Biological Information

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

For January 1, 2010 to December 31, 2010`
Average count for full year = 57.1

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 2010 road-count value was derived from 10 standardized count surveys. For the period January through December, 2010, the census value was 57.1. The 2009 value was 63.9. The 13-year average was 43.2 as of 2000, and 57.7 as of 2010. The record high index value for any year since 1975 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). In 2010, the total mortality count on Big Pine Key and No Name Key was 144 (all known mortalities; this value was 155 in 2009). The mortality index was 115 (human-caused; this value was 126 in 2009). The 2009 value remains the highest on record since 1966, and the 2010 death count the second highest. Prior to 2009 and 2010, highest mortality index (105) occurred in 2005, and the highest total count (132) occurred in 2003.

Over the long-term, the Big Pine Key-No Name Key mortality index (count of deaths documented on over the year) and the road count index have illustrated a moderately strong direct correlation, with an overall positive trend in each. However, in 2010, the count index was average whereas the mortality index was very high. In 2009, similarly, the count index was roughly average and the mortality index was high. The high mortality index was due to road-kills, with an increase of at least 20 road-kills compared to 2007 or 2008 (Table XYZ, below). However, mortalities in 2009 had exceeded 2007—2008 levels by 30.

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

	Cmbt	Diseas	**Dog**	**Drown**	**Entan**	**Poach**	**Road**	**Misc***	Unk	Total	Road as % Total
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%

Human-caused shown in **bold** (*Miscellaneous, known human causes)

The proportion of all known Big Pine and No Name Key deaths that were due to road-kills in 2010 (74 percent) was similar to 2007, 2008 and 2009 (73, 72, and 75 percent, respectively). In 2010, 80% of all known Big Pine and No Name Key mortalities were attributed to all human causes combined (81% in 2009). The long-term average proportion (encompassing 1966-2010) is approximately 81%. The 13-year average attributed to human causes (78% in 2010) has risen gradually since 2001 (73%). From 1983 to 2000, the 13-year average attributed to human causes had gradually declined from 91% to 74%. 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 road-kills. However, an unknown number of both natural and human-caused deaths go entirely undetected. Of the road mortalities in which sex was determined, approximately 43% were females (57% males) in 2010 (42% female, 58% male in 2009). The 13-year average as of 2010 was similar, about 39 and 61 percent females and males, respectively. Road-kills on U.S. comprised approximately 43 percent of all human-caused mortalities on Big Pine Key. Road-kills on U.S. comprised approximately 34 percent of all mortalities from all sources on Big Pine Key and No Name Key combined. The proportion of all Big Pine Key road-kills that were attributed to on U.S. 1, approximately 49 percent, is similar to the average over the last 13 years (48%, 1998—2010). The proportion of road-kills that were attributed to No Name Key was approximately 2 percent (4%, 1998; 13-year range, approximately 1—7%). The proportion of road-kills that were attributed to Big Pine Key, 98%, was similar to the average over the last 13 years (96%, 1998—2010).

The long-term proportion of Big Pine and No Name Key deaths attributed to disease (13-year average as of 2010, approximately 5%) appears higher in that recent period compared to earlier decades (approximately 1%, 1966—2006). The 2010 value (approximately 5%) was consistent with the more recent average.

3. A discussion and interpretation of mortality data.

In 2010, as in 2009, 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 2009 and 2010. 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 proportional rate than in previous years (e.g., if population levels are not actually up to the extent indicated by the recent count indices).

In the context of the long term record of population indices, the overall data from recent years may suggest a partial reduction of the population growth rate (i.e., due to increased per capita mortality, or, mortality rates proportional to growth) as of the late-1990s. Key deer 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 mortality rates, environmental influences, annual productivity of the landscape, and annual variation in female deer productivity.

Road-kills remain the greatest source of mortality to key deer. Roadside feeding may exacerbate threats to a subset of Key deer associated with vehicle collisions. However, we believe that roadside feeding in recent years is somewhat less than in earlier periods, and that roadside feeding only increases the probability of risk within a subset of the overall population. The overall impacts of feeding itself, which may directly or indirectly influence road kills to some degree, likely affects more profound changes in of 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 2010 through December 2010

$$\text{Ratio} = \frac{\text{human-related deaths}}{\text{average deer seen}} = \frac{115}{57.1} = 2.01$$

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), 2.01, was well above the upper boundary of the 95% confidence interval (1.53) defined in the HCP. The 13-year average as of 2000 was 1.42 (95% CI=0.15). The 13-year average as of 2009 was 1.62 (95% CI=0.17). Considering any of these multi-year ranges as a baseline, the ratio in both 2009 and 2010 were significantly high and 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 seeing 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 remain a substantial 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. Detection and documentation would likely be enhanced if a wide array of citizens recognized and effectively reported such cases.