Biological Information

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

For January 1, 2016 to December 31, 2016
Average count for full year = 53

The Key deer road-count index value is the average count from multiple road count surveys throughout the year on Big Pine Key and No Name Key. It has also been referred to as the Key deer "census", road count, and count index; these labels are often used interchangeably. The road counts are conducted on the USFWS survey route, monthly in most years. Recent changes to protocols require a complete road count surveys once every two months, or 6 times annually. Initially in 2016, 5 sunset surveys were completed by USFWS personnel (January, March, May, July and September). Due to the recent outbreak of New World Screwworm, an emergency census was performed by researchers from Texas A&M University. This census consisted of 8 consecutive days of survey efforts between 27 October and 3 November following the standard route but included both a sunrise and sunset survey. These efforts were used to determine post-screwworm mortality estimates of density and population size, as well as potential future impacts and resulting management decisions for the Key Deer herd. USFWS personnel have continued the sunrise /sunset surveys on a once weekly basis to gather data during the incident. Although these three surveys use differing temporal frequencies, the resulting average counts are within 5% of each other. Summaries of the count indices for 2016 and values from previous years for comparison can be found in Table 1 of this report.

Year	Number of Surveys	Average Count
2010	10	57
2011	11	61
2012	10	59
2013	5	68
2014	6	67
2015	5	52
2016 USFWS Pre-screwworm (Jan-Sept)	5	54
2016 TAMU (Nov)	16	54
2016 USFWS Remainder (Dec)	10	51

Table 1: Summary of Key Deer recorded during road surveys and averages for 2010-2016. The three temporally explicit surveys in 2016 are listed chronologically.

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

The other index of key deer abundance is the mortality index (deer deaths documented on Big Pine and No Name Keys [core]). In 2016, the total mortality count (all known mortalities from all causes) on Big Pine Key and No Name Key was 277. This total is the highest recorded, and

was due to the number of deaths attributed to the outbreak of New World Screwworm. Of the 130 recorded deaths from screwworm in 2016, 126 (97%) occurred within the core islands of Big Pine and No Name Key. Non-screwworm-related deaths in the core were 151 individuals. Mortalities caused by deer-vehicle collisions (DVC) in the core area were 109 individuals (72%). Additional human involved (anthropogenic) deer mortalities such as poaching, drowning, and entanglement accounted for 10 additional mortalities (7%) on Big Pine and No-Name Keys. The remaining 32 mortalities are attributed to various causes such as combat inflicted injuries, natural disease (exempting screwworm), or undetermined causes. A table of total mortalities and causes from 2016 and previous years for comparison can be found in Table 2 of this report.

Year	Cause of Mortality										
	Combat	Disease	Dog	Drowning	Entanglement	Human Misc.	Poaching	Screwworm	DVC	Undet.	Total
2010	1	7	0	7	3	0	0		103	20	141
2011	2	12	6	3	3	2	0		131	16	175
2012	4	17	2	3	5	0	0		151	15	197
2013	0	8	0	5	2	0	0		109	27	151
2014	0	3	3	5	1	0	1		121	13	147
2015	1	6	1	2	2	0	4		75*	13	104
2016	0**	8	0	4	3	3	0	126	109	24	277

Table 2: Detailed mortality information for core areas of Big Pine and No Name Keys from 2010-2016. DVC is deer-vehicle collision or road mortality. *****Variation in reported deer-vehicle collisions may be due to reporting error. **Combat injuries in 2016 resulted in screwworm infestation and fatalities.

3. An assessment of the ratio of the number of anthropogenic (human-related) deaths to average deer seen

In 2016, the ratio of human-related deaths to average number of deer seen was 2.21, which is greater than the upper boundary of the 95% confidence interval (1.53) defined in the HCP (Table 3).

Year	Anthropogenic Deaths	Average Deer Seen	Ratio
2010	113	57	2
2011	145	61	2.4
2012	161	59	2.7
2013	116	68	1.7
2014	131	67	2
2015	84	52	1.6
2016	119	53	2.24

Table 3: Ratio of anthropogenic (human-related) deaths to average deer seen during an annual census from 2010-2016.

4. A discussion and interpretation of census and mortality data

In 2016, the average number of deer seen during road surveys performed during 2016 was 53. This number is nearly identical to the previous years' average count. Previous years' surveys were slightly higher than the last two survey years. Speculatively, this variation in detections

may be due to a combination of low availability of fresh water during the unusually dry summer months of 2015 and 2016, disease prevalence, and observer bias.

In 2016, there were 277 mortalities of all causes recorded for Big Pine and No Name Keys. The 126 additional deaths from New World Screwworm is a significant event for the Key Deer, and estimates place the additional reduction of the herd for 2016 at around 15%. Researchers have determined that the loss of mostly breeding age males during the incident does not currently represent a significant threat to the future of the Key Deer population. The highly female-biased population, large male range, and polygamous nature of breeding males requires only 38 males to ensure the continued population growth on the core islands of Big Pine and No Name Key. Surveys performed indicate that there are at least 4 times as many breeding males currently remaining. At the time of this report, the monitoring, treatment, and response by the agencies involved is projected to continue through the summer of 2017. The considerable increase in anthropogenic mortalities between 2015 and 2016 does not represent a trend, and errors in reporting during 2015 are likely the cause. Refuge staff was dramatically reduced by scheduled staff transitions during the beginning of 2015, and the introduction of replacement staff was gradual throughout the year. In addition, a cooperative agreement with both county and state law enforcement officials to augment and improve the response to calls regarding deer injury and mortality was being developed.

5. A summary of reported Lower Keys marsh rabbit road mortality.

One lower Keys marsh rabbit mortality attributed to anthropogenic causes occurred in 2016. The individual was discovered the morning of June 10, 2016 by refuge personnel on a Big Pine Key road, the cause of death was determined to be from a vehicle strike.