 1960s, deer-vehicle collisions (DVCs) have been the single largest Key deer mortality factor accounting for greater than 50% of annual losses. In 2000, 69 DVCs were recorded on BPK (U.S. Fish and Wildlife Service [USFWS], unpublished data). Additionally, over half (35–50 DVCs in 1996–2000) of the DVCs occur along United States Highway 1 (US 1) on BPK, a 5.6-km segment of roadway that bisects the southern end of BPK. The high occurrence of Key deer-vehicle collisions along this road segment has prompted USFWS and Florida Department of Transportation (FDOT) biologists to address this problem. In 2001-2002, FDOT constructed a 2.6-km long system of fencing, 2 underpasses, and 4 experimental deer guards to address DVCs along a portion of the US 1 roadway.

## OBJECTIVES

The goal of this study was to evaluate the effectiveness of the US 1 corridor project in reducing Key deer mortality by comparing (1) the survival of radio-collared deer, (2) deer-vehicle collisions on US 1, and (3) the ability of deer to access the fenced segment.

## FINDINGS AND CONCLUSIONS

In comparing Key deer mortality pre- and post-project completion, researchers found that DVCs along the fenced segment of the US 1 project were reduced by 83–92%. However, overall US 1 Key DVCs did not change. Key deer entry into the fenced segment was minimized to 8 deer during the first-year, resulting in 2 deer mortalities. Researchers also assessed the potential impacts of the US 1 corridor project to Key deer movements by studying radio-collared Key deer annual ranges and radio-collared deer corridor movements, and by assessing Key deer underpass and corridor use. Female and male ranges and core areas did not change ($P > 0.05$). Deer movements within the US 1 corridor were comparable pre- (6 of 23 radio-collared deer crossed the corridor) and post-project (4 of 16). Infrared-triggered camera data indicate that underpass movements increased over time. Collectively, post-project telemetry and camera data indicates that US 1 highway improvements have not restricted Key deer movements. Finally, hourly Key deer movement and US 1 traffic patterns were compared to annual US 1 DVCs. Hourly deer movements showed a positive correlation ($P = 0.012$, $r = 0.505$) to hourly DVCs for the full circadian period. Hourly US 1 traffic showed a significant positive relationship ($P = 0.012$, $r = 0.787$) with DVCs only during the night period. Evaluation of hourly deer movements and hourly traffic volume on US 1 found hourly DVCs to be the result of a combination between both variables.

## BENEFITS

Improvements to the US 1 corridor project have successfully reduced DVCs along the fenced segment of US 1. This decrease translates into increased human safety and an increase in the overall population viability of Key deer. An increase of deer mortalities in the unfenced segment of US 1 was expected and will likely stabilize or decrease in the near future as deer become accustomed to underpasses. Underpasses in combination with fencing can reduce ecological impacts of constantly expanding road networks, but are problematic unless access points filter out those wildlife species most vulnerable to wildlife-vehicle collisions. Wildlife grates allow vehicles to access and use fenced roadways while reducing the ecological, economic, and social impacts associated with those collisions. Results from this study have application with other roadway projects in Florida and around the country where DVCs are problematic.

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