

Biological Information

1. Results of the Key deer abundance indices, including the calculation of the average number of deer seen.

For January 1, 2011 to December 31, 2011

Average count for full year = 61.3

The Key deer road-count index (referred to as the Key deer “census”) value is the average count from multiple road count surveys throughout the year on Big Pine Key and No Name Key. Key deer census, road count, and count index are hereafter used interchangeably. The road counts are conducted on the USFWS Survey Route, approximately monthly. The 2011 road-count value was derived from 12 standardized count surveys. For the period January through December, 2011, the census value was 61.3. The 2010 value was 57.1. The 13-year average was 43.2 as of 2000, and 58.4 as of 2011. The record high count index value for any year since 1975 (when the counts were started) occurred in 2006 (71.5).

The other index of Key deer abundance is the mortality index (human-caused deer deaths documented on Big Pine and No Name Keys). The human-caused mortality index was 153 in 2011 (this value was 113 in 2010). The 2011 count (153 human-caused) is the highest on record since the mortality counts were started in 1966). The second highest was the 2009 value (126 human-caused). Prior to 2009, 2010 and 2011, the highest mortality index (human-caused; 105) occurred in 2005.

In 2011, the total mortality count (all known mortalities from all causes) on Big Pine Key and No Name Key was 184; this value was 142 in 2010, and 155 in 2009). Prior to 2009, 2010 and 2011, the highest total count of all known mortalities (all causes) on Big Pine Key and No Name Key (132) occurred in 2003.

Over the long-term, the Big Pine Key-No Name Key mortality index (count of human-caused deaths documented over the year) and the road count index have illustrated a fairly strong direct correlation, with an overall positive trend in each. However, from 2009 to 2011, the count indices were average whereas the mortality index was high, exceptionally high in 2011. The high mortality index was due to an increase in the absolute number of road-kills (DVCs).

2. A summary of Key deer mortality information, including the calculation of the number of human-related deaths.

	Combat	Disease	Dog	Drowning	Entanglement	Poached	Deer-vehicle collision (DVC)	Miscellaneous (human causes)	Unknown	Total	DVC as % Total
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2007	1	7	0	4	1	1	83	1	15	113	73%
2008	0	2	0	4	1	1	86	2	24	120	72%
2009	0	4	0	4	2	2	117	1	25	155	75%
2010	2	7	0	7	1	0	106	1	20	144	74%
2011	2	13	6	3	3	0	138	3	16	184	75%

Human-caused mortalities shown in **bold**

The proportion of all known Big Pine and No Name Key deaths that were due to DVCs in 2011 (75 percent) was similar to 2007, 2008, 2009, and 2010 (73, 72, 75, and 73 percent, respectively). In 2011, 83% of the total known Big Pine and No Name Key mortalities were attributed to all human causes combined (79-81% in 2007-2010). The long-term average proportion (encompassing 1966-2011) is approximately 83%. From 1983 to 2001, the 13-year average attributed to human causes had gradually declined from 91% to 73%. The 13-year average attributed to human causes (79% in 2011) has risen gradually since subsequent to the 2001 low (73%). Some of the deaths for which the cause was “undetermined”, and likely even some disease deaths, undoubtedly include a substantial number of cases that may actually be attributable to human causes, particularly DVCs. However, an unknown number of both natural and human-caused deaths go entirely undetected.

Of the road mortalities in which sex was determined since 1966, approximately 39% were females (61% males). The 13-year average has ranged from approximately 37-41 percent females. The 13-year average as of 2011 was approximately 41 and 59 percent females and males, respectively.

DVCs on U.S.1 comprised approximately 63 percent of all DVCs on Big Pine Key during 2011. Of the road mortalities documented since 1966, approximately 53 percent were on U.S.1 (13-year average ending 2011, approximately 49%). The 2011 proportion (63%) was the highest value since 1996 (70%). Similarly, DVCs on U.S.1 comprised approximately 62 percent of all mortalities from all sources on Big Pine Key and No Name Key combined. Of the total mortalities documented since 1966, approximately 50 percent were on U.S.1 (13-year average ending 2011, approximately 47%). The 2011 proportion (62%) was the highest value since 1996 (66%).

The proportion of DVCs that occurred on Big Pine Key overall was approximately 98 percent (grand mean, 94%; 13-year average ending 2011, 96%). The proportion of DVCs that were attributed to No Name Key was approximately 2 percent (grand mean, 6%; 13-year average ending 2011, 4%).

The long-term proportion of Big Pine and No Name Key deaths attributed to disease (1966—2006) was approximately 2 percent. The 13-year average increased from approximately 0.1 percent in 1966 to 5 percent (6.3 individual deer) as of 2011. The proportion appears higher in recent periods (5%, 1991-2011) compared to earlier decades (less than 1%, 1966-1990). The 2011 value (approximately 7%) was consistent with the more recent average.

3. *A discussion and interpretation of mortality data.*

In 2011, as in 2009 and 2010, the mortality index was significantly higher than other years on record. However, based on available information including the two indices (summarized above), little can be surmised about the cause of the high values in 2011. Specifically, road mortalities increased, either commensurate with increased population levels recently (which may or may not be well indicated by the count index on a given year), or mortalities occurred at a higher per capita rate than in previous years (e.g., mortality index represented an actual increase in mortality, and count index represented an actual lack of population increase). If the latter is true, one evident factor that could partially explain it is that the proportion of mortalities attributed to U.S.1 was relatively high in 2011 (although this was not the case in 2009 and 2010, which had the next to highest mortality index values).

In the context of the long term record of the count index, the overall data from recent years seemed to indicate a possible reduction of the population growth rate (i.e., due to increased per capita mortality [abundance could decline], or simply a higher mortality rate with population growth [limits on the ongoing increase]) as of the late-1990s. Key deer may have attained or exceeded carrying capacity within the HCP area, which is the core of the Key deer's range. Accordingly, in the absence of new and substantial threats or major changes in habitat that result in major changes in food availability and or survival, the Key deer population within the core may fluctuate around carrying capacity (the actual value of which cannot be directly calculated). Numerical fluctuations will result from source-driven and random variation in factors including environmental influences, annual productivity of the landscape, mortality rates, and annual variation in female productivity.

DVCs remain the prominent source of Key deer mortality. Roadside feeding may exacerbate the threat of DVCs to a subset of Key deer. However, we believe that roadside feeding in recent years is somewhat less than in earlier periods. Additionally, roadside feeding only increases the probability of risk within a subset of the overall population. Though roadside feeding may directly or indirectly influence DVCs to some degree, the more profound impacts of feeding in any context are changes in Key deer social behavior, movement, dispersion, nutrition, and possibly genetic patterns.

5. *An assessment of whether the ratio of the number of human-related deaths to average deer seen remains below 1.53.*

For January 2011 through December 2011

$$\text{Ratio} = \frac{\text{human-related deaths}}{\text{average deer seen}} = \frac{153}{61.3} = 2.50$$

For January 2010 through December 2010

$$\text{Ratio} = \frac{\text{human-related deaths}}{\text{average deer seen}} = \frac{113}{57.1} = 1.98$$

For January 2009 through December 2009

$$\text{Ratio} = \frac{\text{human-related deaths}}{\text{average deer seen}} = \frac{126}{63.9} = 1.97$$

The ratio of human-related deaths (mortality index) to average number of deer seen (count index), 2.50, was well above the upper boundary of the 95% confidence interval (1.53) defined in the HCP, and substantially above the previously high value (1.98 in 2010) since the late 1980s. The 13-year average as of 2000 was 1.42 (95% CI=0.15). The 13-year average as of 2011 was 1.70 (95% CI=0.17). Compared to either of these multi-year ranges, the ratios in 2009, 2010, and 2011 were well outside the stated confidence limits.

8. *A summary of reported Lower Keys marsh rabbit road mortality.*

In both 2006 and 2007, the occurrence of at least one road kill on Big Pine Key was verbally reported by local naturalists, but not otherwise substantiated. In 2008, at least two mortalities were detected and the carcasses retrieved. One was killed by a vehicle on Wilder Road, along a stretch where a rabbit had previously been seen by USFWS personnel fleeing from a cat. In 2009, one was taken from Big Pine Key to a veterinarian, where it died. It reportedly involved a vehicle strike, but no other details were conveyed. A necropsy conducted on that mortality suggested that a predation attempt was likely, but that subsequently, a vehicle strike may have occurred as well. These observations indicate, as per the literature on Lower Keys marsh rabbits, that cats continue to suppress rabbit populations and that vehicle strikes are an additional threat. In 2010, no road mortalities were detected on Big Pine, No Name, or other areas outside of Naval Air Station Key West. In late February, 2011, one LKMR road mortality occurred on and was retrieved on Key Deer Blvd., Big Pine Key. As of February, 2012, one LKMR road mortality occurred on and retrieved from Key Deer Blvd., Big Pine Key. Detection and documentation would likely be enhanced if a wide array of citizens recognized and effectively reported such cases.