

Florida Key Deer Hurricane Irma Report

Prepared for:
National Key Deer Refuge
South Florida Ecological Services Field Office



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FLORIDA KEY DEER HURRICANE IRMA REPORT

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FLORIDA KEY DEER *HURRICANE IRMA REPORT*

OVERVIEW

Hurricane Irma was a Category 4 storm when the eye of the storm passed through the center of the Key deer range on September 9, 2017 (Fig. 1). The passage of Hurricane Irma caused significant property damage to the area as well as impacts to vegetation/water resources for the Key deer population. The focus of this report is to provide density and survival estimates post-Hurricane Irma to U.S. Fish and Wildlife Service (USFWS) managers.

DENSITY ESTIMATES

Road surveys have tracked Key deer population trends since 1968 (Silvy 1975, Lopez 2001, Lopez et al. 2004). During the New World screwworm incident, road surveys were conducted on Big Pine and No Name keys along a standardized route (Parker et al. 2017). These surveys were designed to provide an index to population size and structure (e.g., average number of deer seen/km), and deer density using mark-resight and distance sampling methods (e.g., number of deer/ha; Silvy 1975, Buckland et al. 1993, Lopez 2001, Roberts 2005).

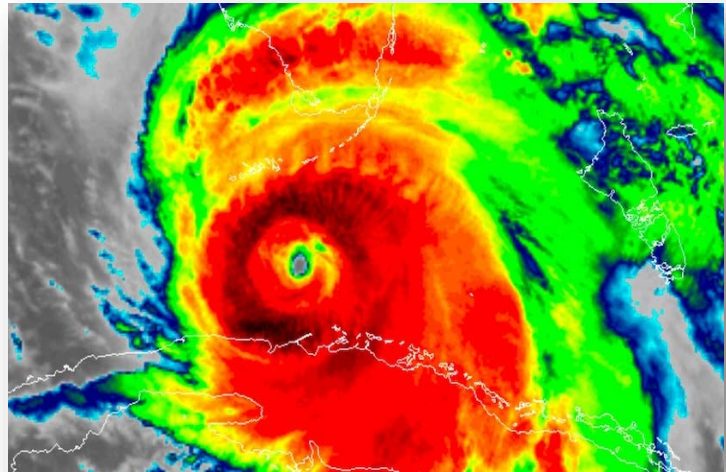


Figure 1. Hurricane Irma prior to the arrival in the Lower Florida Keys, 2017.

After Hurricane Irma, USFWS and NRI personnel continued to collect data from these road surveys (23 September–6 October 2017) to obtain a population estimate. During this period, 13 road surveys (6 sunrise surveys, 7 sunset surveys) were conducted and a population estimate was obtained. This post-Hurricane Irma population estimate was compared to survey data collected prior to the storm and following the New World screwworm incident (November 2016–February 2017; Parker et al. 2017; Fig. 2). Due to seasonal effects and biases, fall/winter time periods were compared in our analyses.

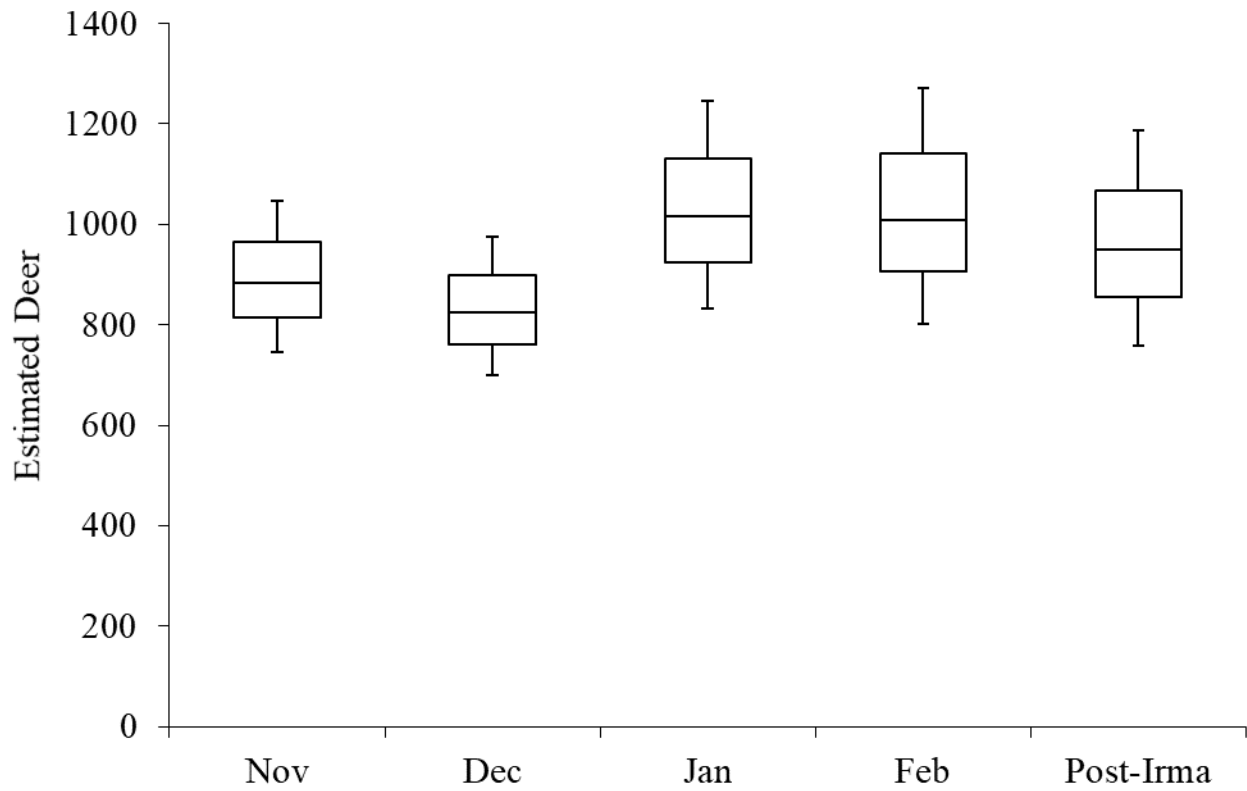


Figure 2. Estimated monthly deer numbers on Big Pine and No Name keys, pre- and post-Hurricane Irma, 2017.

Population estimates from road survey data ranges prior to Hurricane Irma ranges from 825–1,017 deer (CI = 699–1,272) on Big Pine (BPK) and No Name (NNK) keys (Fig. 2, Table 1). Road survey data suggests an average decrease in the Key deer population of -22.99% post-storm (Table 1). Average deer observed also was compared between fall 2016 and fall 2017 and estimated to range between -14 to -24% decrease (Fig. 3).

In calculating the percent population change pre- and post-storm, a conservative approach was taken in obtaining estimates. The *lower* 95% confidence interval estimate post-Hurricane Irma (759 deer) was used as a baseline, and compared to lower confidence intervals, means, and upper confidence intervals for monthly estimates for Key deer from the November 2016, December 2016, January 2017, and February 2017 estimates. Estimated percent population changes ranged from -1.32% (lower confidence intervals) to -49.47% (upper confidence interval; Table 1), with the average being approximately 22.99% (means). Comparing the upper confidence intervals pre-storm to that following Hurricane Irma, these percent population changes ranged as high as -37.94% to -67.59% (Table 1). One should expect less change in the lower confidence interval as it can only go to zero, whereas the upper confidence interval can go to infinity.

Table 1. Summary of Key deer population estimates (mean, 95% lower confidence interval [LCI], 95% upper confidence interval [UCI]) and estimated percent change pre- and post-Hurricane Irma. In calculating the percent population change pre- and post-storm, conservative estimates were obtained by comparing the LCI estimate post-Hurricane Irma (759 deer).

	Mean	LCI	UCI	Mean	LCI	UCI
Nov 16	883	745	1,047	-16.34%	1.84%	-37.94%
Dec 16	825	699	974	-8.70%	7.91%	-28.33%
Jan 17	1,017	831	1,245	-33.99%	-9.49%	-64.03%
Feb 17	1,009	801	1,272	-32.94%	-5.53%	-67.59%
			<i>Average</i>	-22.99%	-1.32%	-49.47%
Post-Irma	949	759	1,187			

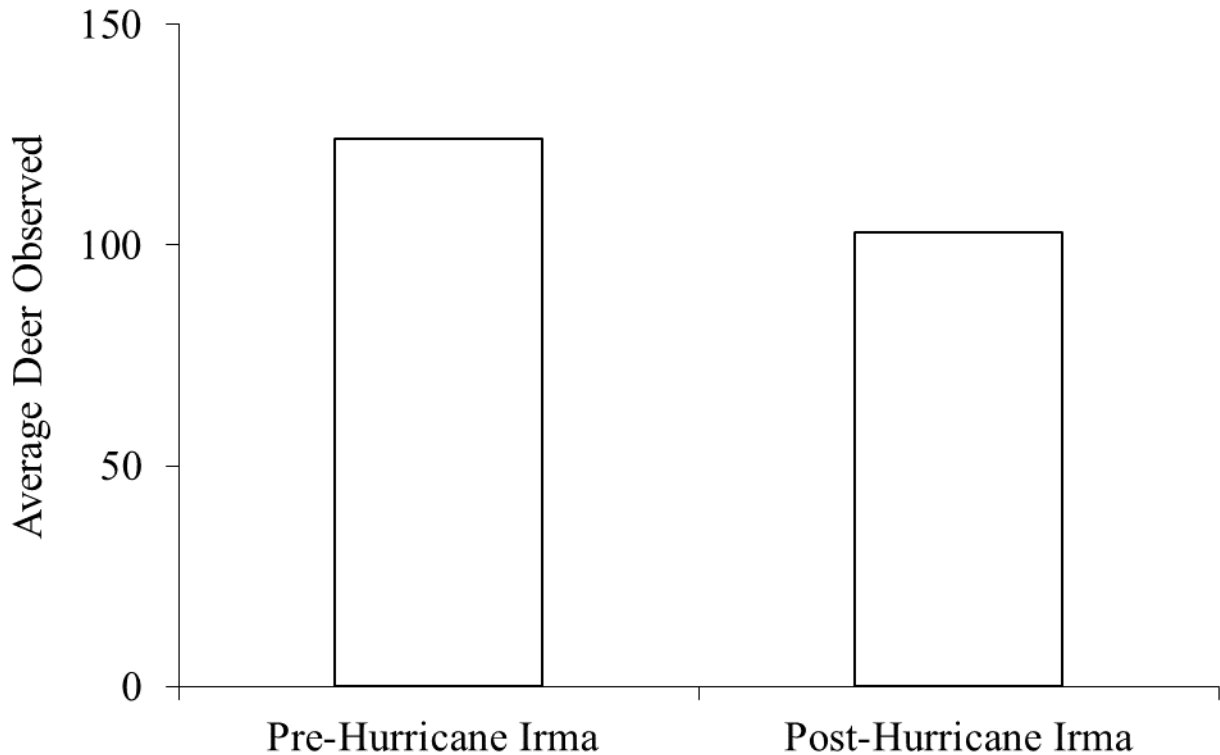


Figure 3. Average deer observed on Big Pine and No Name keys road surveys, pre- (fall 2016) and post-Hurricane Irma (fall 2017). Average deer observed decreased 14–24% between the 2-time periods.

There are several challenges in making these comparisons that should be noted. Road surveys may include sampling bias that could result in overestimate of Key deer numbers (Lopez 2001, Lopez et al. 2004). Sampling bias can occur, for example, when animals are attracted to roads (e.g., grassy shoulders, feeding, etc.). Historically, the application of road surveys in estimating Key deer population numbers have not been problematic, particularly for obtaining population estimates used in trend analyses. Following the discovery of the New World screwworm in summer 2016, increased feeding with treated bread along roadsides and in neighborhoods may have resulted in increased Key deer estimates, particularly towards the latter treatment period (Parker et al. 2017). Conversely, the population estimate obtained post-Hurricane Irma also may be subject to survey biases due to reduced visibility (i.e., trash piles, vegetation alongside roadsides) in some areas, increased visibility in other areas (i.e., reduction or elimination of dense roadside vegetation; e.g., main road on No Name Key, Fig. 4), and increased deer attraction to roadsides due to water or food searches. For these reasons, population change estimates include ranges based on estimated confidence intervals using the lower confidence limit from the post-storm estimate as a baseline (Table 1).



Figure 4. Vegetation reduction pre- (photo above) and post-Hurricane Irma (photo below, 4 weeks post-storm) on No Name Key.

RADIO-COLLARED KEY DEER SURVIVAL

A total of 30 adult female Key deer was captured and radio-collared on Big Pine and No Name keys for the screwworm incident. During summer 2017, as per the contract requirement, the process of collar removal began. Of those 30 previously collared deer, 8 deer remained collared prior to Hurricane Irma (Fig. 5) offering an opportunity to monitor deer survival post-storm.

Tracking of radio-collared deer post-Hurricane Irma found approximately 87.5% survival (8 total radio-collared, 1 mortality). The lone deer mortality was recorded within 14 days post-hurricane. Immediately following the storm, all 8 deer were found to be alive (100% survival). It is assumed that deer number 26 died to storm-related causes (e.g., dehydration).

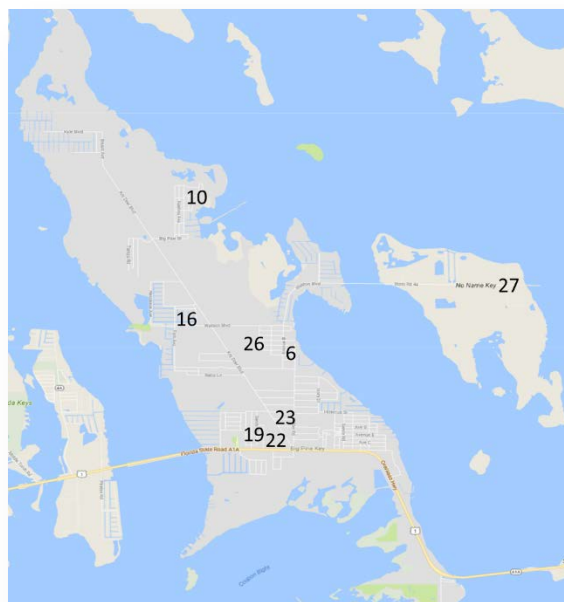


Figure 4. Radio-collared Key deer on Big Pine and No Name Key, 2017.

POPULATION STATUS

At this time, it is recommended a second population estimate be obtained in December/January to overcome some of the biases mentioned previously. This would serve to verify the impacts the hurricane had on the deer population post-storm. Specifically, we recommend the following actions for consideration:

- Continue road surveys to allow a distance estimate to be calculated. Conduct 5–10 surveys (sunset and sunrise) within 2–3-week period every 3–4 months.
- Continue to radio-track collared deer. This would serve to determine changes in ranges and habitat use and provide an index to habitat quality status at a macro-scale.
- Work with volunteer base in salinity monitoring to track freshwater availability for Key deer and the recovery of freshwater holes.

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